

# NV9649

NV9000 Control Panel

## User's Guide

UG0076-00

30 Apr 2013



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A **BELDEN** BRAND

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- Document Revision: 1.0
- Document Part Number: UG0076-00
- Software Version: 6.3.0

### Change History

Rev.	Date	ECO	Description	Approved
1.0	24 Apr 13	18826	Initial release	D.Cox

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

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## **Important Safeguards and Notices**

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

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### **WARNING**

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

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## Symbols and Their Meanings



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



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



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



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



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



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## General Warnings

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

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

## General Cautions

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

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



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## Table of Contents

<b>1</b>	<b>Preface .....</b>	<b>1</b>
	Chapter Structure .....	1
	The PDF Document .....	1
	Terms, Conventions and Abbreviations .....	2
	Other Documentation and Software .....	2
<b>2</b>	<b>Introduction .....</b>	<b>3</b>
	Summary .....	3
	Function Buttons and Displays .....	4
	Display Fields .....	5
	Flags .....	6
	Tally Interface .....	6
	Modes of Operation .....	6
	'Panel Server' Mode .....	6
	'NV9609 Panel' Mode .....	7
	'LCD XY/MD' Mode .....	7
	Additional Modes .....	8
	Level Mode .....	8
	Secondary Modes .....	8
	Special Modes .....	8
	Other NV9649 Functions .....	9
<b>3</b>	<b>Installation.....</b>	<b>11</b>
	Package Contents .....	11
	Installation .....	12
	Installing Software and Documentation.....	13
	Initialization .....	13
	Testing .....	14
<b>4</b>	<b>Configuration .....</b>	<b>17</b>
	Summary .....	17
	Adding a Panel to an NV9000 Configuration .....	17
	NV9649 Panel Configuration Page(s).....	19
	Common Page Features .....	19
	Panel Graphic .....	19
	GPIO Section .....	20
	Commitment Buttons .....	20
	Clear Configuration Button .....	20
	Common Configuration Tasks.....	20
	Configuration Page for the Server Model.....	21
	Characteristics of Server Mode.....	21
	Server Mode Panel Options .....	22

Table of Contents

---

Configuration Page for the LCD XY/MD Model .....	24
Characteristics of LCD XY/MD mode .....	25
The Button Page Table .....	25
LCD XY/MD mode Panel Options .....	26
Button Page List .....	30
Configuration Page for the NV9609 Model .....	31
Characteristics of NV9609 Mode .....	32
NV9609 Mode Panel Options .....	32
Checkbox Options .....	33
Button Definitions .....	34
Button Specification .....	35
Button Functions for Server Mode .....	36
Category Lists .....	40
Button Functions for LCD XY/MD mode .....	41
'Edit Navigation Button' Dialog .....	48
Automatic Fill Options .....	49
Selection Buttons .....	51
Selection Button Behavior .....	51
Selection .....	52
Display Indexes .....	52
Single-Destination "Mode" .....	53
Multi-Destination Configuration .....	53
How to Configure MD Devices .....	53
MD Destination Options .....	55
Button Functions for NV9609 Mode .....	55
Tally (GPIO) Window .....	62
Global Navigation .....	62
Names .....	63
Referencing a Suffix Template .....	63
Referencing a Navigate Template .....	64
Composing Suffix Templates .....	65
Template Changes .....	65
Composing Navigate Templates .....	65
Template Changes .....	66

**5 Operation..... 67**

Summary .....	67
Buttons and Button Legends .....	68
Behavioral Models .....	69
'Panel Server' Mode .....	69
'NV9609 Panel' Mode .....	70
LCD XY/MD Model .....	70
Additional Modes .....	71
Level Mode .....	71
Secondary Modes .....	71
Special Modes .....	72
Operating Concepts .....	72
Levels .....	72
Breakaway .....	72
Level Mode .....	72
Level Grouping .....	73
Hold .....	73
Breakaway .....	73
Multi-Destination Mode .....	73
Category Selection .....	73

---

Lock, Protect, and Release .....	74
Takes .....	74
Name Sets .....	75
Broadcast Routes .....	75
Making Broadcast Routes .....	75
Removing Broadcast Routes .....	76
Data Routing .....	76
Automatic Data Routing .....	76
Manual Data Routing .....	76
Semi-Automatic Data Routing .....	76
Button Functions .....	77
Buttons for the Server Model .....	77
Assign .....	77
Broadcast .....	77
Category .....	77
Chop .....	78
Clear .....	78
Destination Lock .....	78
Destination Mode .....	79
Destination Protect .....	79
Quick Source .....	79
Salvo .....	79
Source .....	79
Source Mode .....	80
Src/Dst Mode .....	80
Take .....	80
Take All .....	80
Undefined .....	80
Buttons for the LCD XY/MD Model .....	81
Back .....	81
Broadcast .....	81
Category .....	81
Chop .....	82
Clear Preset .....	82
Default State .....	82
Destination .....	83
Destination Lock .....	83
Destination Protect .....	83
Free Source .....	83
Forward .....	83
Global Navigate .....	83
Hold .....	84
Level Map .....	84
Menu .....	85
Name Set Toggle .....	85
Navigate .....	85
Page Down .....	85
Page Up .....	86
Panel Lock .....	86
Preset Release .....	86
Previous Source .....	86
Quick Source .....	86
Salvo .....	87
Save Preset .....	87
Selection .....	87
Source .....	88

# Table of Contents

---

Source/Destination .....	88
Source is Master .....	88
Take .....	89
Undefined.....	89
X-Y Display .....	89
XY/MD Mode .....	89
Buttons for the NV9609 Model.....	90
Broadcast .....	90
Category .....	90
Chop .....	91
Clear .....	91
Destination .....	91
Destination Mode .....	91
Destination Lock .....	91
Destination Protect .....	92
Free Source .....	92
Level .....	92
Level Mode .....	92
Menu .....	93
Name Set Toggle.....	93
Page Down .....	93
Page Up .....	93
Panel Lock .....	94
Previous Source .....	94
Quick Source .....	94
Salvo .....	94
Source .....	94
Source Mode .....	94
Src/Dst Mode.....	95
Source is Master.....	95
Take .....	95
Undefined.....	95
Operating Methods .....	96
Client-Server Model Procedures .....	96
Procedure A — Preset a Source Using the Knob .....	96
Procedure B — Preset a Source Using a Keypad.....	97
Procedure C — Assign a New Source to a NV9649 Source Button.....	97
Procedure D — Assign a New Destination to a NV9649 Control Unit.....	97
Procedure E — Takes Using Source Buttons .....	98
Procedure F — Takes Using Quick Source Buttons .....	98
Procedure G.....	98
Salvo Mode .....	98
Menu Mode .....	99
Software Versions .....	99
User .....	99
Panel .....	100
LCD Control.....	100
Setup Mode .....	101
Panel ID.....	101
Software Versions .....	102
Panel Test.....	102

<b>6</b>	<b>GPIO</b> .....	<b>105</b>
	The Interface.....	105
	Input.....	105
	Output.....	106
	GPIO Configuration Concepts.....	106
	The GPIO Section of the NV9649 Page.....	106
	Configuring Outputs.....	107
	Configuring Inputs.....	109
<b>7</b>	<b>Technical Details</b> .....	<b>111</b>
	Power Specifications.....	111
	NV9649 Specifications.....	112
	Environmental Specifications.....	113
	Defaults.....	113
	Initial Panel State.....	113
	Configuration Page.....	113
	DHCP.....	113
	Drawings.....	114
<b>8</b>	<b>Misc. Topics</b> .....	<b>117</b>
	LCD Buttons.....	117
	Power Cord Retention.....	117
	Ordering Information.....	119
	<b>Glossary</b> .....	<b>121</b>
	<b>Index</b> .....	<b>123</b>
	<b>Contact Us</b> .....	<b>131</b>

## Table of Contents

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# 1

## Preface

Chapter 1 is an introduction to the NV9649 User's Guide.

### Topics

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

## Chapter Structure

The following chapters provide detailed information regarding the NV9649 Control Panel:

- Chapter 1, [Preface](#), (this chapter) outlines ways to use this guide.
- Chapter 2, [Introduction](#), provides a functional description of the NV9649.
- 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](#) is also provided for your reference.

## The PDF Document

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

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

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

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#### Note

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

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

## Terms, Conventions and Abbreviations

The following conventions are used throughout this guide:

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

The following terms and abbreviations are used throughout this guide:

- The term "control panel" refers to the NV9649 control panel and to NV96xx control panels, in general.
- "High tally" means that a button is brightly illuminated. High-tally usually means that the button function is selected or active.
- "Low tally" means that a button is illuminated at low intensity. Most buttons assume a low tally state until selected.
- "SE" is an abbreviation used in this document for NV9000-SE Utilities.

## Other Documentation and Software

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

- NV9000 Quickstart Guide.
- 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 router control systems.

# 2 Introduction

Chapter 2 provides a functional description of the NV9649.

## Topics

- [Summary](#) ..... 3
- [Function Buttons and Displays](#) ..... 4
- [Tally Interface](#) ..... 6
- [Modes of Operation](#) ..... 6
- [Additional Modes](#) ..... 8
- [Other NV9649 Functions](#) ..... 9

## Summary

The NV9649 is a 2RU half-width control panel, approximately 3” deep. Two NV9649s can be mounted in a rack side-by-side with a rack mounting kit (part number NV9649-48-RMK).

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

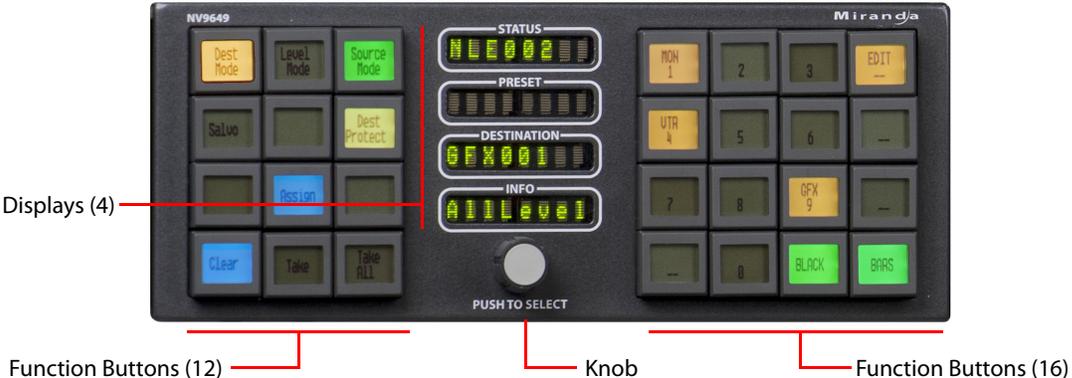


Fig. 2-1: NV9649 Front

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

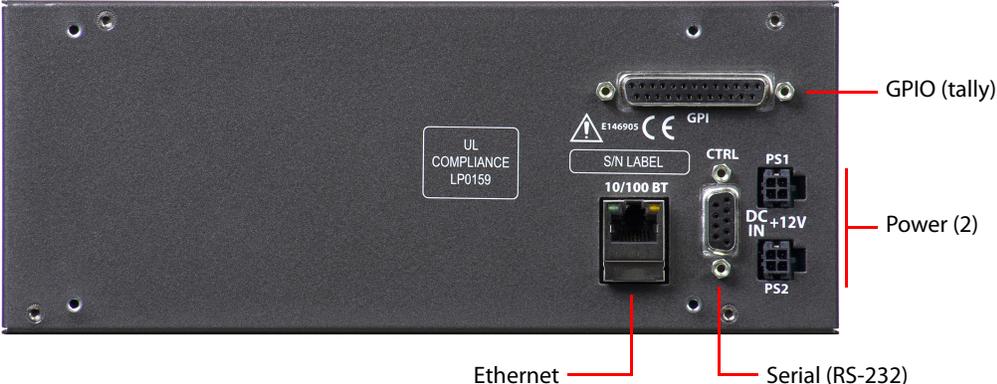


Fig. 2-2: NV9649 Rear

The NV9649 has 3 very different operating modes (or behavioral models):

- ‘Panel Server’ mode. For brevity, we can call this “server” mode.

When the panel is in “server” mode, it operates in conjunction with a number of NV9648 control panels. The NV9649 is the “server” and the NV9648s are the “clients.” The NV9649 and the NV9648s combine to form, in essence, a larger panel — actually a cluster of many small panels. The NV9649, being the server, can change which sources and destinations the NV9648s can use. See [‘Panel Server’ Mode](#) on page 6.

- ‘NV9609 Panel’ mode. For brevity, we can call this “NV9609” mode.

When the panel is in “NV9609” mode, it functions exactly like an NV9609, but with buttons that have LCD legends instead of backlit simple buttons.

(You can refer to the *NV9609 Users Guide* for reference.)

In this mode, the panel operates standalone, without regard to any NV9648s.

- ‘LCD XY/MD’ mode.

In this mode also, the panel operates standalone, without regard to any NV9648s.

When the panel is in “LCD XY/MD” mode, it has a larger function set than it does when operating in the other two modes.

The panel’s buttons are used in a hierarchical fashion: pressing a ‘navigation’ button causes the panel to display a new set of button functions or a “button page.” There can be many such pages, organized in a configurable tree structure.

The operator can switch the panel between “X-Y mode” and multi-destination (MD) mode. In X-Y mode, the operator can perform takes (and locks) on individually selected levels. In MD mode, takes occur on all levels, but the operator can perform takes to multiple destinations simultaneously. See [‘LCD XY/MD’ Mode](#) on page 7.

The panel’s 28 buttons and 4 displays are used in very different ways in the 3 models.

## Function Buttons and Displays

At the front, the panel has 2 button sections, 12 buttons on the left and 16 on the right. Between the sections are four 8-character displays and a knob. Refer to Figure 2-1. You can turn the knob to scroll through device categories and device lists. Pressing the knob selects the category to which you have scrolled. The knob moves in about a millimeter when you press it and you can feel the knob click.

Each function button incorporates a 64×32 LCD. The buttons’ LCDs can be illuminated in 7 colors: red, green, yellow, blue, purple, amber, and grey. Each LCD can be off, bright (high-tally) or dim (low-tally) depending on what the operator is doing and what functions are selected.

A button’s LCD (when it is not off) presents the button legend. Some button legends are fixed. Source and destination buttons, for example, show the source or destination mnemonic. Some button legends vary. Selection buttons have 3 lines of text, the top line displaying the current source, the middle line displaying the preset source, and the bottom line displaying the level (in X-Y mode) or MD device in MD mode.

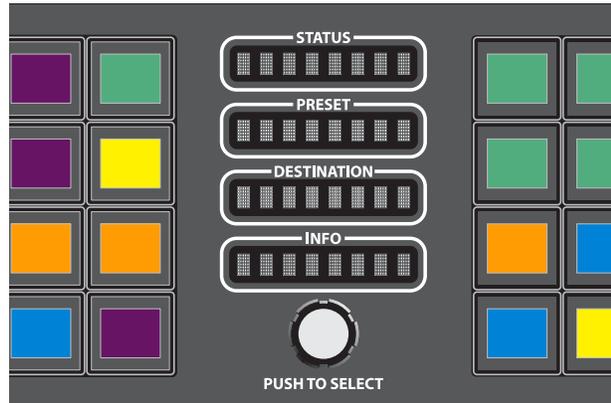
The buttons and displays are used differently in the 3 operating modes.

The displays generally show, respectively, from top to bottom, (1) the current source, (2) the preset source, (3) the selected destination, and (4) level information.

When the panel is in LCD XY/MD mode, the 28 function buttons form a “button page” in a hierarchical structure of button pages.

## Display Fields

The display area has four separate 8-character display fields:



These are their functions:

- Status.

The 'Status' field shows the source that is routed to the currently selected destination, which is identified in the 'Destination' field.

If the operator is scrolling through levels in *level mode*, the 'Status' field changes to indicate the source for each level of the current destination. Level mode is available only when the panel is operating under the NV9609 model. See [Level Mode](#) on page 8.

- Preset.

The 'Preset' field has two different functions:

(1) It shows the source that will be routed to the currently selected destination when the operator presses the 'Take' button or will be assigned to a client .

(1) It shows the source that will be assigned to a source button of a client NV9648 when the panel is operating under the 'Panel Server' model.

The 'Preset' field also shows source or destination categories and source or destination devices during category selection. See [Category Selection](#) on page 73.

- Destination.

The 'Destination' field shows the currently selected destination.

- Information.

Under normal operating conditions, the 'Information' field displays the level (or levels) that will be changed in the next take. The field displays either “All Level” or the name of a selected level.

When the panel is operating under the NV9609 or LCD XY/MD model, the 'Status', 'Preset', and 'Destination' fields can show either alternate device names (from a name set) or system mnemonics 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.) The panel does not use name sets under the server model.

## Flags

When a destination is in breakaway, the 'Status' field indicates the breakaway with an asterisk in its eighth character position.

- ▲ This does not occur when the panel is in 'Panel Server' mode.
- ▲ The asterisk will obscure the last character of the source name if the name has 8 characters.

## 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 or off. 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 NV9649 behavior that depends on the tally inputs.

What you connect to the tally interface is, of course, up to you. Miranda 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 labeled a "GPI interface."

See chapter 6, [GPIO](#), on page 75, for complete detail.

## Modes of Operation

The NV9649 has 3 operating modes (or behavioral models). The panel's 28 buttons and 4 displays are used in very different ways in the 3 modes.

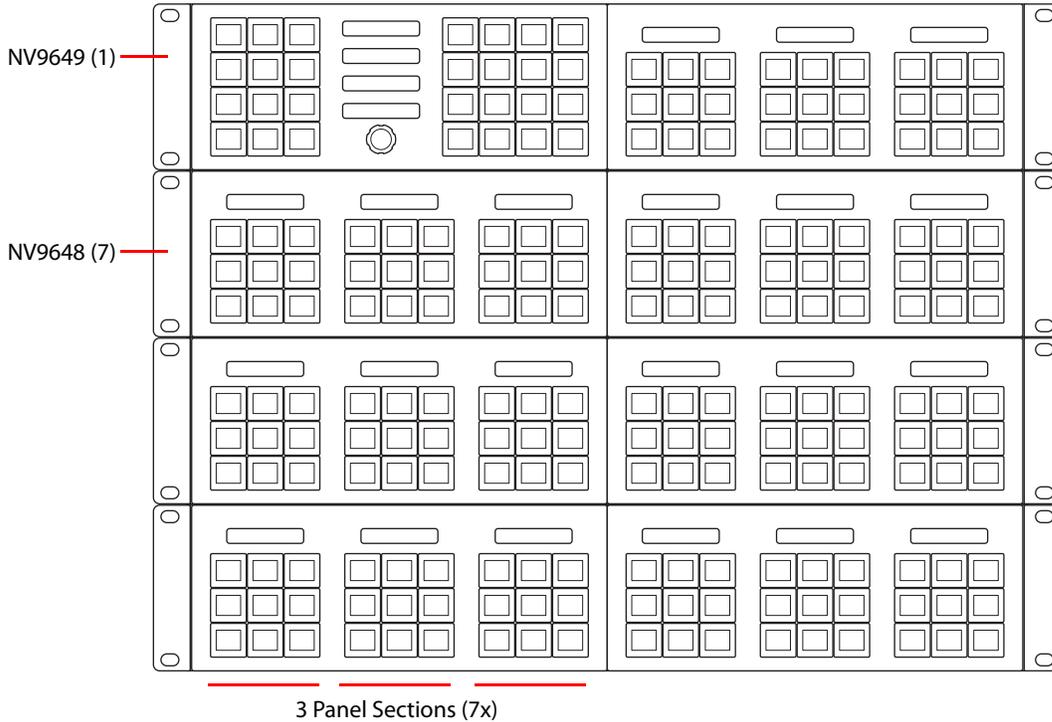
### 'Panel Server' Mode

When the panel is in "server" mode, it operates in conjunction with a number of NV9648s. The NV9649 is the "server" and the NV9648s are the "clients." The NV9649 and the NV9648s combine to form, in essence, a larger panel—actually a cluster of many small control units. The NV9649, being the server, can change which sources and destinations the NV9648s can use.

Each NV9648 has 3 identical sections and, in client mode, each section functions as a complete and separate control unit, unrelated to any other NV9648 section. Each display shows a destination chosen by the operator of the NV9649. (The NV9649 can also assign sources to the source buttons of individual NV9648 control units.)

The display in each of the clients' control units shows the control unit's current source when the NV9649 is in *source mode* and show the control unit's destination when NV9649 is in *destination mode*. See [Special Modes](#) on page 8.

Here is an example of a system with an NV9649 and 7 NV9648 clients:



In this example, there are 21 control sections in addition to the controls of the NV9649. At any moment, the operator can route to 21 destinations. The operator can assign different destinations to the control units at any time. The function buttons in each individual control unit apply only to the destination assigned to that control unit.

### 'NV9609 Panel' Mode

When the panel is in "NV9609" mode, it functions exactly like an NV9609, but with buttons that have LCD legends instead of backlit simple buttons.

In this mode, the panel operates standalone, without regard to any NV9648s.

Please refer to the *NV9609 Users Guide* for more detail.

### 'LCD XY/MD' Mode

When the panel is in LCD XY/MD mode, it operates standalone, without regard to any NV9648s, and has a moderately richer function set than a panel in the other two modes.

The panel's buttons can be used in a hierarchical fashion: pressing a 'navigation' button causes the panel to display a new set of configured button functions, called a "button page." There can be many such pages, organized in a configurable tree structure.

The operator can switch the panel between "X-Y mode" and multi-destination (MD) mode. In X-Y mode, the operator can perform takes (and locks) on individually selected levels for a single destination at a time. In MD mode, takes occur on all levels, but the operator can perform takes to multiple destinations simultaneously.

In LCD XY/MD mode, the panel supports the use of multiple 'selection' buttons. When the panel is in X-Y mode, the selection buttons select levels. When the panel is in MD mode, the selection buttons select MD devices (which are destinations). If there are more levels (or more MD devices) than there are selection buttons, the operator can press a 'Page Up' or 'Page Down' button to scroll through the list of levels (or, in MD mode, the list of MD devices).

## Additional Modes

### Level Mode

When the panel is operating under the NV9609 model, operators can switch the panel in and out of *level mode* (if the panel has a 'Level Mode' button). Level mode allows you to select one of the destination's levels (by scrolling). A take in level mode is a single-level breakaway.

When the panel is **not** in level mode, takes occur on either all levels or selected levels of the current destination. Takes on all levels are said to be "all level."

If the panel has multiple 'Level' buttons, operators can perform multiple-level breakaway.

### Secondary Modes

Additional but secondary modes of panel operation are:

- Setup mode—where the NV9649 is freshly powered up, but disconnected from the network. In this mode, you can preset the NV9649's panel ID and perform a few diagnostic tasks. See [Setup Mode](#) on page 101
- Salvo mode—pressing a salvo button places the NV9649 in salvo mode, where it is expected that the operator will choose a salvo and then the 'Take' button to executes a salvo. (The duration of a salvo is indeterminate, but usually short.) See [Salvo Mode](#) on page 98.
- Menu mode—pressing a menu button places the NV9649 in "menu" mode. In menu mode, the buttons lose their normal functions and become part of a menu that changes as needed during menu operation. See [Menu Mode](#) on page 99. (The panel does not have a menu in server mode.)

When the panel is not in setup mode, salvo mode, or menu mode, we say it is in *normal mode*. Normal mode might or might not include level mode.

### Special Modes

When the panel is in server mode or NV9609 mode, two additional modes can be applied:

- Source mode—when the operator places the panel in source mode, category buttons produce source lists and, under server mode, operations involving NV9648s refer to sources.
- Destination mode—when the operator places the panel in destination mode, category buttons produce destination lists and, under server mode, operations involving NV9648s refer to destinations.

When the panel is in LCD XY/MD mode, one additional mode can be applied:

- Hold mode—when the operator has pressed a 'Hold Preset' button. See [Selection Buttons](#) on page 51.

## Other NV9649 Functions

The NV9649 can be configured to perform the following additional functions:

- Previous source and free source.
- System salvos.
- Lock/protect/release for destinations.
- Device selection using categories and indexes or suffixes.
- Multiple- and single-level breakaways.
- Broadcast data routing.



# 3 Installation

Chapter 3 provides a functional description of the NV9649.

## Topics

<a href="#">Package Contents</a> .....	11
<a href="#">Installation</a> .....	12
<a href="#">Installing Software and Documentation</a> .....	13
<a href="#">Initialization</a> .....	13
<a href="#">Testing</a> .....	14

## Package Contents

If you have ordered one or more NV9649 control panels from Miranda, inspect the shipping container for damage. If you find any container damage, unpack and inspect the contents. If the contents are damaged, notify the carrier immediately.

As you unpack the shipping container, look for the packing slip and compare it against the contents to verify that you received everything as ordered. If anything is missing (or if you find equipment damage unrelated to shipping), please contact technical support. Refer to [Miranda Technical Support](#) on page 101.

Depending on your order, the NV9649 items that can ship include:

- One or more NV9649 control panels.
- One or two power supplies for each NV9649, with straps that secure the AC power cords to the power supplies.
- One or more rack-mounting kits (NV9649-48-RMK).
- Optional WC0053 breakout cable.

The package does not contain network cables, serial cables, or mounting screws. (The rack-mounting kit, if present, does contain screws.)

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

This document *does* address the relationship of the NV9649 to the NV9649. Otherwise, this document does *not* address the shipment or installation of any other equipment or software that can be used in conjunction with the NV9649 (including the NV9000 system controller, NV915 system controller, other NV96xx control panels, EC9700 GUI, EC9710 GUI, and configuration programs such as UniConfig 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

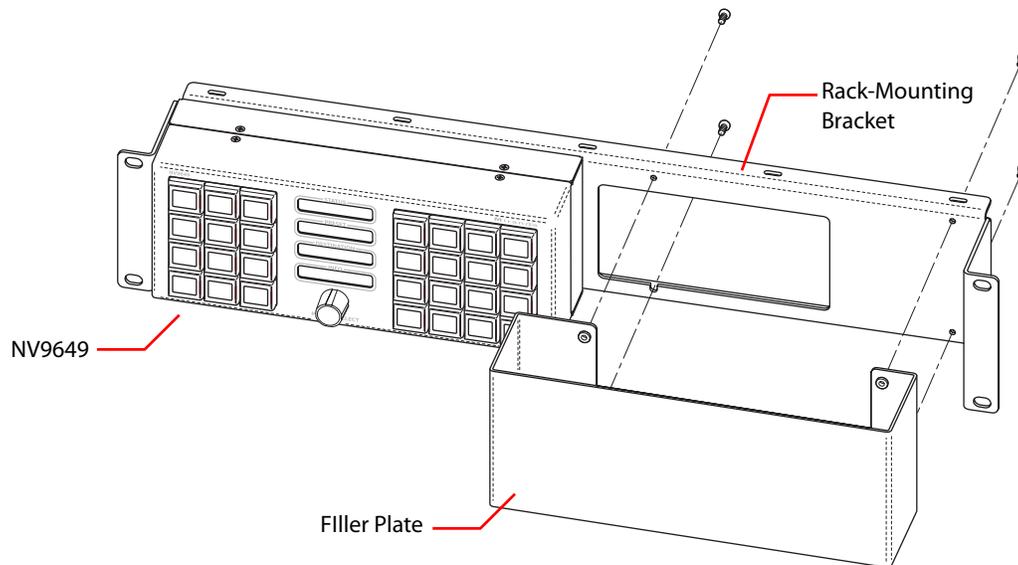
Follow these steps to install a NV9649 control panel:

- 1 Mount, and secure, the panel(s) in the rack.

The NV9649 is designed to mount in a 19" rack. Rack-mounting is not a requirement.

The NV9649 is a 2RU half-width panel: you can install two of them side by side in a rack. Rack mounting (either one or two NV9649s) requires a rack mounting bracket such as the one in Miranda's NV9649-48-RMK (rack-mounting kit). The kit contains two parts, (1) the bracket itself and (2) a filler plate for brackets that will hold only one panel. The kit provides 8 mounting screws for attaching the panels to the bracket.

The NV9649 mounts on the kit's bracket using 4 screws. The bracket has two apertures in which the connectors at the rear of the panel are exposed:



The filler plate and the NV9649 attach to the bracket in the same way. Each may be placed on either side of the bracket.

See [Drawings](#) on page 83 for bracket dimensions.

Once the panel(s) are attached to the bracket, you can place the bracket in position in your rack. Attach the bracket to the rack frame, using screws appropriate for your rack. The bracket'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 NV9649.
- 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 81 for details on the PS0001 power supply. See also [Power Cord Retention](#) on page 87.

- 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 75 for detail regarding the tally interface.

## Installing Software and Documentation

This document is available through the Miranda web site.

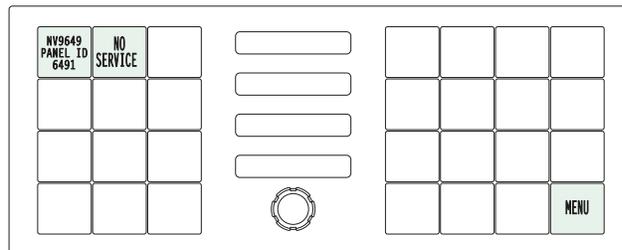
You must use NV9000-SE Utilities to configure the NV9649 control panel. Contact Miranda if you need to obtain the latest version of this NV9000 configuration software.

You may use the Panel IP Configuration Utility if you want your NV9649 to have a static IP address (with respect to the NV9000) or to use DHCP. The panel, as it comes from the factory, defaults to DHCP.

## Initialization

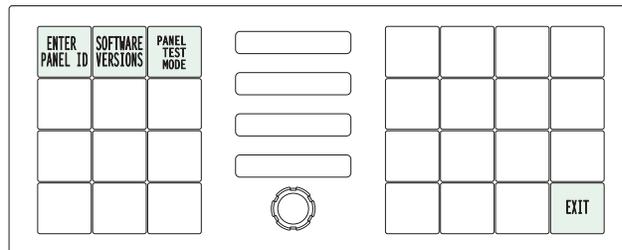
Before your NV9000 system controller can communicate with an NV9649, you must give it a panel ID. Follow these steps for each NV9649 you are installing:

- 1 Power up the NV9649. Do **not** connect its Ethernet cable. (Disconnect it if it is connected.)  
After a few seconds, the display will show either 'No Service' or 'Acquire IP Address' at the top left and show the panel's current panel ID:



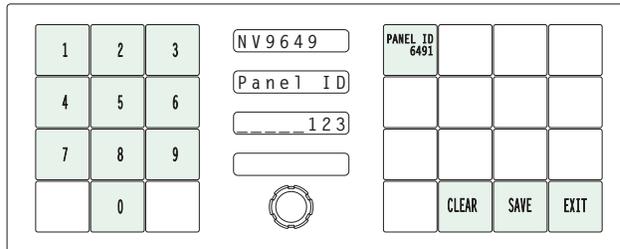
The menu button, with which to access the setup functions, is at the lower right.

- 2 Press the menu button. The panel now displays a menu of 3 items:



Press 'Enter Panel ID' to go to the panel ID menu. Or press 'Exit' to leave the menu.

- 3 The panel ID menu has a numeric “keypad” with which you can enter a new panel ID:



The panel shows the current panel ID on the top left button of the right-hand button matrix. It shows the panel ID you are entering in the third display (labeled ‘Destination’).

If you make a mistake, press ‘Clear’ to erase your entry and start over.

When you have entered a panel ID correctly, press ‘Save’.

Press ‘Exit’ at any time to leave the panel ID menu. You might have to press ‘Exit’ more than once to leave the menu entirely.

- 4 After you enter the panel ID, reconnect the Ethernet cable. The NV9000 system controller can detect your panel in a few seconds. But it will do so only when the NV9000 has a panel configuration defined for this panel ID.

**(All panel IDs must be unique.)**

You can now prepare an NV9649 configuration in NV9000-SE Utilities and upload the configuration to the NV9000. You need the panel ID to create a NV9649 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.

When you restart the NV9000 system controller with the appropriate panel configuration, the NV9649 you have configured should become active. Its buttons and displays will turn on, showing meaningful data.

## Testing

A panel test function is available when the NV9649 is disconnected from the system controller. Run the test to determine the health of your NV9649. See [Setup Mode](#) on page 101 for detail. You can also view the software version numbers under setup mode.

These are points to consider after you install your NV9649 control panel(s):

- 1 Do the buttons illuminate? When an NV9649 powers up, one or more of its buttons are supposed to turn green or amber. Does it pass the panel test mentioned above?
- 2 When the NV9649 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 its configuration should light.  
If you continue to see “No Server,” “ACQ IP,” or “Locating Network,” you have a problem. Reboot everything and try again.
  - ▲ The NV9649, by default, acquires its IP address through DHCP on the NV9000’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 in the 'Preset' display field, you have either not initialized the panel or no configuration has been created for your panel in NV9000-SE Utilities.

- 3 Is the NV9000 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?

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 NV9649.

## Topics

<a href="#">Summary</a> .....	17
<a href="#">Adding a Panel to an NV9000 Configuration</a> .....	17
<a href="#">NV9649 Panel Configuration Page(s)</a> .....	19
<a href="#">Button Definitions</a> .....	34
<a href="#">Tally (GPIO) Window</a> .....	62
<a href="#">Global Navigation</a> .....	62

This chapter addresses configurers. Operators and other persons not interested in NV9649 configuration need not read this chapter.

## Summary

The NV9649 is a relatively simple panel. It has 28 function buttons in 2 sections, a small display area, a knob for device selection, and a GPIO (tally) interface.

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 NV9649. Figure 4-3, following, shows the default NV9649 panel configuration page from NV9000-SE Utilities.

## Adding a Panel to an NV9000 Configuration

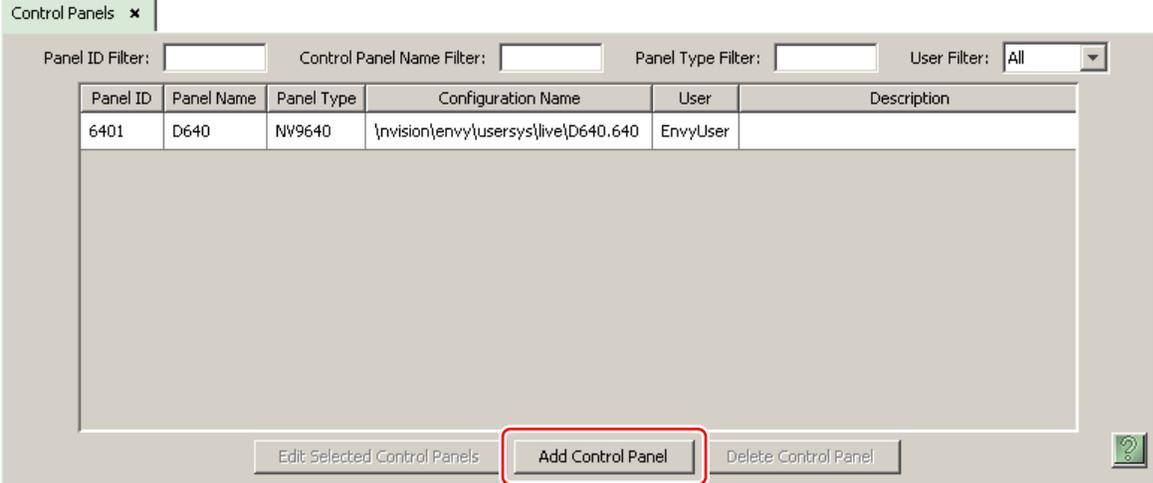
You must create configurations for the NV9649 using NV9000-SE Utilities. We assume that you are familiar enough with NV9000-SE Utilities that you can understand the following material. It is not difficult material, but some of the concepts might not be familiar to everyone.

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

## Configuration

### Adding a Panel to an NV9000 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

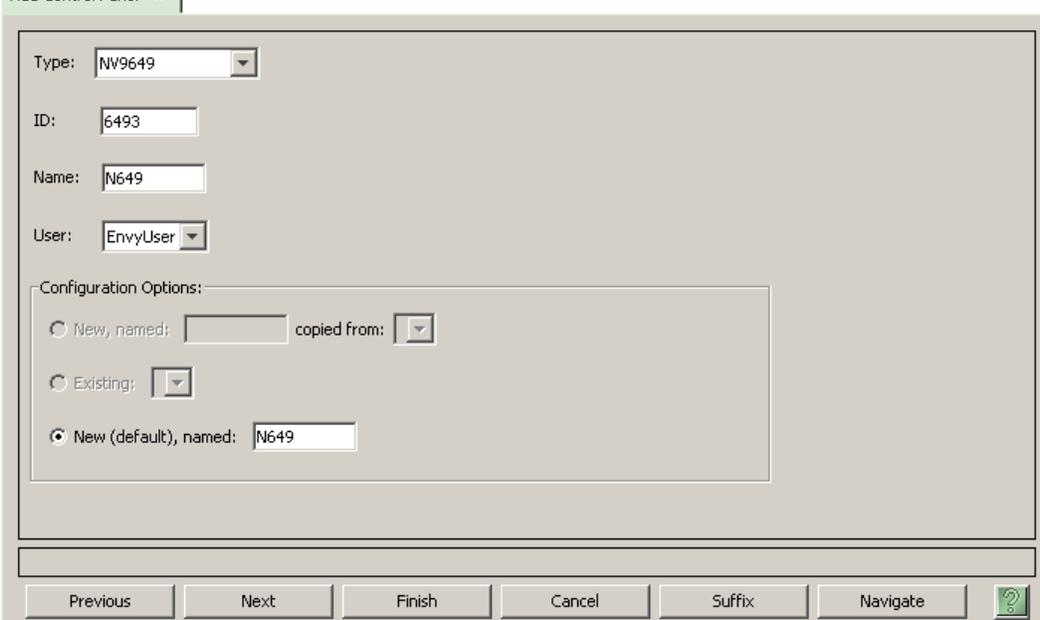
Panel ID Filter:  Control Panel Name Filter:  Panel Type Filter:  User Filter: All

Panel ID	Panel Name	Panel Type	Configuration Name	User	Description
6401	D640	NV9640	{nvision\envy\usersys\live\D640.640}	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: NV9649

ID: 6493

Name: N649

User: EnvyUser

Configuration Options:

New, named:  copied from:

Existing:

New (default), named: N649

Previous Next Finish Cancel Suffix Navigate

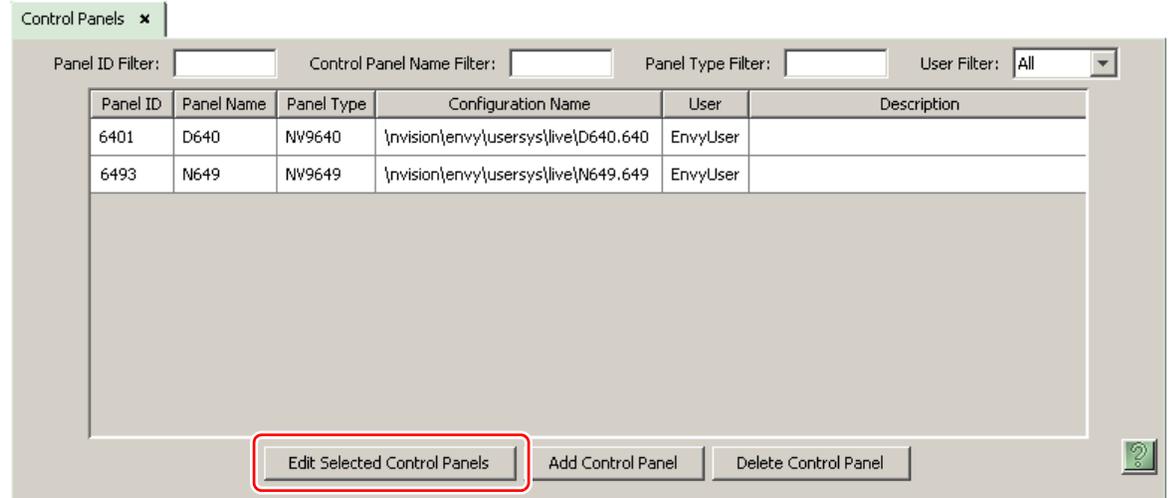
Choose "NV9649" from the 'Type' field. In the ID field, enter the panel ID you assigned to the panel while it was in setup mode. Give a name to the panel in the name field and select a user.

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 NV9649 configuration file is .649. Click 'Next' or 'Finish' to proceed.

Return to the 'Control Panels' page to view your new entry. To edit an NV9649 configuration, either double-click its list entry or select the entry and then click 'Edit Selected Control Panels':



You will then see the panel configuration page for the selected NV9649.

The following section of this guide discusses using the panel configuration page in which you configure an NV9649.

## NV9649 Panel Configuration Page(s)

The NV9649 panel can be configured to operate under 3 behavioral models:

- 'Panel Server' mode.
- 'NV9609 Panel' mode.
- 'LCD XY/MD' mode.

(The behavioral model is selected in the first entry of the panel options. That entry is a drop-down list.)

The panel configuration pages for the 3 models differ greatly. The set of button functions differ and the panel options also differ.

- ▲ If you change the behavioral model for a configuration, the software reinitializes the configuration to the default (empty) configuration. Any configuration you have thus far created will be lost. Therefore, choose the appropriate behavioral model first.

### Common Page Features

Please refer to figures 4-1, 4-2, and 4-3, following.

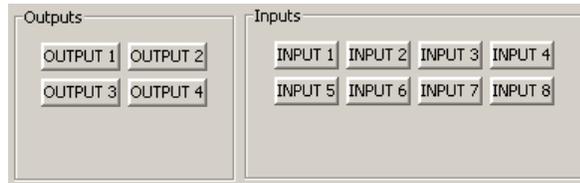
#### Panel Graphic

At the top of the page is a graphic representation of the NV9649 panel. Above the graphic is the pathname of the panel's configuration file. (This file corresponds to what you are editing, which will eventually be sent to the NV9000.)

Configurers must click a button "proxy" in the graphic to select the button for configuration.

### GPIO Section

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. The section has two parts: inputs and outputs.



By clicking on one of the input or output buttons, you can configure the input or output. (The NV9649 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 75.

### 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.

The 'Save and Close' button, also at the bottom, dismisses the configuration page in addition to saving the configuration changes.

### Clear Configuration Button

The 'Clear Configuration' button, located in the 'Panel Options' regions, completely empties the configuration, reverting to default values. The button does not, however, change the selected behavioral model.

### Common Configuration Tasks

The person configuring an NV9649 panel will want to consider how best to use the buttons 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.
- Define logic for some or all of the tally inputs and outputs.

## Configuration Page for the Server Model

This is a sample NV9649 panel configuration page for server mode:

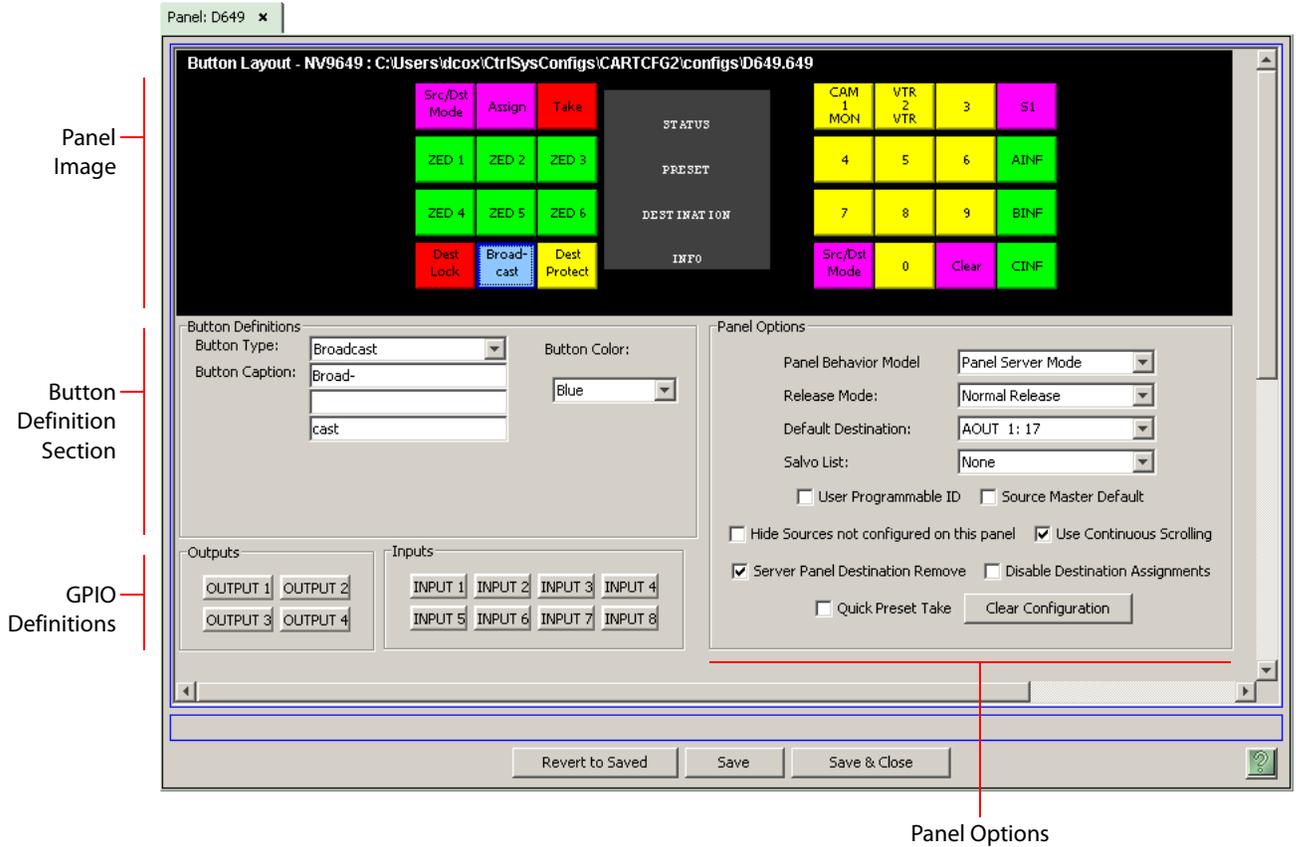


Fig. 4-1: NV9649 Configuration Page (for Server Mode)

There are 15 button function types for a panel in server mode (not counting 'Undefined'):

Assign	Broadcast	Category
Chop	Clear	Destination Lock
Destination Mode	Destination Protect	Quick Source
Salvo	Source	Source Mode
Src/Dst Mode	Take	Take All

These are described in [Button Functions for Server Mode](#) on page 36.

### Characteristics of Server Mode

The NV9649 (the “server”) operates in conjunction with one or more NV9648s (the “clients”). The NV9649 can assign a destination to any of an NV9648’s 3 control sections and also assign sources to the source buttons of any of an NV9648’s control units.

(The NV9648 has 3 sections that are independent control units. Each unit—having one display and 9 buttons—corresponds to a destination.)

The NV9648s show current sources in their displays when the NV9649 is in source mode and show the sections’ destinations when the NV9649 is in destination mode. (Please refer to the *NV9648 Users’ Guide* for information regarding NV9648 control panels.)

## Configuration

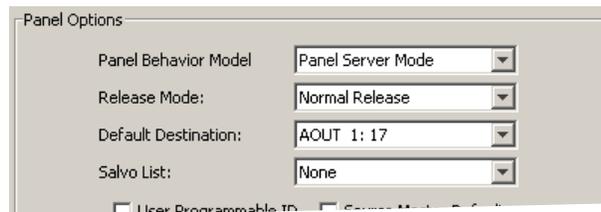
### NV9649 Panel Configuration Page(s)

---

- ▲ The NV9649's panel ID is referenced by the configurations of the NV9648s. Those references link the NV9648s to the NV9649.

### Server Mode Panel Options

In a server mode configuration, the panel options section, at the right of the configuration page, has 4 drop-down menus (and 6 checkbox options). These are the drop-down menus:



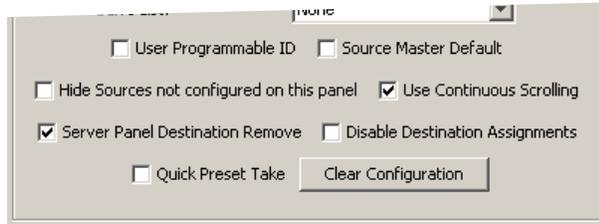
- ▲ By making a selection in the behavioral model field, you change the content of the entire configuration page, including the set of panel options. *Changing the model clears the entire configuration.*

These are the drop-down menu options for the panel in client mode:

Panel Behavioral Model	Panel Server Mode	In server mode, the panel interoperates with a number of NV9648s, the NV9648s being configured as the “clients.”
	NV9609 Panel Mode	In NV9609 mode, the panel behaves exactly like an NV9609. Please refer to the <i>NV9609 Users Guide</i> for additional details.
	LCD XY/MD Mode	In LCD XY/MD mode, the panel has a slightly larger function set than under the other two models. Under this model, the operator can choose either X-Y mode or multi-destination (MD) mode.
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 emphatically 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.)
Salvo List	[none]	Salvo lists appear in the drop-down menu. A salvo list designates the particular salvos (among potentially many) from which the operator can choose when the panel is in salvo mode. Salvo lists are defined, in NV9000-SE Utilities, under the ‘Views’ pane, using the ‘Salvo Lists’ table and the ‘Salvo List Details’ table. The NV9000 configuration might not have any salvo lists, in which case ‘None’ is the only entry in the drop-down menu.

## Checkbox Options

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



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

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).
- 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 NV9000 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.
- 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.
- Use continuous scrolling.  
If you check this box, the panel will scroll source or destination devices continuously (or indefinitely). That is, the display will show the first device in the list following the last when you are scrolling up, and will show the last device after the first if you are scrolling down.  
If you leave this box unchecked, the panel will stop scrolling when it reaches either the beginning or end of the list.  
This option does **not** affect scrolling of salvos when the panel is in salvo mode.
- Server panel destination remove.  
This option, when checked, prevents the NV9649 from being able to perform takes. Under this option, ‘Take’ buttons do not illuminate when a source is preset.  
The NV9649’s destination display and status display remain blank.  
The underlying consideration is that takes are to be performed on the NV9648 clients only.
- Disable destination assignments.  
If you check this option, the NV9649’s ability to assign destinations to NV9648 sections is disabled.
- Quick preset take.  
If you check this option, when the operator presets a source, all ‘Take’ buttons in all NV9648 control units go high-tally. The operator may then use the ‘Take’ button in the control unit that corresponds to the destination to which the take is intended.

## Configuration

### NV9649 Panel Configuration Page(s)

If you leave this option unchecked, the 'Take' buttons in the NV9648 units do not go high-tally. Takes are not enabled on the NV9648s when the operator presets a source at the NV9649.

## Configuration Page for the LCD XY/MD Model

This is a sample NV9649 panel configuration page for LCD XY/MD mode:

Panel: L649 x

Button Layout - NV9649 : C:\Users\dcox\CtrlSysConfigs\CARTCFG2\configs\L649.649

Panel Image:

Button Definition Section:

Page Table:

GPIO Definitions:

Panel Options:

Page Number	Page Name	Linked From Page
1	Default	
2	UTILS	1

Fig. 4-2: NV9649 Configuration Page (for LCD XY/MD Mode)

In LCD XY/MD mode, the panel is standalone — independent of any NV9648s.

There are 31 button function types for a panel in LCD XY/MD mode (not counting 'Undefined'):

Back	Broadcast	Category
Chop	Clear Preset	Default State
Destination	Destination Lock	Destination Protect
Free Source	Global Navigate	Hold
Level Map	Menu	Name Set Toggle
Navigate	Page Down	Page Up
Panel Lock	Preset Release	Previous Source
Quick Source	Salvo	Save Preset
Selection	Source	Source Master
Source/Destination	Take	X-Y Display
XY/MD Mode		

These are described in [Button Functions for LCD XY/MD mode](#) on page 41.

### Characteristics of LCD XY/MD mode

The panel in LCD XY/MD mode has a somewhat more extensive function set than panels in server mode or NV9609 mode. In LCD XY/MD mode, the panel does *not* interoperate with NV9648s.

All 28 function buttons form a "button page" in a hierarchical structure of button pages. The panel's buttons can be used in a hierarchical fashion: pressing a 'navigation' button (or a 'global navigation' button) causes the panel to display a new set of configured button functions, called a "button page." There can be many such pages, organized in a configurable tree structure.

The panel supports the use of multiple 'selection' buttons. When the panel is in X-Y mode, the selection buttons select levels. When the panel is in MD mode, the selection buttons select MD devices (which are destinations). If there are more levels (or more MD devices) than there are selection buttons, the operator can press a 'Page Up' or 'Page Down' button to scroll through the list of levels (or, in MD mode, the list of MD devices).

### The Button Page Table

In LCD XY/MD mode, the configuration page has an additional section, the button page table, just below the button definition section. This is an example:

Page Number	Page Name	Linked From Page
1	Default	
2	A SRCs	1
3	B SRCs	1
4	C SRCs	1
7	A DSTs	1
8	B DSTs	1
9	C DSTs	1

This 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."

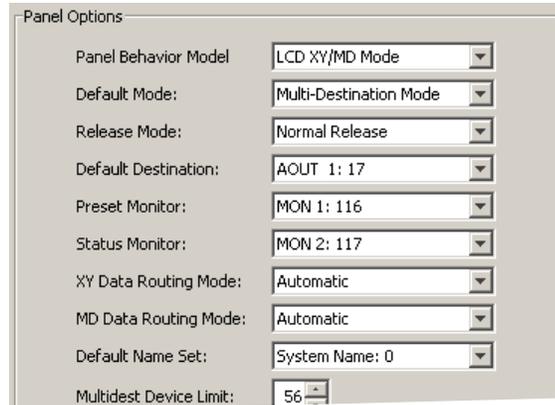
During operation, category buttons can display device subpages when pressed. Those subpages are not explicitly definable in NV9000-SE Utilities. The button page list does not

display the device subpages accessed through category buttons. Category buttons can also display suffix pages when pressed. Global navigation and suffix pages are included in the button page table.

See [Button Page List](#) on page 30.

### LCD XY/MD mode 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:



These are its drop-down menu options:

Panel Behavioral Model	Panel Server Mode	In server mode, the panel interoperates with a number of NV9648s, the NV9648s being configured as the “clients.”
	NV9609 Panel Mode	In NV9609 mode, the panel behaves exactly like an NV9609. Please refer to the <i>NV9609 Users Guide</i> for additional details.
	LCD XY/MD Mode	In LCD XY/MD mode, the panel has a slightly larger function set than under the other two models. Under this model, the operator can choose either X-Y mode or multi-destination mode.
Default Mode	X-Y Mode	Starts the panel in XY mode after a reset. See <a href="#">Defaults</a> on page 87.
	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 <device>	<p>The current source video is not sent to a monitor.</p> <p>The current source video for the selected destination appears on the specified monitor (device).</p>
XY Data Routing Mode	Automatic	<p>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.</p>
	Semi-automatic (recommended)	<p>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.'</p> <p>If the control port is not in use, the control level take occurs normally.</p>
	Manual	<p>If the control port is in use for the source or destination device, the system takes all (selected) levels except control. It <b>does not</b> perform the control level route.</p> <p>If the control port is not in use, the control level take occurs normally.</p> <p>To carry out a take on a machine control port that is in use, the operator must first free the port by performing a "tristate" take on the port, that is, taking the device (as a source) to itself (as a destination) on the control level.</p> <p>A take can occur on the machine control level if, in the status column of the display, the source entry is "FREE."</p>
MD Data Routing Mode	Automatic	<p>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.</p>
	Manual	<p>If the control port is in use for the source or destination device, the system takes all (selected) levels except control. It <b>does not</b> perform the control level route.</p> <p>If the control port is not in use, the control level take occurs normally.</p> <p>To carry out a take on a machine control port that is in use, the operator must first free the port by performing a "tristate" take on the port, that is, taking the device (as a source) to itself (as a destination) on the control level.</p> <p>An operator can determine whether the control level is free by switching momentarily to X-Y mode and examining the destination's levels.</p>

## Configuration

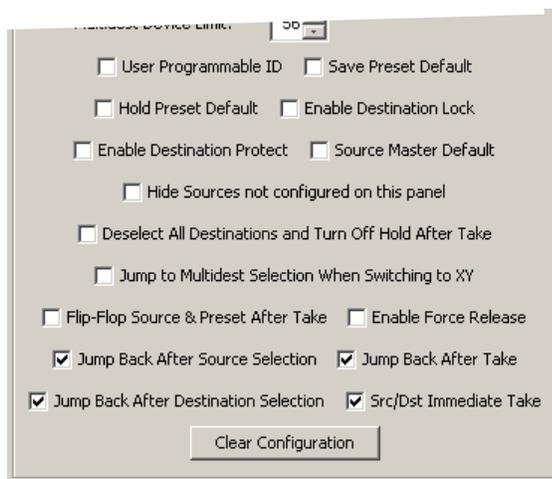
### NV9649 Panel Configuration Page(s)

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Default Name Set	System Name	A list of “name sets” appears in the drop-down menu. The name sets can be defined under the System Management pane of NV9000-SE Utilities. Choose ‘System Name’ in this list if you do not want, or do not care about, device name aliases.  Do <b>not</b> choose ‘System Name’ if you are configuring any ‘Name Set Toggle’ buttons.
Multidest Device Limit	(Selectable in multiples of 8)	The number of multi-destination entries you are allowing. Make this value equal to or greater than the number of MD devices you need. The default, and lowest value, is 8. The maximum is 512. (Elsewhere in the configuration, you will create a list of MD devices. You can leave some MD destinations unassigned.)

### Checkbox Options

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



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

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

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 machine control source the *controlling* device (or master device) by default. Otherwise, the destination is the master by default. (The option is specifically for use with NV9000 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.
- 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 NV9649 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.

## Configuration

### NV9649 Panel Configuration Page(s)

- 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 NV9649 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.

### 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.

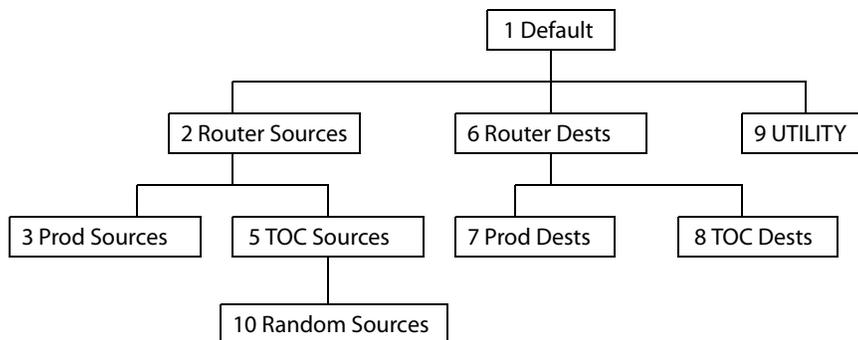
To delete a page or pages from the tree, select the pages in the button page list, right-click the list, and choose one of the deletion commands from the context menu that appears.

- ▲ 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, category buttons or global navigation buttons to jump to other pages.

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.)

## Configuration Page for the NV9609 Model

This is the default NV9649 panel configuration page page for NV9609 mode:

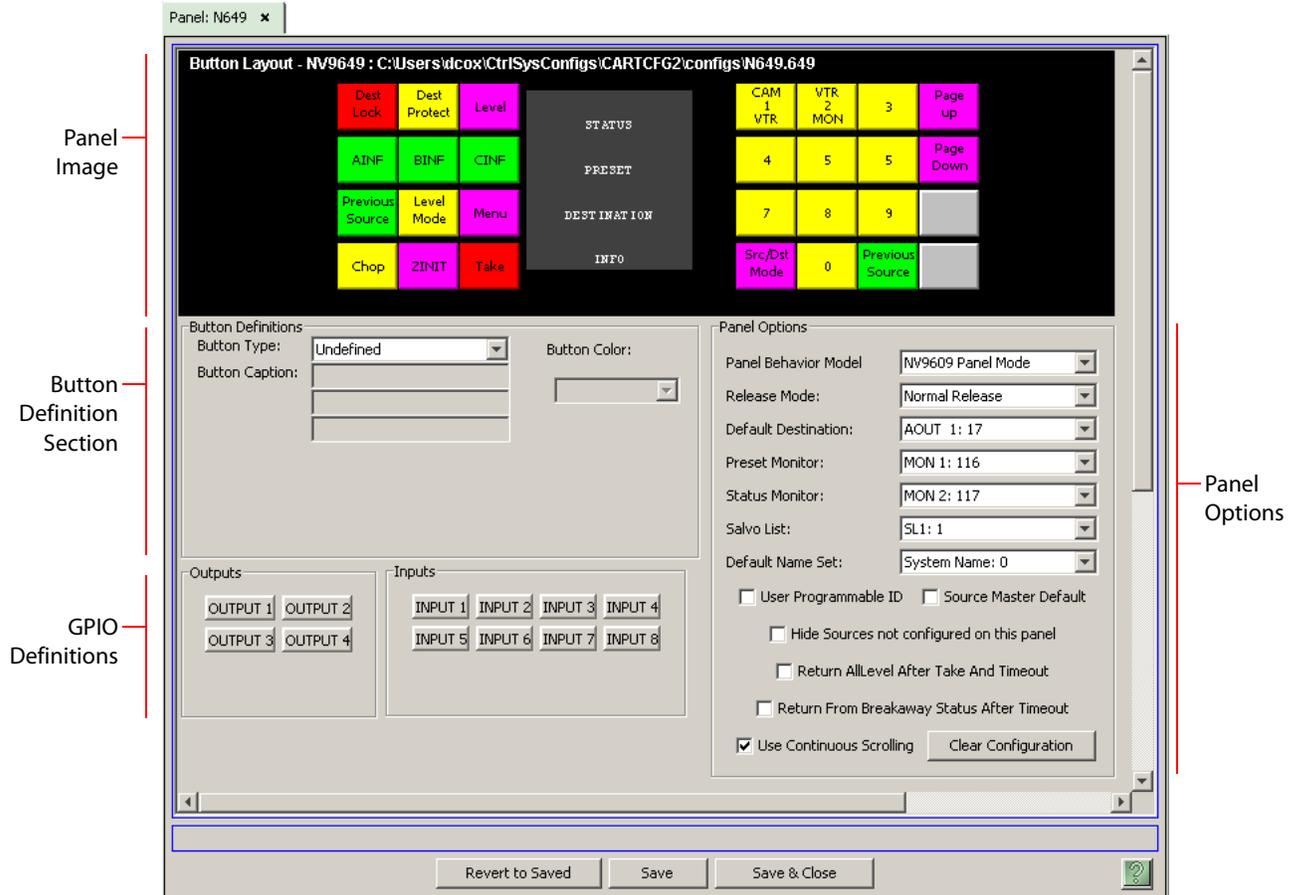


Fig. 4-3: NV9649 Configuration Page (for NV9609 Mode)

In NV9609 mode, the panel is standalone — independent of any NV9648s.

## Configuration

### NV9649 Panel Configuration Page(s)

There are 24 button function types for a panel in NV9609 mode (not counting 'Undefined'):

Broadcast	Category	Chop
Clear	Destination	Destination Lock
Destination Mode	Destination Protect	Free Source
Level	Level Mode	Menu
Name Set Toggle	Page Down	Page Up
Panel Lock	Previous Source	Quick Source
Salvo	Source	Source Master
Source Mode	Src/Dst Mode	Take

These are described in [Button Functions for NV9609 Mode](#) on page 55.

### Characteristics of NV9609 Mode

Under the NV9609 model, the NV9649 exactly emulates the NV9609 control panel, which has the same physical layout of buttons and displays and has roughly the same size as the NV9649. The NV9649's knob can be used to emulate the 'Page Up' and 'Page Down' functions of the NV9609.

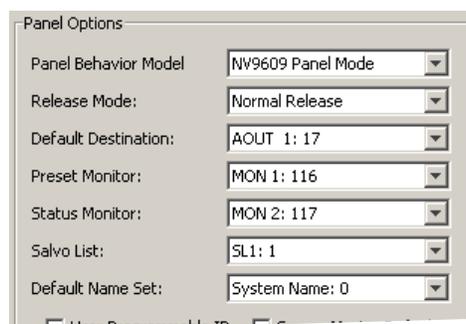
The major difference between the NV9609 and the NV9649 is that the NV9649 has LCD buttons whereas the NV9609 has backlit buttons that do not have LCD legends.

The NV9609, and thus the NV9649, is characterized by having a "level mode." See [Level Mode](#) on page 71. (Refer also to the *NV9609 Users' Guide*.)

- ▲ Under the NV9609 model, the NV9649 is a standalone panel and is independent of any NV9648s.

### NV9609 Mode 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:



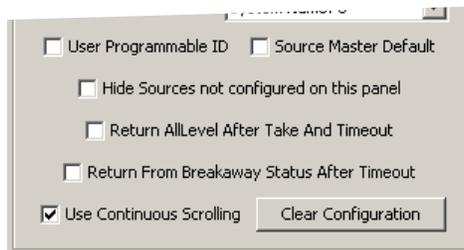
These are its drop-down menu options:

Panel Behavioral Model	Panel Server Mode	In server mode, the panel interoperates with a number of NV9648s, the NV9648s being configured as the "clients."
	NV9609 Panel Mode	In NV9609 mode, the panel behaves exactly like an NV9609. Please refer to the <i>NV9609 Users Guide</i> for additional details.
	LCD XY/MD Mode	In LCD XY/MD mode, the panel has a slightly larger function set than under the other two models. Under this model, the operator can choose either X-Y mode or multi-destination mode.

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).
Salvo List	[none]	Salvo lists appear in the drop-down menu. A salvo list, as you might think, is a list of salvos. The salvos in the list you choose are the salvos the operator can choose in salvo mode.  Salvo lists are defined, in NV9000-SE Utilities, under the 'Views' pane, using the 'Salvo Lists' table and the 'Salvo List Details' table. The NV9000 configuration might not have any salvo lists, in which case 'None' is the only entry in the drop-down menu.
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, alternate device names. Do <b>not</b> choose 'System Name' if you are configuring any 'Name Set Toggle' buttons.

## Checkbox Options

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



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

By default, all the check box options are clear.

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).

- 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 NV9000 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.
- Return all-level after take and timeout.  
If you check this box, the panel will revert to all-level state after the timeout period following a breakaway take.  
If you leave this box unchecked, the panel will **not** revert to an all-level state.  
The default timeout period is 30 seconds. See [LCD Buttons](#) on page 117.
- Return from breakaway status after timeout.  
If you check this option, a panel that is in level mode will leave level mode after the timeout period.  
The default timeout period is 30 seconds. See [LCD Buttons](#) on page 117.
- Use continuous scrolling.  
If you check this box, the panel will scroll source or destination devices continuously (or indefinitely). That is, the display will show the first device in the list following the last when you are scrolling up, and will show the last device after the first if you are scrolling down.  
If you leave this box unchecked, the panel will stop scrolling when it reaches either the beginning or end of the list.  
This option does **not** affect scrolling of salvos when the panel is in salvo mode or levels when the panel is in level mode.

## Button Definitions

The NV9649 panel can be configured to operate under 3 behavioral models:

- ‘Panel Server’ mode.
- ‘NV9609 Panel’ mode.
- ‘LCD XY/MD’ mode.

The set of button functions for the 3 behavioral models differ greatly.

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 NV9649 device list changes also.

The number and names of categories can also change over time and the NV9649 will track those changes too.

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### 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.

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## Button Specification

The button definitions section has several controls:

The screenshot shows a control panel titled "Button Definitions". It contains the following elements:

- Button Type:** A pull-down menu with "Selection" selected.
- Button Caption:** Three stacked text input boxes. The first box contains "Sel".
- Display Index:** A pull-down menu with "1" selected.
- Button Color:** A pull-down menu with "Yellow" selected.
- Place this button on all subsequent child pages:** An unchecked checkbox.
- Edit Multi-Dest Devices:** A button located below the other controls.

The controls vary according to the button type.

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

The screenshot shows a pull-down menu titled "Button Color:". The menu is open, displaying a list of color options: Green, Amber, Blue, Green, Grey, Purple, Red, and Yellow. The "Green" option is currently selected and highlighted.

On the panel, each of the 7 defined colors has two brightness levels: "high-tally" and "low-tally." Buttons are dark if their functions are disabled.

Buttons are low tally if they are available and unselected. Buttons are high tally when they are selected. (An exception to this is the LCD brightness submenu when the panel is in menu mode.) Some button types are never high-tally.

Check box "Place this button on all child pages." When the operator presses a 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.

The Navigate button is a special case. It invoking an "Edit Navigate Button" dialog during configuration. See ['Edit Navigation Button' Dialog](#), on page 48.

## Button Functions for Server Mode

These are the button types available for NV9649 configurations under the server model:

Type	Description (under Server Mode)
Assign	<p>When the panel is in destination mode, the button is used to assign a selected destination to an NV9648 control unit.</p> <p>When the panel is in source mode, the button is used to assign a preset source to a source button of an NV9648 control unit.</p> <p>(Pressing a source button of the desired NV9648 control unit completes the assignment.)</p> <p>See <a href="#">Operating Methods</a> on page 96 for detail.</p>
Broadcast	<p>On the data (machine 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.</p> <p>The button definition has no fields to configure.</p> <p>A broadcast button is useful in dubbing applications or when a backup (redundant) device is in use. See <a href="#">Broadcast Routes</a> on page 75.</p> <p>See also the <a href="#">Source Master</a> button, following.</p>

Type	Description (under Server Mode)
Category	<p data-bbox="540 310 1040 338">During operation, the button has 3 functions:</p> <ol data-bbox="557 352 1424 531" style="list-style-type: none"> <li data-bbox="557 352 1373 380">1 Display a source category's device list when the panel is in source mode.</li> <li data-bbox="557 394 1403 453">2 Display a destination category's device list when the panel is in destination mode.</li> <li data-bbox="557 468 1424 531">3 Present a suffix (or a digit) to be appended to a device name during category selection.</li> </ol> <p data-bbox="540 546 1403 678">Thus, when you configure a category button, it has 3 drop-down lists in the button definition section: 'Src Category', 'Dst Category', and 'Suffix'. You should choose a category from each category list. (You may choose 'None' in either category list.)</p> <p data-bbox="540 693 1403 789">The button definition section also presents a "level set filter" drop-down list in which you can select a level set to reduce the number of categories through which to browse.</p> <p data-bbox="540 804 1424 900">Each category button displays 2 lines of text: (1) either the source category name or the destination category name, and (2) suffix text, in that order. If the button has no suffix text, the second line shows dashes.</p> <p data-bbox="540 915 1424 1081">When the operator first presses a category button, the category mnemonic appears in the 'Preset' display. After the category is thus selected, the operator uses a keypad (button array) to enter the device index within the category. (The keypad is a set of category buttons to which indexes or suffixes have been assigned.)</p> <p data-bbox="540 1096 1386 1192">Pressing a category button when the panel is in source mode starts the "construction" of a source device name. Pressing a category button when the panel is in destination mode starts the "construction" of a destination name.</p> <p data-bbox="540 1207 1386 1266">▲ Operators can also use the knob to scroll through sources or destinations after choosing a category.</p> <p data-bbox="540 1281 1414 1308">The default button text is the category name. You can override the default text. See <a href="#">Category Lists</a> on page 40.</p> <p data-bbox="540 1367 1386 1465">▲ Note that category buttons in server mode function differently from category buttons under LCD XY/MD mode and NV9609 mode. There are differences in the configuration of these buttons too.</p>
Chop	<p data-bbox="540 1480 1424 1612">When a chop function is supported by a 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	<p data-bbox="540 1627 1308 1654">The button definition has no fields to configure. Its legend is arbitrary.</p> <p data-bbox="540 1669 1386 1766">The button reverts to the most recent preset. You may think of this as a "back-space key." It erases the suffixes you entered under category select in reverse order. Operators can press 'Clear' multiple times; each press is another</p> <p data-bbox="540 1780 1308 1810">The button definition has no fields to configure. Its legend is arbitrary.</p>

Type	Description (under Server Mode)
Destination Lock	<p>Sets or removes a “lock” on the current destination device. The lock can be removed only by an operator using a panel that same user ID as the user ID associated with the lock, or by a panel that has “Force Release” enabled.</p> <p>The button definition has no fields to configure. Its legend cannot be changed.</p>
Destination Mode	<p>The button places the panel in destination mode. Category selections in destination mode select destination devices. Under the server model, source categories are ignored when the panel is in destination mode.</p> <p>Categories that include both source and destinations appear in both source mode and destination mode.</p> <p>The button definition has no fields to configure.</p>
Destination Protect	<p>Sets or removes a “protect” on the current destination device. The protect can be removed only by an operator using a panel that same user ID as the user ID associated with the protect, or by a panel that has “Force Release” enabled.</p> <p><b>Note:</b> a protect prevents <i>others</i> from routing to a destination; a lock prevents <i>anyone</i>— even the user who issued the lock— from routing to the destination.</p> <p>The button definition has no fields to configure. Its legend cannot be changed.</p>
Menu	<p>This button puts the NV9649 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 only if you want the operator to have access to the menu.</p> <p>By pressing certain LCD buttons, the operator makes menu selections and may enter data (such as panel ID) or change LCD brightness values. The LCD button text varies with context in menu mode. See <a href="#">Menu Mode</a> on page 64.</p>
Quick Source	<p>A quick source button selects a source and performs an immediate take to the current destination of the NV9649 unless ‘the panel option ‘Server Panel Destination Remove’ is checked in the configuration.</p> <p>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’)</p> <p>The button definition section also presents a “level set filter” drop-down list in which you can select a level set to reduce the number of sources through which to browse.</p> <p>The button legend is the source name, unless you check ‘Use Custom Button Text’ and assign the button your own text.</p>
Salvo	<p>A salvo button places the panel in salvo mode. In salvo mode, the operator scrolls through the salvo list configured for the panel (as a panel option) to select a salvo. When the desired salvo is selected, the operator presses a ‘Take’ button to execute the salvo. The panel then returns to normal operating mode.</p> <p>The button definition has no fields to configure.</p>

Type	Description (under Server Mode)
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>The source selected by a source button is preset to be take to the current destination of the NV9649. (No takes can occur at the NV9649 if the panel option 'Server Panel Destination Remove' is checked in the configuration.)</p> <p>When you configure a source button, a drop-down menu appears: 'Source Device'. Choose a device from the list. (The 'None' entry is merely a placeholder. Do not choose 'None'.)</p> <p>The button definition section also presents a "level set filter" drop-down list in which you can select a level set to reduce the number of sources through which to browse.</p> <p>The button legend is the source name, unless you check 'Use Custom Button Text' and assign the button your own text.</p>
Source Mode	<p>The button places the panel in source mode. Category selection in source mode selects a source device. Under server mode, destination categories are ignored when the panel is in source mode.</p> <p>Categories that include both source and destination devices appear in both source mode and destination mode.</p> <p>The button definition has no fields to configure.</p>
Src/Dst Mode	<p>The button toggles between source and destination modes. Category selections in source mode select source devices. Category selections in destination mode select destination devices.</p> <p>Categories that include both source and destination devices appear in both source mode and destination mode.</p> <p>The button definition has no fields to configure.</p>
Take	<p>In normal mode, a take button routes the preset source to the selected destination on selected level or levels. (By default, takes are on all levels.)</p> <p>In salvo mode, a take button executes a selected salvo.</p> <p>A take button is disabled (and dark) until it is possible for the operator to execute a take.</p> <p>Configurers should provide the operator a 'Take' button. The button definition has no fields to configure.</p>
Take All	<p>The button takes the selected (i.e., preset) source to <i>all</i> NV9648 control units.</p> <p>The button definition has no fields to configure.</p>
Undefined	<p>Makes the button undefined and inactive. On the actual panel, it will remain unused (dark).</p>

## Category Lists

When the NV9649 is in server mode, operators can select devices in 3 steps:

- 1 Place the panel in either source mode or destination mode, as required.
- 2 Turn the knob until the desired device category mnemonic appears in the preset display. Then press the knob to select that category.
- 3 When the category has been selected, the operator can now either turn the knob to select a device within the category, or press suffix (or index) buttons to “build” a device name from the category mnemonic and the pressed suffixes. The operator can actually use both techniques to select a device in the category.

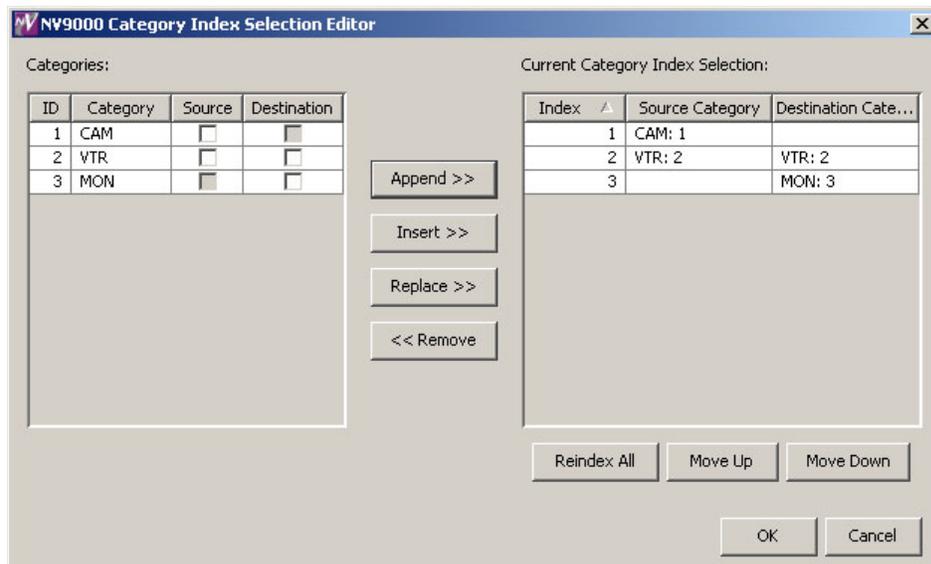
To minimize the number of categories through which the operator must search, the configurer must define a *category list* that includes only the categories through which the operator may browse using the knob. The list is independent of the categories represented on buttons.

- ▲ The operator cannot select categories with the knob unless you define two category lists, one for sources and one for destinations. The category list may, of course, include all categories.

## How to Create a Category List

Follow these guidelines.

- 1 Go to the NV9649 configuration page in NV9000-SE Utilities. (The page must be for a configuration using the server model.)
- 2 Right-click the display area of the panel graphic in the panel’s configuration page. The ‘Category Index Selection Editor’ window appears:



On the left is a list of *all* categories defined in the NV9000 system. On the right is a list of the categories in the list you are defining. Initially the list for the panel configuration is empty.

- 3 Modify the list.

To add categories to the list, select one or more categories on the left and copy it to the right, using either the ‘Append’ button, the ‘Insert’ button, or the ‘Replace’ button.

The categories are either source categories or destination categories or both, as indicated by check boxes on the left. To select or unselect a category, click the box. A selected category has a check mark in the box.

The 'Append' button *appends* the selected categories to the end of your list.

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

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

The 'Remove' button *removes* highlighted categories from the right.

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

Also at the bottom right is a 'Reindex All' button. Click this button to renumber the categories consecutively (in the order in which you placed them in the list) and without gaps in the ordering.

When you have finished editing the category list, click OK to save the list. You can click 'Cancel' if you want to discard any changes you have made to the list.

You will have actually defined two lists, one for sources and one for destinations. These lists define the categories through which the operator may browse using the knob at the front of the panel.

## Button Functions for LCD XY/MD mode

These are the button types available for NV9649 configurations under the LCD XY/MD model:

Type	Description (under LCD XY/MD Mode)
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> <p>The button definition has no fields to configure. Its legend is arbitrary (except that it is always "Back" when placed on a page by the system).</p>
Broadcast	<p>On the data (machine 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.</p> <p>The button definition has no fields to configure. Its legend is arbitrary.</p> <p>A broadcast button is useful in dubbing applications or when a backup (redundant) device is in use. See <a href="#">Broadcast Routes</a> on page 75.</p> <p>See also the <a href="#">Source Master</a> button, following.</p>

Type	Description (under LCD XY/MD Mode)
Category	<p>Pressing the button displays a category's device list.</p> <p>▲ Note that category buttons in LCD XY/MD mode function differently from category buttons under server mode and NV9609 mode. There are differences in the configuration of these buttons too.</p> <p>When you configure a category button, two drop-down lists 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' and '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. 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. The list might span several pages. See <a href="#">Global Navigation</a> on page 62 for further detail. (The suffix page is intended to give the operator a keypad with which to enter device suffixes or indexes.)</p> <p>The button definition section also presents a "level set filter" drop-down list in which you can select a level set to reduce the number of categories through which to browse.</p> <p>The default button text is the category name. You can override the default text.</p>
Chop	<p>When a chop function is supported by a 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> <p>The button definition has no fields to configure. Its legend is arbitrary.</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> <p>The button definition has no fields to configure. Its legend is arbitrary.</p>
Default State	<p>Returns the panel to its most recent power-up state. That is called the <i>default state</i>.</p> <p>The button definition has no fields to configure. Its legend is arbitrary.</p>

Type	Description (under LCD XY/MD Mode)
Destination	<p>Selects a destination.</p> <p>When you configure a destination button, a drop-down menu appears: 'Destination Device'. Choose a device from the list. The 'None' entry is merely a placeholder. Do not choose 'None'.</p> <p>The button definition section also presents a "level set filter" drop-down list in which you can select a level set to reduce the number of sources through which to browse.</p> <p>The button legend is the source name, unless you check 'Use Custom Button Text' and assign the button your own text.</p>
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>The button definition has no fields to configure. Its legend cannot be changed.</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><b>Note:</b> a protect prevents <i>others</i> from routing to a destination; a lock prevents <i>anyone</i>— even the user who issued the lock— from routing to the destination.</p> <p>The button definition has no fields to configure. Its legend cannot be changed.</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> <p>The button definition has no fields to configure. Its legend is arbitrary.</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>To the operator, a global navigation button is very much like a navigation button. The difference arises primarily during configuration.</p> <p>During configuration, you must select a previously defined "global navigation" template from the drop-down list provided. The global navigation page is the target of a jump which the button will execute.</p> <p>The template itself may have structure that ordinary button pages have. It can include any button type except additional global navigate buttons. See <a href="#">Global Navigation</a> on page 62.</p> <p>The button legend is arbitrary.</p>

Type	Description (under LCD XY/MD Mode)
Hold	<p>In multi-destination mode, Hold retains destination selections after a take. In X-Y mode, Hold retains breakaway levels after a take. (There are other effects. See <a href="#">Selection Buttons</a> on page 51.)</p> <p>The button definition has no fields to configure. Its legend is arbitrary.</p>
Level Map	<p>Cross-connects levels (in the same physical router). The function is typically used to shuffle audio channels, for example, to connect AES1/2 to AES3/4.</p> <p>The Level Map mode is cancelled when the next normal take is performed involving the selected destinations.</p> <p>The button definition has no fields to configure. Its legend is arbitrary.</p>
Menu	<p>This button puts the NV9649 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 <a href="#">Menu Mode</a> on page 64.</p> <p>The button definition has no fields to configure. Its legend is arbitrary.</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. Its legend is arbitrary.</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 can use the navigate function to create new button pages.)</p> <p>The default text for a Navigate button depends on what you assign it. Sometimes it is “Navigate.” You will probably want to change it to something meaningful.</p> <p>See <a href="#">‘Edit Navigation Button’ Dialog</a> on page 48 for detail.</p>
Page Down	<p>(1) Scrolls the levels or MD destinations on the selection buttons <i>down</i> or (2) 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>The button definition has no fields to configure. Its legend is arbitrary.</p>

Type	Description (under LCD XY/MD Mode)
Page Up	<p>(1) Scrolls the levels or MD destinations on the selection buttons <i>up</i> or (2) 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 list.</p> <p>When the panel is displaying the <i>first page</i> of a list of devices in a category, the 'Page Up' button returns the operator to the page containing the category button.</p> <p>The button definition has no fields to configure.</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> <p>The button definition has no fields to configure. Its legend cannot be changed.</p>
Preset Release	<p>Removes locks and protects from preset source devices. This button is not needed if source locks and protects are not used in your system.</p> <p>The button definition has no fields to configure.</p>
Previous Source	<p>Presets the previously routed source to the currently selected destination. The operator must next press take to restore the previous source. This function is useful when a user makes a route in error.</p> <p>The button does <b>not</b> restore the previous destination. If the user changed the destination and presses 'Previous Source', the take will not restore the previous route.</p> <p>The button definition has no fields to configure.</p>
Quick Source	<p>A quick source button selects a source and performs an immediate take.</p> <p>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')</p> <p>The button definition section also presents a "level set filter" drop-down list in which you can select a level set to reduce the number of sources through which to browse.</p> <p>The button legend is the source name, unless you check 'Use Custom Button Text' and assign the button your own text.</p>
Salvo	<p>The button presets a salvo. (Subsequently pressing the 'Take' button actually executes the salvo.)</p> <p>When you assign a Salvo button, a drop-down list appears in which you select a system salvo (previously defined in NV9000-SE Utilities).</p> <p>The 'None' entry is merely a placeholder. Do not choose 'None'.</p> <p>(You can cause the panel to generate salvo buttons automatically using the options of the 'Edit Navigation Button' dialog when you create a navigation button.) See <a href="#">'Edit Navigation Button' Dialog</a> on page 48.</p>

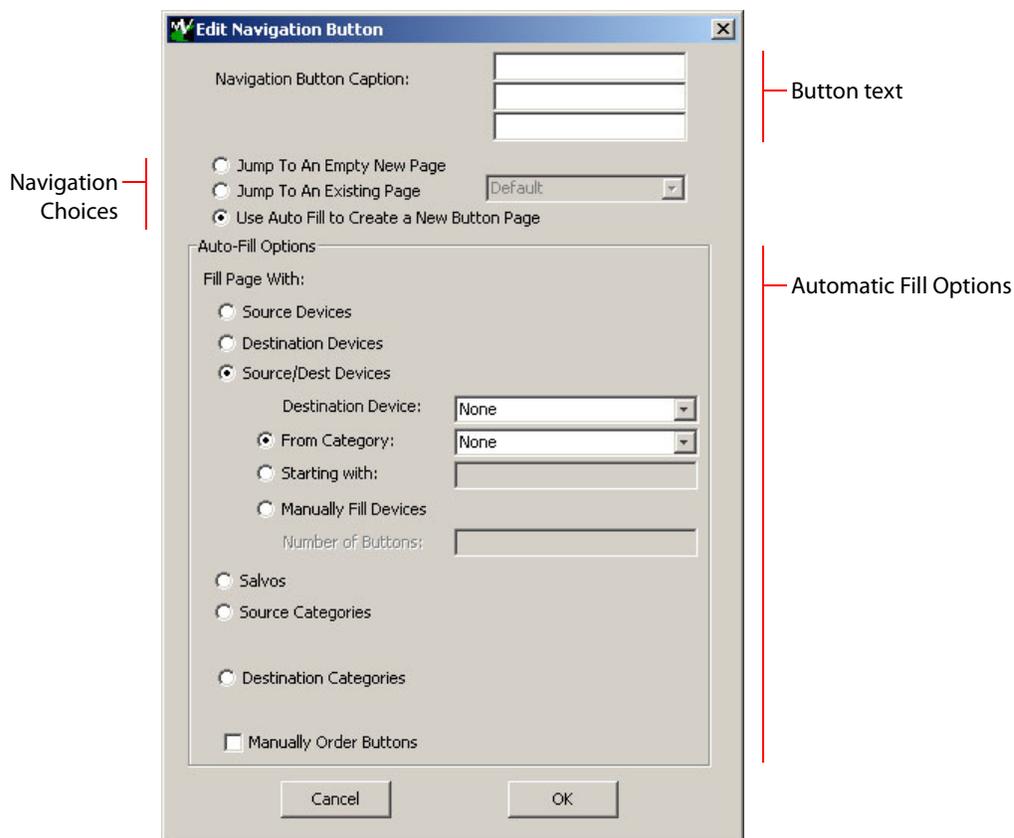
Type	Description (under LCD XY/MD Mode)
Save Preset	<p>When this function is enabled (its button is high tally), whatever is on preset is retained (on preset) after a take. When the function is disabled (its button is low tally), preset is cleared after a take.</p> <p>The button definition has no fields to configure. Its legend is arbitrary.</p>
Selection	<p>Typically, at least one button page should provide a set of selection buttons. Operators press selection buttons to select levels (when the panel is in XY mode) or to select MD devices (in MD mode). Each selection button represents one level or one MD device.</p> <p>You may configure any number of selection buttons (on any button page). The selection buttons can be arranged anywhere on the button page.</p> <p>When there are more levels, or more MD devices, than buttons on a page, the panel enables scrolling. The operator presses 'Page Up' or 'Page Down' to scroll through the levels or MD devices to make selections.</p> <p>See <a href="#">Selection Buttons</a> on page 51 for further detail.</p> <p>During configuration, when you assign a selection button, a drop-down menu appears in the button definition area: 'Display Index'. An 'Edit Multi-Dest Devices' button also appears.</p> <p>The drop-down menu for the button's <i>display index</i> has as many entries as the the number of selection buttons you have defined. Choose consecutive display indexes from 1 to the number of selection buttons on the page.</p> <p>Use the 'Edit Multi-Dest Devices' button to define MD devices. It opens a window in which you can define MD devices. They are assigned to selection buttons in the order in which you define them. See <a href="#">Multi-Destination Configuration</a> on page 53.</p> <p>▲ You can also obtain the MD device editing window by right-clicking the display area of the panel graphic.</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 configure a source button, a drop-down menu appears: 'Source Device'. Choose a device from the list. (The 'None' entry is merely a placeholder. Do not choose 'None!')</p> <p>The button definition section also presents a "level set filter" drop-down list in which you can select a level set to reduce the number of sources through which to browse.</p> <p>The button legend is the source name, unless you check 'Use Custom Button Text' and assign the button your own text.</p>

Type	Description (under LCD XY/MD Mode)
Source Master	<p>Means "source is the master" and makes the source device the master. Otherwise, the destination is the master. It applies to machine control routes.</p> <p>The button is a toggle: Press it once to make the source the master (it goes high-tally); press it again to make the destination the master (the button is low-tally).</p> <p>A panel option allows you to make "source is master" the default. In this case, the button still toggles between "source is master" and "destination is master," and the button, if present, is high-tally by default.</p> <p>The 'Source is Master' button is also used to initiate "broadcast" control routes. See <a href="#">Broadcast Routes</a> on page 61.</p> <p>The button definition has no fields to configure. Its legend is arbitrary.</p>
Source/ Destination	<p>A source/destination button selects both a source and a destination at one time.</p> <p>A source/destination button can be configured to perform an immediate take. If it is not, the operator must also press a 'Take' button to effect a take.</p> <p>When you configure a source/destination button, two drop-down menus appear: 'Src Device' and "Dst Device". Choose a device from each list. (You may choose 'None'.)</p> <p>The button definition section also presents a "level set filter" drop-down list in which you can select a level set to reduce the number of sources through which to browse.</p> <p>The button legend is composed of the source and destination device names, unless you check 'Use Custom Button Text' and assign the button your own text.</p>
Take	<p>In X-Y mode, a take button switches the preset source device(s) 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> <p>The button definition has no fields to configure. Its legend is arbitrary.</p>
Undefined	<p>Makes the button undefined and inactive. On the actual panel, it will remain unlit (dark).</p>
XY Display	<p>The 'X-Y Display' button displays current route status — in X-Y mode, MD mode, or in limited X-Y mode. Pressing this button has no effect. It also displays other messages in other circumstances, as required.</p> <p>Prior to a take, the 'X-Y Display' button displays the preset destination name (and turns low-tally red if that destination is locked or protected by another user.)</p> <p>After a take, the 'X-Y Display' button also displays the current source name.</p> <p>If there is no destination selected, the 'X-Y Display' button says so.</p> <p>The button definition has no fields to configure. Its legend is defined by the system and varies in context.</p>

Type	Description (under LCD XY/MD Mode)
XY/MD Mode	Switches the panel between X-Y and multi-destination modes. 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. The button definition has no fields to configure. Its legend is defined by the system and varies in context.

### '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 the navigation button's 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 NV9649 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 NV9649 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.

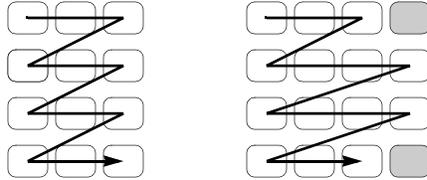
NV9000-SE Utilities (SE) creates at least one new button page, filling the page(s) with button functions according to the fill options you specify. Automatic fill has several sub-options:

Source buttons	Salvo buttons
Destination buttons	Source category buttons
Source/destination buttons	Destination category 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, but in two sections:



During operation, the navigation button will cause the NV9649 to display the first of the auto-fill pages. The operator uses the 'Page Up' and 'Page Down' buttons to page through the list. These are placed in the right-most column of buttons, and are indicated by gray buttons in the illustration above.

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.
- 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 repositioned where the black line is when you release your mouse button.

## Selection Buttons

- ▲ Selection buttons are available only when the panel is configured under the LCD XY/MD model.

Operators use selection buttons to select *levels* when the panel is in X-Y mode and *MD devices* when the panel is in MD (multi-destination) mode. Selection buttons also provide feedback (e.g., source and destination mnemonics on the face of the buttons) when the operator is performing takes.

A set of selection buttons supports (1) level selection in XY mode and (2) 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.

Selection (of levels or MD devices) is affected by 'Hold' mode. 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.

## Selection Button Behavior

### X-Y Mode

When the panel is in X-Y 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.

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.

### Populating the MD Device List

The 'Edit Multi-Destination Device' button appears when you are configuring a selection button. Click this button to get the 'Multi-Destination Entry' window. The window presents a list of all destinations on the left and a set of MD devices at the right. The MD device set is initially empty

and becomes populated as you add destination devices from the left. You can add devices in any order. The order is preserved and is the order in which the MD devices appear on the selection buttons under scrolling.

See [Multi-Destination Configuration](#) on page 53.

## 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.)

## Display Indexes

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 as many entries as there are selection buttons. Creating a new selection button creates a new display index.

It is possible but probably wasteful for two or more selection buttons to have the same display index.

## Single-Destination “Mode”

The panel, when it is in server mode, is —by definition— a single-destination panel. (The destination is defined as a panel option at configuration.)

- ▲ This does not contradict the idea that the server can assign destinations to its associated NV9648 clients.

The panel, in either LCD XY/MD or NV9609 mode, can be configured as a single-destination panel by defining a default destination during configuration and providing no destination selection buttons.

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

## Multi-Destination Configuration

Multi-destination (MD) devices are a subset of all destination devices. 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 visible at all times.
- ▲ You should make sure your configuration includes a ‘Page Up’ and a ‘Page Down’ button if the operator will be required to scroll through MD devices.

The limit to the number of MD devices is 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. Similarly, the operator could scroll through 4 pages of 16 selection buttons.

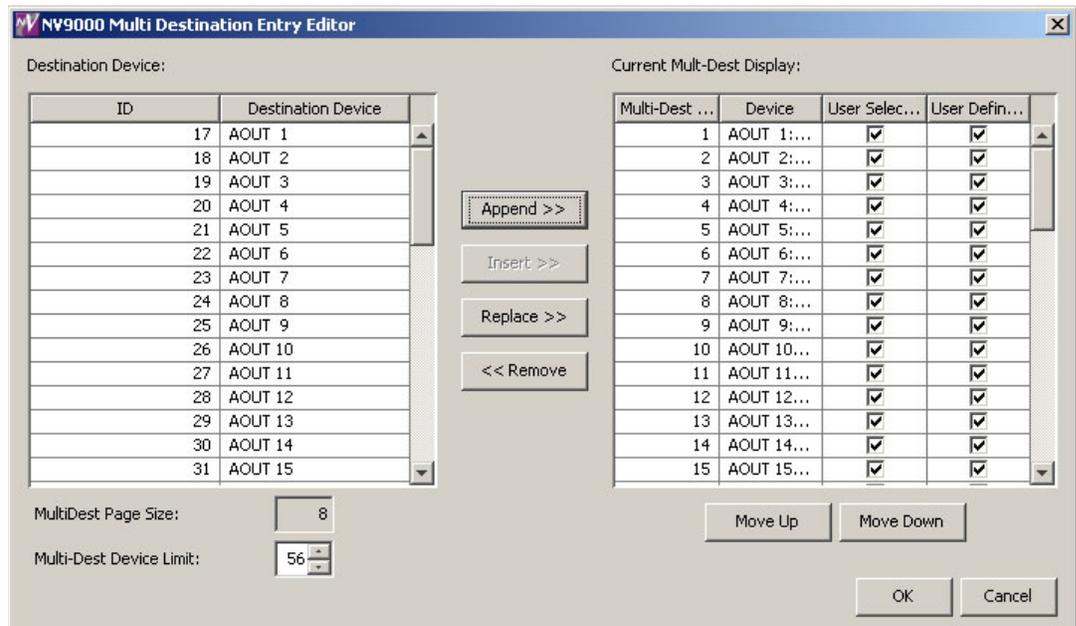
## How to Configure MD Devices

Follow these guidelines.

- 1 Go to the NV9649 configuration page of NV9000-SE Utilities.
- 2 Click any button in the panel image. In the button definition section, choose ‘Selection’ from the drop-down list.

A ‘Display Index’ field and an ‘Edit Multi-Dest Devices’ button appear in the button definition section.

3 Click 'Edit Multi-Dest Devices'. The multi-destination entry editor appears:



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. The MD device list is initially empty.

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(s) to the end of your set of MD destinations.

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

The 'Replace' button *replaces* whatever MD destination(s) 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 field is grayed out and irrelevant.)

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 will appear on the selection buttons or the display of a running panel having this configuration (when it is operating in MD mode).

You can edit the set of MD devices later, adding or removing entries as you wish. (To edit the MD devices, again choose a selection button in the panel graphic and click the 'Edit Multi-Dest Devices' button.)

## 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.

## Button Functions for NV9609 Mode

These are the button types available for NV9649 configurations under the NV9609 model:

Type	Description (under NV9609 Mode)
Broadcast	<p>On the data (machine 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.</p> <p>The button definition has no fields to configure. Its legend is arbitrary.</p> <p>A broadcast button is useful in dubbing applications or when a backup (redundant) device is in use. See <a href="#">Broadcast Routes</a> on page 75.</p> <p>See also the <a href="#">Source Master</a> button, following.</p>

Type	Description (under NV9609 Mode)
Category	<p>The button selects a device category. The button can operate in source mode or destination mode. (Source category buttons operate in level mode; destination category buttons do not.)</p> <p>During configuration, you can specify a source category for the button, a destination category, and a suffix. Any of those fields can be 'None'. When the field is 'None', the button is inapplicable in that context.</p> <p>Thus, when the panel is in source mode, category buttons that are not configured with a source category become disabled. When the panel is in destination mode, category buttons that are not configured with a destination category become disabled. Category buttons configured with both source and destination categories are available in either mode. Category buttons that have only a suffix configured are disabled until a category becomes selected.</p> <p>After a category button has been pressed, the operator must then press number or suffix buttons to perform a device selection within the category. The operator may also use the knob to select devices within the category.</p> <p>When the panel is in source mode, pressing a category button places the category mnemonic in the 'Preset' display. As the operator enters suffixes to select a source, the name of a source constructed from the category name and suffixes thus far entered appears in the 'Preset' field.</p> <p>When the panel is in destination mode, pressing a category button places the category mnemonic in the 'Preset' display. As the operator enters suffixes to select a destination, the suffixes are appended to the contents of the 'Preset' field, and the name of a destination constructed from the category name and suffixes thus far entered appears in the 'Destination' field.</p> <p>If you want your panel to have a keypad, you must use category buttons to implement the keypad. Any particular category button can represent 3 items: a source category, a destination category, and a suffix (which is typically numeric).</p> <p>The names of devices in categories are composed of the category name followed by one or more suffices. (Device names are limited to 8 characters, however.)</p> <p>NV9000-SE Utilities allows configurers to designate a separator character which is inserted between the parts of the device name.</p> <p>▲ Note that category buttons in NV9609 mode function differently from category buttons under LCD XY/MD mode and server mode. There are differences in the configuration of these buttons too.</p>
Chop	<p>When a chop function is supported by a 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> <p>The button definition has no fields to configure. Its legend is arbitrary.</p>

Type	Description (under NV9609 Mode)
Clear	<p>The button reverts to the most recent preset. You may think of this as a “back-space key.” It erases the suffixes you entered under category select in reverse order.</p> <p>(If the operator is in level mode, or in salvo mode, ‘Clear’ brings the panel back to normal mode.)</p> <p>The button definition has no fields to configure. Its legend is arbitrary.</p>
Destination	<p>The button selects a destination. The destination name appears in the ‘Destination’ display. The destination is the target of an upcoming take, which will route a source to that destination.</p> <p>Pressing a destination button has two side effects: it clears—or partially clears—the ‘Preset’ display, and (2) it turns off the ‘Take’ button if it is on.</p> <p>When you configure a destination button, a drop-down menu appears: ‘Destination Device’. Choose a device from the list. The ‘None’ entry is merely a placeholder. Do not choose ‘None’.</p> <p>The button definition section also presents a “level set filter” drop-down list in which you can select a level set to reduce the number of sources through which to browse.</p> <p>The button legend is the source name, unless you check ‘Use Custom Button Text’ and assign the button your own text.</p>
Destination Lock	<p>The button 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>The button definition has no fields to configure. Its legend cannot be changed.</p> <p>The NV9649 provides no explicit indication, during operation, whether a destination is locked or unlocked.</p>
Destination Mode	<p>The button places the panel in destination mode. Category selections in destination mode select destination devices. Category buttons that are not configured with destination categories become disabled.</p> <p>Categories that include both source and destinations appear in both source mode and destination mode.</p> <p>The button definition has no fields to configure. Its legend is arbitrary.</p>
Destination Protect	<p>The button sets or removes a “protect” on the current destination device. The protect can be removed only by the user that originally set the protect, or by a panel that has “Force Release” enabled.</p> <p><b>Note:</b> a protect prevents <i>others</i> from routing to a destination; a lock prevents <i>anyone</i>—even the user who issued the lock—from routing to the destination.</p> <p>The button definition has no fields to configure. Its legend cannot be changed.</p> <p>The NV9649 provides no explicit indication, during operation, whether a destination is locked or unlocked.</p>

Type	Description (under NV9609 Mode)
Free Source	<p>The button selects a pre-defined phantom device that can be used to release or “free” devices on the data (machine control) level. A free source is also used with tielines to free the tieline for others to use. The free source is defined in the <i>Level Set Details</i> page of NV9000-SE Utilities.</p> <p>The button definition has no fields to configure. Its legend is arbitrary.</p>
Level	<p>The button selects a level.</p> <p>The button definition has one field to configure: the level.</p> <p>If the panel has multiple level buttons, operators can select multiple levels. When all level buttons are selected, a take is “all-level.” When one or more level buttons are selected, a take occurs on those levels. (If a panel has a level button for all levels of the current destination, and they are all selected, that condition would be “all level” too.)</p> <p>You must select levels before selecting the source, otherwise multi-level takes do not work. They are all level.</p> <p>(Multi-level takes — and level buttons — are not available in <i>level mode</i>.)</p> <p>Operators that want to examine the levels of a destination may press ‘Level Mode’ and scroll through the levels. The ‘Status’ display shows the source for each individual level as you scroll and shows whether the source is a breakaway source.</p>
Level Mode	<p>The button toggles the panel in and out of level mode. “All Level” appears in the ‘Info’ display when level mode is off.</p> <p>Level mode allows operators (1) to examine the levels of the current destination and (2) to perform single-level takes.</p> <p>Source buttons and destination buttons, and some other button types, are disabled in level mode. The only means to select a source are source category buttons.</p> <p>The operator must start the selection of a source (using a category button) while in level mode for single-level breakaway. The panel exits level mode when the operator starts the source selection. The level chosen in level mode remains in effect for the take.</p> <p>The button definition has no fields to configure. Its legend is arbitrary.</p>
Menu	<p>This button puts the NV9649 panel in menu mode and displays a menu on the buttons that provides access to a variety of panel functions. Without the button, the operator has no access to the menu functions.</p> <p>By pressing certain buttons, the operator makes menu selections and may enter data (such as panel ID) or change brightness values. When the panel is in menu mode, the menu button cycles through the functions of the menu. See <a href="#">Menu Mode</a> on page 99.</p> <p>The button definition has no fields to configure. Its legend is arbitrary.</p>

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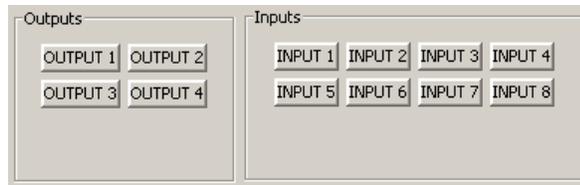
Type	Description (under NV9609 Mode)
Name Set Toggle	<p>The button toggles the panel between its default name set and the “system name” set. One or the other becomes the active name set.</p> <p>The button definition has no fields to configure. Its legend is arbitrary.</p> <p>If the default name set is 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>
Page Down	<p>The button scrolls <i>down</i>.</p> <p>Scrolling devices within a category: ‘Page Down’ moves to the next <i>lower</i> device in the category’s device list. (Example: if the current device is CAM_4, the next lower device would probably be CAM_3, subject to the device definitions in the NV9000 configuration.) Scrolling devices is possibly only when a category selection is in progress. Whether the list wraps around at the beginning or end is governed by the ‘Use Continuous Scrolling’ panel option.</p> <p>Scrolling salvos in salvo mode: ‘Page Down’ moves to the salvo with the next <i>lower</i> index in the salvo list. A valid salvo list must have been specified in the panel options.</p> <p>Scrolling levels in level mode: ‘Page Down’ moves first to “All levels” and then to the first level and then to the <i>next</i> levels defined for the destination. Using the ‘Page Down’ button, an operator can cycle through all the levels (including “All Levels”) indefinitely.</p> <p>The button definition has no fields to configure. Its legend is arbitrary.</p>
Page Up	<p>The button scrolls <i>up</i>.</p> <p>Scrolling devices within a category: ‘Page Up’ moves to the next <i>higher</i> device in the category’s device list. (Example: if the current device is VTR_12, the next higher device would probably be VTR_13, subject to the device definitions in the NV9000 configuration.) Scrolling devices is possibly only when a category selection is in progress. Whether the list wraps around at the beginning or end is governed by the ‘Use Continuous Scrolling’ panel option.</p> <p>Scrolling salvos in salvo mode: ‘Page Up’ moves to the salvo with the next <i>higher</i> index in the salvo list. A valid salvo list must have been specified in the panel options.</p> <p>Scrolling levels in level mode: ‘Page Up’ moves first to “All levels” and then to the last level and then to <i>previous</i> levels defined for the destination. Using the ‘Page Up’ button, an operator can cycle through all the levels (including “All Levels”) indefinitely.</p> <p>The button definition has no fields to configure. Its legend is arbitrary.</p>

Type	Description (under NV9609 Mode)
Panel Lock	<p>The button 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 amber. Pressing the panel lock button again reverts the panel to its previous state.</p> <p>The button definition has no fields to configure. Its legend cannot be changed.</p>
Previous Source	<p>The button presets the previously routed source to the currently selected destination. The operator must next press 'Take' to restore the previous route. This function is useful when an operator makes a route in error.</p> <p>The button definition has no fields to configure. Its legend is arbitrary.</p> <p>The button does <b>not</b> restore the previous destination. If the user changed the destination and presses 'Previous Source', the take will not restore the previous route.</p>
Quick Source	<p>A quick source button selects a source and performs an immediate take.</p> <p>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'.)</p> <p>The button definition section also presents a "level set filter" drop-down list in which you can select a level set to reduce the number of sources through which to browse.</p> <p>The button legend is the source name, unless you check 'Use Custom Button Text' and assign the button your own text.</p>
Salvo	<p>A salvo button places the panel in salvo mode. In salvo mode, the operator scrolls through the salvo list configured for the panel (as a panel option) to select a salvo. When the desired salvo is selected, the operator presses a 'Take' button to execute the salvo. The panel then returns to normal operating mode.</p> <p>The button definition has no fields to configure.</p>
Source	<p>The button selects a source. The source name appears in the 'Preset' display.</p> <p>During configuration, when you assign a source button, a drop-down menu appears: 'Source Device'. Choose a device from the list. The 'None' entry is merely a placeholder. Do not choose 'None'.</p> <p>The button definition section also presents a "level set filter" drop-down list in which you can select a level set to reduce the number of sources through which to browse.</p> <p>The button legend is the source name, unless you check 'Use Custom Button Text' and assign the button your own text.</p>

Type	Description (under NV9609 Mode)
Source Master	<p>Means "source is the master" and makes the source device the master. Otherwise, the destination is the master. This button (and these concepts) apply only to machine control routes.</p> <p>The button definition has no fields to configure. Its legend is arbitrary.</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" machine control routes. See <a href="#">Broadcast Routes</a> on page 75.</p>
Source Mode	<p>The button places the panel in source mode. Category selections in source mode select source devices. Category buttons that are not source categories become disabled in source mode.</p> <p>Categories that include both source and destinations appear in both source mode and destination mode.</p> <p>The button definition has no fields to configure. Its legend is arbitrary.</p>
Src/Dst Mode	<p>The button toggles between source and destination modes. Category selections in source mode select source devices. Category selections in destination mode select destination devices.</p> <p>The button definition has no fields to configure. Its legend is arbitrary.</p>
Take	<p>In normal mode, a take button routes the preset source to the selected destination on selected level or levels.</p> <p>In salvo mode, a take button executes a selected salvo.</p> <p>A take button is disabled (and dark) until it is possible for the operator to execute a take.</p> <p>Configurers should provide the operator a 'Take' button. The button definition has no fields to configure. Its legend is arbitrary.</p>
Undefined	<p>This button type is a placeholder: during configuration, it makes the button undefined and inactive. On the actual panel, the undefined button remains unlit (dark).</p>

## 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 NV9649 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 105.

## Global Navigation

NV9000-SE Utilities supports what are known as “global navigation” pages for NV9649 control panels. Global navigation pages are templates — patterns — that may be used and reused in the creation of NV9649 configurations.

▲ Global navigation pages are allowed only under the LCD XY/MD model.

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 NV9649 configurations. Navigate templates support all functions except ‘Global Navigate’. That is because templates cannot be nested.

Templates themselves are **not** NV9649 configurations.

Follow these steps to create either type:

- 1 Choose ‘Control Panels’ from the ‘Configuration’ pane. Then click ‘Add Control Panel’.
- 2 In the ‘Add Control Panel’ page, complete the details as you would for a panel: The panel type is NV9649. 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:

ID	Panel ID	Panel	Panel Type	Configuration Name
2	6404	9640-4	NV9640	\nvision\envy\usersys\live\pROD 6404.640
3	6402	9640-2	NV9640	\nvision\envy\usersys\live\pROD 6404.640
23	6492	Demo649	NV9649	\nvision\envy\usersys\live\D642.649
25	6493	SFx649	NV9649 Suffix	\nvision\envy\usersys\live\S64 .649.suffix
26	6494	Gnav649	NV9649 Navigation	\nvision\envy\usersys\live\G64 ..649.navigate

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 (under LCD XY/MD mode), the button definition region displays a checkbox option: 'Use global suffix page to select devices':

When you check the option, an addition 'Suffix Page' field appears. Choose one of your defined 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	Breakaway	1
10	Sfx1	1
11	Nav1	1
12	Gnav Sub Page	11

- ▲ The suffix page is a *copy* of the suffix template. It is not the template or a link to the template. Category buttons in the panel configuration that reference a suffix template do have links to their templates.
- ▲ The suffix page allows operators to enter a **numerical** suffix (that is, an index).

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

- ▲ There are different ways to join the category with the index (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

Navigate

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	Sfx:1	1
11	Nav1	1
12	Gnav Sub Page	11

Global navigation page(s)

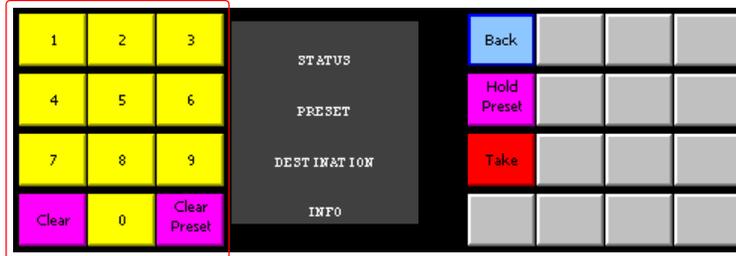
- ▲ The global navigation pages are copies made from the navigate template. They are not the template or a link to the template. The ‘Global Navigate’ buttons in the panel configuration that reference a navigate template do have links to their templates.

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

A global navigation page should at least have a ‘Back’ button.

## Composing Suffix Templates

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



Keypad

The keypad itself consists of 'Category' buttons. On a suffix page, a "category button" simply places a numeral or a suffix on the suffix template. When the operator presses a numeral or a suffix, the numeral or suffix is appended to the mnemonic of the device being identified for selection.

- ▲ Certain numerals become disabled when 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 needed.

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

The operator can use a 'Clear' button to erase a mistakenly entered digit.

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 can see the entries in the list) you will probably want to click 'Push changes to panel configs' on the configuration page. When you do, the configuration software adjusts all NV9649 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 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 (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 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 instructions for the NV9649 control panel.

## Topics

<a href="#">Summary</a> .....	67
<a href="#">Behavioral Models</a> .....	69
<a href="#">Operating Concepts</a> .....	72
<a href="#">Button Functions</a> .....	77
<a href="#">Operating Methods</a> .....	96
<a href="#">Salvo Mode</a> .....	98
<a href="#">Menu Mode</a> .....	99
<a href="#">Setup Mode</a> .....	101

This chapter is intended specifically for the NV9649 panel **operator**.

## Summary

As an NV9649 operator, you will be confronted initially with a relatively small and simple panel — 28 buttons, four 8-character displays, and a knob (that you can rotate and push).

The panel can operate according to 3 behavioral models (or operating modes):

- Server mode.  
The NV9649 (the “server”) operates in conjunction with a number of NV9648s (which are the “clients”).
- NV9609 mode.  
The panel operates almost exactly like an NV9609.
- LCD XY/MD mode.  
The panel has a hierarchical (tree-like) structure of button “pages”. You can switch at any time between “X-Y mode” (in which you can select individual levels for a take) to MD (multi-destination) mode where you can perform many simultaneous takes that are all-level.

Communicate with your system administrator (or whoever designed the control system or configured its control panels) to understand the model in which the panel was configured and how it operates.

- ▲ If your panel operates under the server model, it will operate in conjunction with a number of NV9648s (the “clients”). You will need to understand how to operate the NV9648s as well.
- ▲ 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.

## Buttons and Button Legends

Each of the NV9649's 28 LCD buttons has 1, 2, or 3 lines of text, 8 characters per line. When there are one or two lines of text, the characters are large; when there are 3 lines of text, the characters are smaller. (One or all of the lines of text might be blank). 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.

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 87, for a color chart.

The panel's LCD XY/MD behavioral model supports a hierarchical (or tree-structured) set of button pages. Although one can see a list of the pages in the tree during configuration, the structure of the tree is not evident on the panel itself. You, the panel operator, must commit some or all of 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.

Under the LCD XY/MD model, 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 "Page Down" button and a "Page Up" button if there are more sources than buttons. Pressing the 'Page Down' button takes you to the next page of sources. Pressing the 'Page Up' 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.

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.

Under the XY/MD model, the panel will probably have 'Selection' buttons. In X-Y mode, selection buttons report the preset source, current source, and the levels for the current destination. In multi-destination (MD) mode, selection buttons report the preset source, current source, and destination device.

A reverse field (light letters on a dark background) indicates that a breakaway exists or that level mapping has been performed on a source.

The user interface of an NV9649 in one installation can be radically different from the user interface of an NV9649 in another installation.

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.

## Behavioral Models

The panel can operate according to 3 behavioral models (or operating modes):

- Server mode.
- NV9609 mode.
- 'LCD XY/MD' mode.

Your panel will operate in only one of these modes. It is not possible to change modes except by reconfiguration. It is not likely that your panel will be reconfigured often.

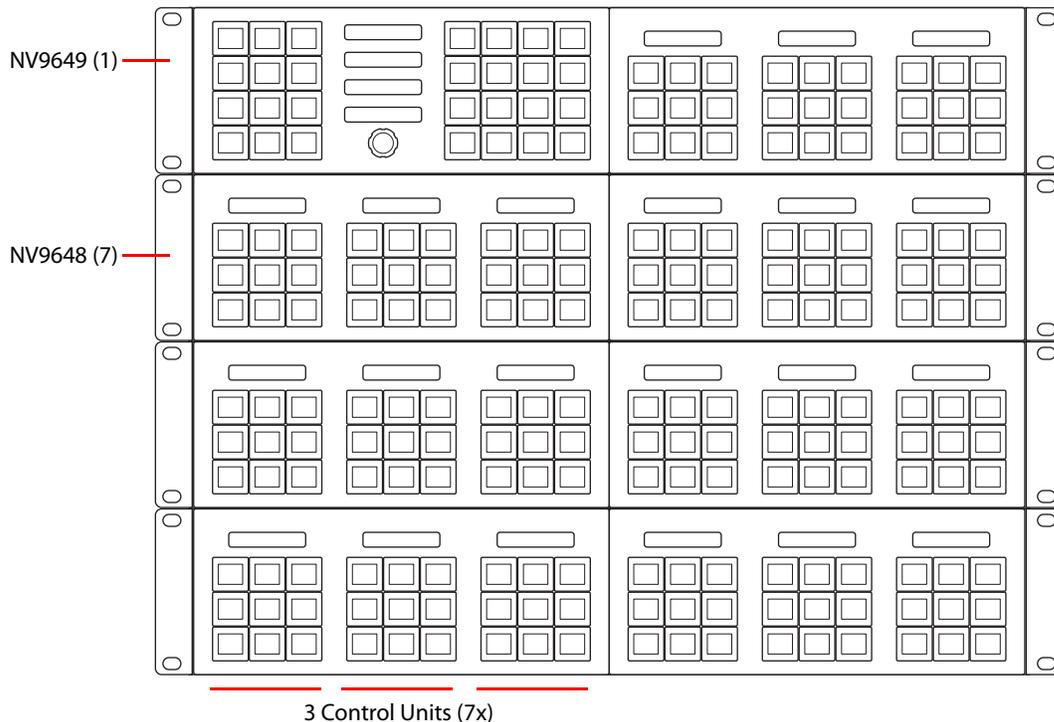
### 'Panel Server' Mode

When the panel is in "server" mode, it operates in conjunction with a number of NV9648s. The NV9649 is the "server" and the NV9648s are the "clients." The NV9649 and the NV9648s combine to form, in essence, a larger panel — actually a cluster of many small control units. The NV9649, being the server, can control which sources and destinations the NV9648s can select.

Each NV9648 has 3 identical sections and each section functions as a complete and separate control unit, unrelated to any other NV9648 section. Each section controls a destination you choose at the NV9649. The section's display usually shows that destination.

The NV9649 can also assign sources to the source buttons of individual NV9648 control units.

Here is an example of a system with an NV9649 and 7 NV9648 clients:



In this example, there are 21 control sections in addition to the controls of the NV9649. At any moment, the operator can route to 21 destinations. You can assign different destinations to the control units at any time. The function buttons in each individual control unit apply only to the destination assigned to the unit.

There are 15 button function types for a panel in server mode (not counting 'Undefined'):

Assign	Broadcast	Category
Chop	Clear	Destination Lock
Destination Mode	Destination Protect	Quick Source
Salvo	Source	Source Mode
Src/Dst Mode	Take	Take All

These are described in [Buttons for the Server Model](#) on page 77. See [Operating Methods](#) on page 96 for how to assign sources and destinations to the NV9648 control units.

Please refer to the *NV9648 Users Guide* for information regarding the use of the NV9648.

### 'NV9609 Panel' Mode

When the panel is in "NV9609" mode, it functions exactly like an NV9609, but with buttons that have LCD legends instead of simple backlit buttons.

In this mode, the panel operates standalone, without regard to any NV9648s.

Please refer to the *NV9609 Users Guide* for additional information.

There are 24 button function types for a panel in NV9609 mode (not counting 'Undefined'):

Broadcast	Category	Chop
Clear	Destination	Destination Lock
Destination Mode	Destination Protect	Free Source
Level	Level Mode	Menu
Name Set Toggle	Page Down	Page Up
Panel Lock	Previous Source	Quick Source
Salvo	Source	Source Master
Source Mode	Src/Dst Mode	Take

These are described in [Buttons for the NV9609 Model](#) on page 90.

### LCD XY/MD Model

When the panel is in LCD XY/MD mode, it operates standalone, without regard to any NV9648s, and has a moderately richer function set than a panel in the other two modes.

The panel's buttons can be used in a hierarchical fashion: pressing a 'navigation' button causes the panel to display a new set of configured button functions, called a "button page." There can be many such pages, organized in a configurable tree structure.

You can switch the panel between "X-Y mode" and multi-destination (MD) mode. In X-Y mode, you can perform takes (and locks) on individually selected levels for a single destination at a time. In MD mode, takes occur on all levels, but you can perform takes to multiple destinations simultaneously.

The panel supports the use of multiple 'selection' buttons. When the panel is in X-Y mode, the selection buttons select levels. When the panel is in MD mode, the selection buttons select MD devices (which are destinations). If there are more levels (or more MD devices) than there are selection buttons, you can press a 'Page Up' or 'Page Down' button to scroll through the list of levels (or, in MD mode, the list of MD devices).

There are 31 button function types for a panel in LCD XY/MD mode (not counting 'Undefined'):

Back	Broadcast	Category
Chop	Clear Preset	Default State
Destination	Destination Lock	Destination Protect
Free Source	Global Navigate	Hold
Level Map	Menu	Name Set Toggle
Navigate	Page Down	Page Up
Panel Lock	Preset Release	Previous Source
Quick Source	Salvo	Save Preset
Selection	Source	Source Master
Source/Destination XY/MD Mode	Take	X-Y Display

These are described in [Buttons for the LCD XY/MD Model](#) on page 81.

## Additional Modes

### Level Mode

When the panel is operating under the NV9609 model, operators can switch the panel in and out of *level mode* (if the panel has a 'Level Mode' button). Level mode allows you to select one of the destination's levels (by scrolling). A take in level mode is a single-level breakaway.

When the panel is **not** in level mode, takes occur on either all levels or selected levels of the current destination. Takes on all levels are said to be "all level."

If the panel has multiple 'Level' buttons, operators can perform multiple-level breakaway.

### Secondary Modes

Additional but secondary modes of panel operation are:

- Setup mode—where the NV9649 is freshly powered up, but disconnected from the network. In this mode, you can preset the NV9649's panel ID and perform a few diagnostic tasks.
- Salvo mode—pressing a salvo button places the NV9649 in salvo mode, where it is expected that the operator will choose a salvo and then press a 'Take' button to executes a salvo. (The duration of a salvo is indeterminate, but usually short.)
- Menu mode—pressing a menu button places the NV9649 in "menu" mode. In menu mode, the buttons lose their normal functions and become part of a menu that changes as needed during menu operation. (Menu mode is not available under the server model.)

When the panel is not in setup mode, salvo mode, or menu mode, we say it is in *normal mode*.

Normal mode might or might not include level mode.

## Special Modes

When the panel is in server mode or NV9609 mode, two additional modes can be applied:

- Source mode— when the operator places the panel in source mode, category buttons produce source lists and, under server mode only, operations involving NV9648s refer to sources.
- Destination mode— when the operator places the panel in destination mode, category buttons produce destination lists and, under server mode only, operations involving NV9648s refer to destinations.

When the panel is in LCD XY/MD mode, one additional mode can be applied:

- Hold mode— when the operator has pressed a 'Hold Preset' button. See [Selection Buttons](#) on page 51.

## Operating Concepts

### Levels

In 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 mapping.

Levels are usually called "virtual levels" in NV9000-SE Utilities.

The effect of this is that when you, the operator, choose a destination, the NV9000 recognizes 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 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. (Routers are not mixers.)

### Level Mode

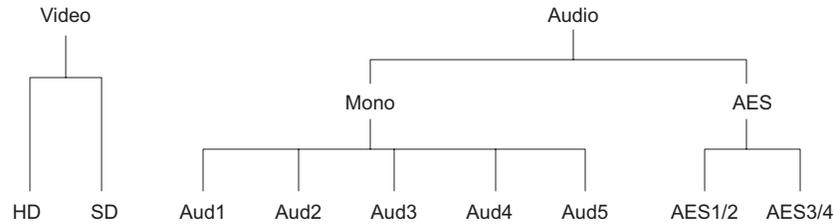
As stated earlier, you can switch the panel in and out of level mode (if the panel has a 'Level Mode' button). Level mode allows you to select exactly one of the destination's levels (by scrolling). A take in level mode is a *single-level breakaway*.

When the panel is **not** in level mode, takes occur on either all levels or selected levels of the current destination. If the panel has multiple 'Level' buttons, you can perform multiple-level breakaway when the panel is not in level mode.

- ▲ Level mode is available only under the NV9609 model.

## 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 “Audx” levels are grouped under ‘Mono’. The two AES levels are grouped under AES. The two video levels are grouped under ‘Video’. The groups ‘Mono’ and AES are also grouped under ‘Audio’.

The levels ‘Video’, ‘Audio’, ‘Mono’, and ‘AES’ are abstract levels; the other levels (e.g., HD) are basic levels.

- ▲ If you have chosen a destination whose basic levels are grouped, the panel’s selection buttons show only the bottom-most (or “leaf node”) levels.

*We discuss level groups — a feature of the router control system — only to state that the NV9649 does **not** have support for level groups.*

## Hold

Under the LCD XY/MD model, 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.

NV9649 category buttons can represent a source category or a destination category. When you press a category button to begin device selection, the panel displays a list of all devices in that category. You can scroll through multiple pages of devices using ‘Page Up’ and ‘Page Down’ buttons to find the device you want.

You can also use the panel's knob to perform device selection by category. The panel will be in either source mode or destination mode. Turning the knob scrolls through categories. Pressing the knob selects the category displayed in the 'Preset' display. When you press the knob, the panel allows you use the knob to scroll through devices within the selected category or to append suffixes to the category mnemonic, using a "keypad", to form the desired device name. The device so named becomes the selected device.

The knob is used only when the panel is operating under the 'Panel Server' model.

## 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 NV9649 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

A "take" is a route as it is being performed.

In X-Y mode, a take can be a route from one source, on all levels, to a destination or it can be a router from multiple sources, on different levels, to a destination.

In MD mode, a take is (1) a route of a source to a destination on all levels or (2) several such routes executed simultaneously.

A take can occur in 4 ways:

- You have selected a destination and then a source. A 'Take' button lights and you press the 'Take' button.
- You have selected a destination and press a 'Quick Source' button (or a 'Src/Dst' button). The take occurs immediately.
- There is a default destination (or a destination assigned by an NV9648) and you select a source. A 'Take' button lights and you press the 'Take' button.

- There is a default destination (or a destination assigned by an NV9648) and you press a 'Quick Source' button (or a 'Src/Dst' button). The take occurs immediately.

▲ Immediate takes on 'Src/Dst buttons' is a panel option that can be enabled or disabled.

## Name Sets

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

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

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

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

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

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

▲ The panel might use a name set. The panel option is available only under the LCD XY/MD model. You cannot switch between the specified name set and the default name set.

## 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’.

## Button Functions

The NV9649 has 3 behavioral models. The sets of button functions differ in the 3 models.

### Buttons for the Server Model

There are 15 button function types for a panel in server mode (not counting ‘Undefined’):

<a href="#">Assign</a>	<a href="#">Broadcast</a>	<a href="#">Category</a>
<a href="#">Chop</a>	<a href="#">Clear</a>	<a href="#">Destination Lock</a>
<a href="#">Destination Mode</a>	<a href="#">Destination Protect</a>	<a href="#">Quick Source</a>
<a href="#">Salvo</a>	<a href="#">Source</a>	<a href="#">Source Mode</a>
<a href="#">Src/Dst Mode</a>	<a href="#">Take</a>	<a href="#">Take All</a>

#### Assign

When the panel is in destination mode, the button begins the assignment of a selected destination to an NV9648 control unit.

When the panel is in source mode, the button begins the assignment of a selected source to source button of an NV9648 control unit.

See [Operating Methods](#) on page 96 for detail.

#### 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 75 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

Each category button represents 3 items: a source category, a destination category, and a device suffix (or a numerical index).

A category button displays 2 lines of text: (1) either the source category name when the panel is in source mode, or the destination category name when the panel is in destination mode, and (2) its suffix text. If the button has no suffix text, the second line shows dashes.

When you first press a category button, the category mnemonic appears in the 'Preset' display. After the category is thus selected, you use a keypad (which is a button array) to enter the device index within the category. (The keypad is a set of category buttons to which indexes or suffixes have been assigned.)

(Typically the category buttons are arranged to form a keypad on your panel in which the digits or suffixes are logically arranged.)

Pressing a category button when the panel is in source mode starts the "construction" of a source device name. Pressing a category button when the panel is in destination mode starts the construction of a destination name.

- ▲ Note that category buttons in server mode function differently from category buttons under LCD XY/MD mode and NV9609 mode. There are differences in the configuration of these buttons too.
- ▲ The names of devices in categories are composed of the category name followed by one or more suffixes. NV9000-SE Utilities allows configurers to designate a separator character which is inserted between the parts of the device name. (Device names are limited to 8 characters, however.)
- ▲ You can also perform device selection by category and index using the panel's knob. See [Category Lists](#) on page 40.

## 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

The 'Clear' button reverts the panel to the most recent preset state. (It does not cause any changes to the routers, control system, or its signals.)

You may think of this as a "backspace" or "cancel" key. During category/suffix device selection, it erases the suffixes you entered in reverse order.

(If you are in level mode or in salvo mode, 'Clear' brings you back to normal mode.)

## Destination Lock

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

- ▲ The NV9649 provides no explicit indication, during operation, whether a destination is locked or unlocked.

### Destination Mode

The button places the panel in destination mode. Category selections in destination mode select destination devices. Category buttons that are not configured with destination categories become disabled.

When the panel is in destination mode, you can assign a destination to a control unit of an associated NV9648. See [Operating Methods](#) on page 96.

Destination devices are represented on the 'Destination' display.

### 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 NV9649 provides no explicit indication, during operation, whether a destination is locked or unlocked.

### Quick Source

A quick source button selects a source and performs an immediate take (to the destination of the control unit in which the quick source button is located).

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

The salvo button places the panel in salvo mode. In salvo mode, you can the knob to select a salvo from the salvo list configured for the panel (as a panel option). When the desired salvo is selected, press a 'Take' button to execute the salvo. The panel then returns to normal operating mode.

You can also press 'Page Up' and 'Page Down' buttons to browse through the salvo list.

Pressing a button other than 'Take', 'Page Up', or 'Page Down' returns to its normal operating mode.

### Source

The button selects a specific source. The source name appears in the 'Preset' display.

Selecting a source activates the 'Take' button, which you must press to complete the route.

### **Source Mode**

The button places the panel in source mode. Category selections in source mode select source devices. Category buttons that are not source categories become disabled in source mode.

Categories that include both source and destinations appear in both source mode and destination mode.

In source mode, a category selection appears at the beginning of the 'Preset' display.

### **Src/Dst Mode**

The button toggles between source and destination modes. Category selections in source mode select source devices. Category selections in destination mode select destination devices.

### **Take**

In normal mode, a take button routes the preset source to the selected destination on selected level or levels.

In salvo mode, a take button executes a selected salvo.

A take button is disabled (and dark) until it becomes possible for the operator to execute a take.

### **Take All**

Use the 'Take All' button to take a source you have selected to the destinations of *all* the NV9648 control units.

### **Undefined**

An undefined button cannot be used and appears dark (unlit) on the panel. The term "undefined" has meaning primarily to the configurer.

(Other buttons, temporarily disabled, might also appear dark. They are not necessarily undefined.)

## Buttons for the LCD XY/MD Model

There are 31 button function types for a panel in LCD XY/MD mode (not counting 'Undefined'):

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

### Back

Redisplay the previous button page. (The previous button page becomes 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 it is for back buttons generated automatically for lists. A back button is never high-tally.

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 75 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

Each category button represents (1) either a source category or a destination category, and (2) a device suffix (or a numerical index).

A category button displays 2 lines of text: (1) a source category name when the panel is in source mode or a destination category name when the panel is in destination mode, and (2) its suffix text. If the button has no suffix text, the second line shows dashes.

A category button selects a category for the purpose of device selection. In source mode, it selects a source category. In destination mode, it selects a destination category. After you press a category button, you must then press number or suffix buttons to perform a device selection within the category. You may also use scroll buttons ('Page Up' and 'Page Down') to select device indexes and suffixes within the category if the panel has scroll buttons.

When the panel is in source mode, a category button places the category mnemonic in the 'Preset' display. As you enter suffixes to select a source, the name of a source constructed from the category name and suffixes thus far entered appears in the 'Preset' field.

In destination mode, a category button places the category mnemonic in the 'Preset' display. As you enter suffixes to select a destination, the suffixes are appended to the contents of the 'Preset' field, and the name of a destination constructed from the category name and suffixes thus far entered appears in the 'Destination' field.

When the panel is in source mode, category buttons that are not configured with a source category become disabled. When the panel is in destination mode, category buttons that are not configured with a destination category become disabled. Category buttons configured with both source and destination categories are available in either mode. Category buttons that have only a suffix configured are disabled until a category becomes selected and the set of device names in the category include the digit or suffix on the button. If, for example, the devices in the category number from 1 to 7, buttons for the digits 8 and 9 will be disabled.

A typical NV9649 configuration has a "keypad" — possibly on a suffix page — with which you can enter device indexes or suffixes. Keypad buttons are actually category buttons. Any keypad button can also be a source category button and a destination category button.

- ▲ Note that category buttons in server mode function differently from category buttons under LCD XY/MD mode and NV9609 mode. There are differences in the configuration of these buttons too.
- ▲ The names of devices in categories are composed of the category name followed by one or more suffixes. NV9000-SE Utilities allows configurers to designate a separator character which is inserted between the parts of the device name. (Device names are limited to 8 characters, however.)
- ▲ You cannot perform a name set change using a 'Nameset Toggle' button while a category selection is in progress.

## 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 any preset entries.

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

## Default State

This button returns the NV9649 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 might have any legend.

## Destination

The button selects a destination. The destination name appears in the 'Destination' display. The destination is the target of an upcoming take, which will route a source to that destination.

Pressing a destination button has two side effects: it clears — or partially clears — the 'Preset' display, and (2) it turns off the 'Take' button if it is on.

## Destination Lock

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

- ▲ The NV9649 provides no explicit indication, during operation, whether a destination is locked or unlocked.

## 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 NV9649 provides no explicit indication, during operation, whether a destination is locked or unlocked.

## Free Source

The button selects a pre-defined phantom device that can be used to release or "free" devices on the data (machine control) level. A free source is also used with tielines to free the tieline for others to use. The actual free source used is defined in the NV9000 configuration.

Use this button as if it were a source button.

## 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](#).

## Global Navigate

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

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

## Hold

The 'Hold' (a.k.a. 'Hold Preset') 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.

## 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 preset source. Here, the source is CAM-14:
- 2 Press 'Level Map'. The button goes bright and the 'XY Display' button tells you to "Select Source Level."  
Press a level (selection) button.
- 3 The the 'XY Display' button now says "Select Dest Level."  
Press another level (selection) button.
- 4 At this point, the level mapping is complete.
- 5 You can view the mapping using an 'Information' button. After you view the information, press the 'Information' button again to return to the X-Y display.
- 6 Finally, press 'Take'. After the take, a plus sign appears in the status column next to the mapped level. You can review 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

This button puts the panel in menu mode and produces a menu on the buttons and in the displays that provides access to a variety of panel functions.

Without the button, the operator has no access to the menu functions.

By pressing certain buttons, you makes menu selections and enter data (such as panel ID) or change brightness values. When the panel is in menu mode, you must press the 'Menu' button to cycle through the functions of the menu. See [Menu Mode](#) on page 99.

The button definition has no fields to configure.

## Name Set Toggle

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

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

## Navigate

- ▲ It is not likely that you will see any button labeled "navigate" on your panel. The configurer will have labeled such buttons according to their actual purpose.

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

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, 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.

Category buttons can also cause the display of a target page. In practice, navigate buttons and category buttons are nearly indistinguishable, although the pages they display can be quite different.

See the [Category](#) button type.

## Page Down

The button scrolls *down*. The meaning of scrolling varies with context:

- Scrolling devices within a category: 'Page Down' moves to the next *lower* device in the category's device list. (Example: if the current device is CAM\_4, the next lower device would probably be CAM\_3, subject to the device definitions in the NV9000 configuration.)  
Scrolling devices is possibly only when a category selection is in progress.
- Scrolling salvos in salvo mode: 'Page Down' moves to the salvo with the next *lower* index in the panel's salvo list. (It is expected that if the panel has a salvo button, it also has a salvo list.)

- Scrolling levels in level mode: 'Page Down' moves first to "All levels" and then to the first level and then to the *next* levels defined for the destination. Using the 'Page Down' button, you can cycle through all the levels (including "All Levels") indefinitely.

## Page Up

The button scrolls *up*. The meaning of scrolling varies with context:

- Scrolling devices within a category: 'Page Up' moves to the next *higher* device in the category's device list. (Example: if the current device is VTR\_12, the next higher device would probably be VTR\_13, subject to the device definitions in the NV9000 configuration.) Scrolling devices is possibly only when a category selection is in progress.
- Scrolling salvos in salvo mode: 'Page Up' moves to the salvo with the next *higher* index in the panel's salvo list. (It is expected that if the panel has a salvo button, it also has a salvo list.)
- Scrolling levels in level mode: 'Page Up' moves first to "All Level" and then to the last level and then to *previous* levels defined for the destination. Using the 'Page Up' button, you can cycle through all the levels (including "All Level") indefinitely.

## Panel Lock

The button 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 amber.

The button is a toggle: press the panel lock button again to revert the panel to its previous state.

## 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 NV9649.)

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

The button presets the previously routed source to the currently selected destination. To restore the previous route, you must next press 'Take' assuming you have not changed the destination. This function is useful when you make a route in error.

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

## Quick Source

A quick source button selects a source and performs an immediate take (to the destination of the control unit in which the quick source button is located).

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

The button presets a salvo. (Subsequently pressing the 'Take' button actually executes the salvo.)

The default button text is the salvo name but the button can have any legend.

### 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

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 destination is selected and low-tally when it is not selected. Sometimes selection buttons are dark, meaning that the level or MD destination is either not in use or not available.

### 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 levels than buttons, scrolling is enabled.

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

Hold mode preserves the level selection after a take.

### MD Mode

When the panel is in MD mode, a selection button represents an MD destination. If there are more MD destinations than selection buttons, scrolling is enabled. Pressing a selection button selects the destination.

- ▲ 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,

- 1 Select an MD device. 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 become unselected.

If the configurer has turned on the option, you may redefine any MD destination. 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

The button selects a specific source. The source name appears in the 'Preset' display.

Selecting a source activates the 'Take' button, which you must press to complete the route.

### Source/Destination

The button toggles between source and destination modes. Category selections in source mode select source devices. Category selections in destination mode select destination devices.

### Source is Master

Means "source is the master" and makes the source device the master. Otherwise, the destination is the master. This button (and these concepts) apply only to machine control routes.

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).

The 'Source is Master' button is also used to initiate "broadcast" machine control routes. See [Broadcast Routes](#) on page 75.

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 reverses the roles.

The 'Source is Master' button is used to initiate "broadcast" control routes. See [Broadcast Routes](#) on page 75.

The panel can be configured so that "source is master" is the default state or so that "destination is master" is the default. The button still toggles between "source is master" and "destination is master."

- ▲ Pressing the 'Source is Master' button turns off the 'Broadcast' button and vice versa.

## Take

In normal mode, a take button routes the preset source to the selected destination on selected level or levels.

In salvo mode, a take button executes a selected salvo.

A take button is disabled (and dark) until it becomes possible for the operator to execute a take.

## Undefined

An undefined button cannot be used and appears dark (unlit) on the panel. The term “undefined” has meaning primarily to the configurer.

## X-Y Display

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

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

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

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

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

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

## XY/MD Mode

This button switches the panel between X-Y and multi-destination modes.

The button is green for X-Y mode and amber for multi-destination mode.

The button text 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.

## Buttons for the NV9609 Model

There are 24 button function types for a panel in NV9609 mode (not counting 'Undefined'):

<a href="#">Broadcast</a>	<a href="#">Category</a>	<a href="#">Chop</a>
<a href="#">Clear</a>	<a href="#">Destination</a>	<a href="#">Destination Lock</a>
<a href="#">Destination Mode</a>	<a href="#">Destination Protect</a>	<a href="#">Free Source</a>
<a href="#">Level</a>	<a href="#">Level Mode</a>	<a href="#">Menu</a>
<a href="#">Name Set Toggle</a>	<a href="#">Page Down</a>	<a href="#">Page Up</a>
<a href="#">Panel Lock</a>	<a href="#">Previous Source</a>	<a href="#">Quick Source</a>
<a href="#">Salvo</a>	<a href="#">Source</a>	<a href="#">Source is Master</a>
<a href="#">Source Mode</a>	<a href="#">Src/Dst Mode</a>	<a href="#">Take</a>

### 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 75 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 selects a category. In source mode, it selects a source category. In destination mode, it selects a destination category. After you press a category button, you must then press number or suffix buttons to perform a device selection within the category. You may also use scroll buttons ('Page Up' and 'Page Down') to select device indexes and suffixes within the category if the panel has scroll buttons.

When the panel is in source mode, a category button places the category mnemonic in the 'Preset' display. As you enter suffixes to select a source, the name of a source constructed from the category name and suffixes thus far entered appears in the 'Preset' field.

In destination mode, a category button places the category mnemonic in the 'Preset' display. As you enter suffixes to select a destination, the suffixes are appended to the contents of the 'Preset' field, and the name of a destination constructed from the category name and suffixes thus far entered appears in the 'Destination' field.

- ▲ Source category buttons operate in level mode; destination category buttons do not.

When the panel is in source mode, category buttons that are not configured with a source category become disabled. When the panel is in destination mode, category buttons that are not configured with a destination category become disabled. Category buttons configured with both source and destination categories are not disabled in either mode. Category buttons that have only a suffix configured are disabled until a category becomes selected.

A typical NV9649 configuration has a "keypad" with which you can enter device indexes or suffixes. Keypad buttons are actually category buttons. Any keypad button can also be a source category button and a destination category button.

The names of devices in categories are composed of the category name followed by one or more digits or suffixes. NV9000-SE Utilities allows configurers to designate a separator character

which is inserted between the parts of the device name. (Device names are limited to 8 characters, however.)

- ▲ You cannot perform a name set change using a 'Nameset Toggle' button while a category selection is in progress.

## 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

The 'Clear' button reverts the panel to the most recent preset. (It does not cause any changes to the routers, control system, or its signals.)

You may think of this as a "backspace" or "cancel" key. During category/suffix device selection, it erases the suffixes you entered in reverse order.

(If you are in level mode or in salvo mode, 'Clear' brings you back to normal mode.)

## Destination

The button selects a destination. The destination name appears in the 'Destination' display. The destination is the target of an upcoming take, which will route a source to that destination.

Pressing a destination button has two side effects: it clears — or partially clears — the 'Preset' display, and (2) it turns off the 'Take' button if it is on.

## Destination Mode

The button places the panel in destination mode. Category selections in destination mode select destination devices. Category buttons that are not configured with destination categories become disabled.

Destination devices are represented on the 'Destination' display.

Categories that include both source and destinations appear in both source mode and destination mode.

## Destination Lock

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

- ▲ The NV9649 provides no explicit indication, during operation, whether a destination is locked or unlocked.

### 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 NV9649 provides no explicit indication, during operation, whether a destination is locked or unlocked.

### Free Source

The button selects a pre-defined phantom device that can be used to release or “free” devices on the data (machine control) level. A free source is also used with tielines to free the tieline for others to use. The actual free source used is defined in the NV9000 configuration.

Use this button as if it were a source button.

### Level

The button selects a level. If the button’s level is not defined for the current destination, the button is disabled however.

Level buttons are not available in level mode. A level is selected differently in level mode.

If the panel has multiple level buttons, operators can select multiple levels. When all level buttons are *deselected*, a take is “all-level.” When one or more level buttons are selected, a subsequent take occurs on those levels.

You must select level(s) before selecting the source, otherwise the level selection does not work and the take will be all-level.

The color of the level buttons reflect the levels of the current destination in a limited way. (With just two colors, it is not possible to represent all possible combinations of sources taken to a destination.) If the destination has breakaway levels, some of the level buttons will be amber; some will be green. Otherwise, they will all be green.

If you want to examine the levels of a destination, press ‘Level Mode’ and scroll through the levels. The ‘Status’ display shows the source for each individual level as you scroll and shows whether the source is a breakaway source.

### Level Mode

The ‘Level Mode’ button toggles the panel in and out of level mode. “All Level” appears in the ‘Info’ display when level mode is turned off.

Level mode allows operators (1) to examine the levels of the current destination and (2) to perform single-level takes.

Source buttons and destination buttons, and several other button types, are disabled in level mode. The only means to select a source in level mode are *source category buttons*.

To effect a single-level take in level mode, (1) scroll to choose a level, then (2) start the selection of a source (using a category button) while in level mode. The panel exits level mode immediately after you start the source selection. Complete the source selection.

The level chosen in level mode remains in effect for the take. After completing the source selection, press the 'Take' button which will have become enabled.

- ▲ The 'Level Mode' button is disabled until a destination has been selected.

## Menu

This button puts the panel in menu mode and produces a menu on the buttons and in the displays that provides access to a variety of panel functions.

Without the button, the operator has no access to the menu functions.

By pressing certain buttons, you makes menu selections and enter data (such as panel ID) or change brightness values. When the panel is in menu mode, you must press the 'Menu' button to cycle through the functions of the menu. See [Menu Mode](#) on page 99.

The button definition has no fields to configure.

## Name Set Toggle

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

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

## Page Down

The button scrolls *down*. The meaning of scrolling varies with context:

- Scrolling devices within a category: 'Page Down' moves to the next *lower* device in the category's device list. (Example: if the current device is CAM\_4, the next lower device would probably be CAM\_3, subject to the device definitions in the NV9000 configuration.)  
Scrolling devices is possibly only when a category selection is in progress.
- Scrolling salvos in salvo mode: 'Page Down' moves to the salvo with the next *lower* index in the panel's salvo list. (It is expected that if the panel has a salvo button, it also has a salvo list.)
- Scrolling levels in level mode: 'Page Down' moves first to "All levels" and then to the first level and then to the *next* levels defined for the destination. Using the 'Page Down' button, you can cycle through all the levels (including "All Levels") indefinitely.

## Page Up

The button scrolls *up*. The meaning of scrolling varies with context:

- Scrolling devices within a category: 'Page Up' moves to the next *higher* device in the category's device list. (Example: if the current device is VTR\_12, the next higher device would probably be VTR\_13, subject to the device definitions in the NV9000 configuration.) Scrolling devices is possibly only when a category selection is in progress.
- Scrolling salvos in salvo mode: 'Page Up' moves to the salvo with the next *higher* index in the panel's salvo list. (It is expected that if the panel has a salvo button, it also has a salvo list.)

- Scrolling levels in level mode: 'Page Up' moves first to "All Level" and then to the last level and then to *previous* levels defined for the destination. Using the 'Page Up' button, you can cycle through all the levels (including "All Level") indefinitely.

### Panel Lock

The button 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 amber.

The button is a toggle: press the panel lock button again to revert the panel to its previous state.

### Previous Source

The button presets the previously routed source to the currently selected destination. To restore the previous route, you must next press 'Take' assuming you have not changed the destination. This function is useful when you make a route in error.

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

### Quick Source

A quick source button selects a source and performs an immediate take (to the destination of the control unit in which the quick source button is located).

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

The salvo button places the panel in salvo mode. In salvo mode, you can the knob to select a salvo from the salvo list configured for the panel (as a panel option). When the desired salvo is selected, press a 'Take' button to execute the salvo. The panel then returns to normal operating mode.

You can also press 'Page Up' and 'Page Down' buttons to browse through the salvo list.

Pressing a button other than 'Take', 'Page Up', or 'Page Down' returns to its normal operating mode.

### Source

The button selects a specific source. The source name appears in the 'Preset' display.

Selecting a source activates the 'Take' button, which you must press to complete the route.

### Source Mode

The button places the panel in source mode. Category selections in source mode select source devices. Category buttons that are not source categories become disabled in source mode.

Categories that include both source and destinations appear in both source mode and destination mode.

In source mode, a category selection appears at the beginning of the 'Preset' display.

### Src/Dst Mode

The button toggles between source and destination modes. Category selections in source mode select source devices. Category selections in destination mode select destination devices.

### Source is Master

Means "source is the master" and makes the source device the master. Otherwise, the destination is the master. This button (and these concepts) apply only to machine control routes.

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).

The 'Source is Master' button is also used to initiate "broadcast" machine control routes. See [Broadcast Routes](#) on page 75.

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 reverses the roles.

The 'Source is Master' button is used to initiate "broadcast" control routes. See [Broadcast Routes](#) on page 75.

The panel can be configured so that "source is master" is the default state or so that "destination is master" is the default. The button still toggles between "source is master" and "destination is master."

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

### Take

In normal mode, a take button routes the preset source to the selected destination on selected level or levels.

In salvo mode, a take button executes a selected salvo.

A take button is disabled (and dark) until it becomes possible for the operator to execute a take.

### Undefined

An undefined button cannot be used and appears dark (unlit) on the panel. The term "undefined" has meaning primarily to the configurer.

## Operating Methods

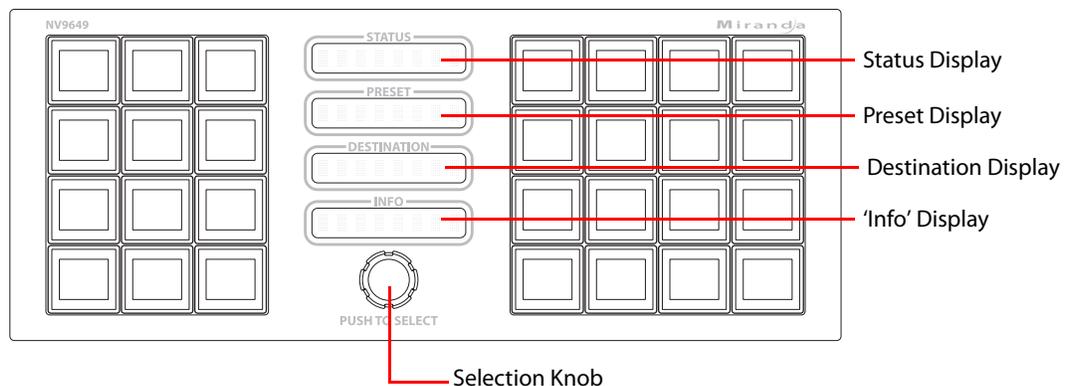
Operating the NV9649 in either NV9609 mode or LCD XY/MD mode is relatively straightforward. The NV9609 model is simple; the XY/MD model is more complex.

The server model is also simple but not at all obvious because of the interaction between the NV9649 and the multiple NV9648s.

To summarize that interaction, the NV9649 can assign destinations to each of the individual control units (9 buttons, 1 display) of the associated NV9648s. The NV9649 can also assign sources to source buttons of the individual control units of the associated NV9648s.

(The NV9649 button that applies in this interaction is the 'Assign' button. The NV9649's knob can be used to perform device selection by category. The NV9649 will have been configured in "server" mode.)

This is a view of the NV9649 panel, identifying the different features that apply to server mode:



## Client-Server Model Procedures

Preset procedures, A and B, are used by the "Assign" procedures, C and D, following, next page.

### Procedure A — Preset a Source Using the Knob

To preset a source in the preset display of the NV9649 (server):

- 1 Ensure that the NV9649 is in *source* mode. Press a 'Source Mode' button or press a 'SRC/DST Mode' button when the panel is in destination mode.
- 2 Turn the knob on the NV9649, clockwise or counter-clockwise, to scroll through the categories that were configured for the panel.
- 3 When you reach the desired category, identified in the NV9648's preset display, push the knob. (You can feel it click.) The NV9649's preset display will show the mnemonic of the selected category.
- 4 Use the knob now to scroll through the devices in the category until you see the desired device in the preset display. (Device names consist of the category mnemonic followed by a (usually) numeric suffix.
- 5 At any time, you can press a 'Clear' button to erase the preset entry you have selected. You might have to press 'Clear' more than once.

## Procedure B — Preset a Source Using a Keypad

To preset a source in the preset display of the NV9649 (server):

- 1 Ensure that the NV9649 is in *source* mode. Press a 'Source Mode' button or press a 'SRC/DST Mode' button when the panel is in destination mode.
- 2 Use a category button to select the desired category. The selected category will be displayed in the preset display. (The panel must have been configured with one or more category buttons.)
- 3 After choosing a category, use the panel's keypad to "type in" the index of the desired device contained in the category. For example, if the category is VTR and the device is VTR\_12, type in 1, then 2. (The panel must have been configured with one or more suffix buttons, which are category buttons that provide suffixes.)

As you press keys of the keypad, a device that currently matches the string of indexes will be displayed in the 'Preset' display.

Note also that you can use the knob to scroll forward or back from any point in the device selection (starting at that whatever index you have entered so far).

- ▲ During device selection by keypad, certain keys in the keypad become disabled if it is not possible to use the keys to perform further selection. For instance, if you have devices numbered 1–16 in a category and you press 2 (e.g., VTR2), all keys in the keypad become disabled because another digit would create an index of 20, 21, or similar, which is beyond the range of 1–16.

- 4 At any time, you can press a 'Clear' button to go back **one key press at a time** as you require.

## Procedure C — Assign a New Source to a NV9649 Source Button

To assign a new source to a source button of an NV9648's control unit:

- 1 Ensure that the NV9649 is in *source* mode. Press the 'Source Mode' button or press a 'SRC/DST Mode' button if the panel is in destination mode.
- 2 Use procedure A or procedure B described above to select (i.e., preset) the desired source.
- 3 Press an 'Assign' button on the NV9649.
- 4 Press the intended source button — in the intended control unit of the intended NV9648. The software assigns the source selected at the NV9648 to that button. The source text appears on the button's LCD.

## Procedure D — Assign a New Destination to a NV9649 Control Unit

To assign a new destination to a control unit of an NV9648:

- 1 Ensure that the NV9649 is in *destination* mode. Press the 'Destination Mode' button or press a 'SRC/DST Mode' button if the panel is in source mode.
- 2 Select a destination device by (1) turning the knob or (1) selecting the category and device index using a "keypad." Use the method described under procedures A or B. But because you have placed the NV9648 in destination mode, the method selects a destination.
- 3 Press an 'Assign' button on the NV9649.
- 4 Press any *source* button in the intended control unit of the intended NV9648. (To help you do this, the source buttons of NV9648s — and only the source buttons — will be lighted.)

Note: because the NV9649 is in destination mode, the new destination mnemonic will immediately appear in the display of the intended control unit.

### Procedure E — Takes Using Source Buttons

To perform a take to a single destination using an NV9648 control unit having standard source buttons:

- 1 Press a source button in the control unit that corresponds to your intended destination. The source becomes selected and the source button goes high-tally. The take button in the same control unit goes high-tally red.
- 2 Press the take button. The take is completed.

### Procedure F — Takes Using Quick Source Buttons

To perform a take to a single destination using an NV9648 control unit having quick source buttons:

- 1 Press a quick source button in the control unit that corresponds to your intended destination.
- 2) That source is immediately taken to the destination of that control unit.

### Procedure G

To perform a 'Take All':

- 1 Ensure that the NV9649 is in *source* mode. Press the 'Source Mode' button or press a 'SRC/DST Mode' button if the panel is in destination mode.
- 2 Use procedure A or procedure B described above to select (i.e., preset) the desired source.
- 3 Press a 'Take All' button on the NV9649.
- 4 The source is taken to the destinations of *all* NV9648 control units, regardless of how many there are.

## Salvo Mode

The panel must be configured to have a salvo list. Otherwise, salvo mode does not function.

The salvo button places the panel in *salvo mode* where the operator can scroll through the panel's salvo list. When you find the salvo of your choice, press the 'Take' button to execute the salvo. After the salvo executes, the panel returns to its normal mode.

Press the salvo button again while the panel is in salvo mode to reset the salvo selection to nothing.

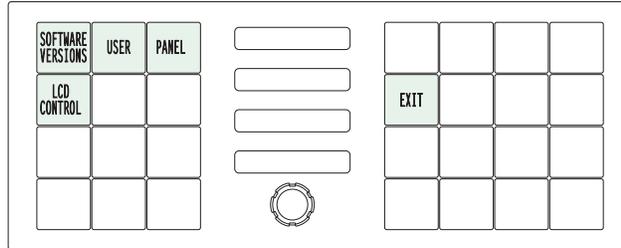
Press any other button while the panel is in salvo mode to return the panel to its normal mode.

## Menu Mode

The NV9649 enters menu mode if it has a menu button and you press the menu button.

- ▲ The menu uses the buttons on your panel. The legends and functions of these buttons in normal operating mode do not apply while the panel is in menu mode.

This is the menu that appears when you press a menu button:



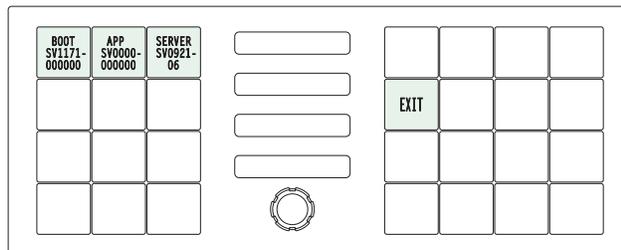
There are 4 submenus:

Software version      User      Panel      LCD Control

You can always use the 'Exit' button at the right to leave the menu or a submenu.

## Software Versions

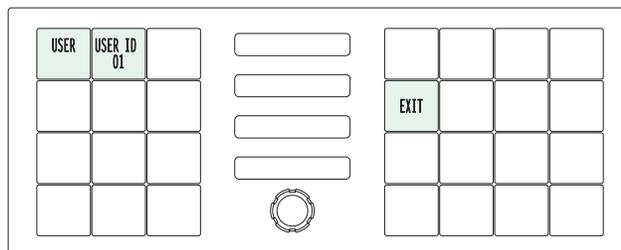
The software versions submenu appears first when you press the 'Software Versions' button:



Press 'Exit' to leave the submenu.

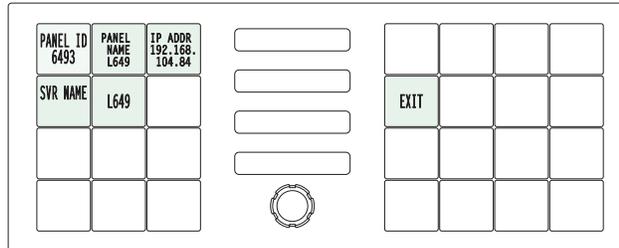
## User

The 'User' submenu merely displays the configured user ID. (You cannot change it.)



## Panel

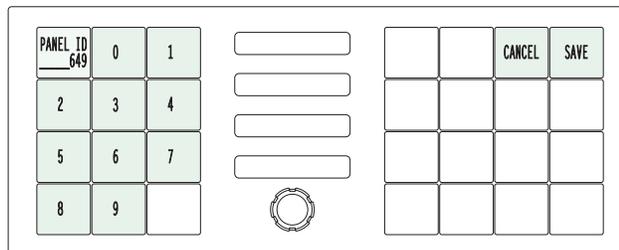
The 'Panel' submenu displays facts about the panel:



The 5 buttons at 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 configurers ensure that they are sending correct configuration file to the correct panel.

▲ The panel acquires its IP address through DHCP on the NV9000'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. To change the panel ID, press the panel ID button. A panel ID entry menu appears containing a keypad:



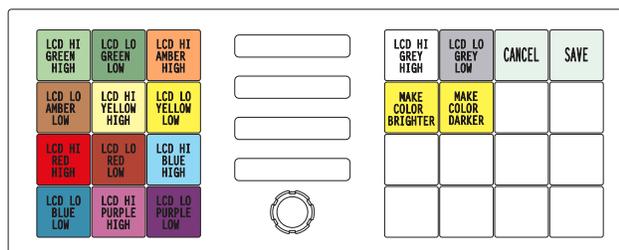
Press the keys of the keypad to enter a number. The number you enter is displayed on the panel ID button.

Press Cancel to leave the submenu without changing the panel ID.

Press Save to accept your change to the panel ID and leave the submenu.

## 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:



There are 14 buttons for the 7 button colors. They occur in pairs. 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 brightness.)

To change a color's brightness, select the button for the color you want to change. Press either the 'Make Color Brighter' button or the 'Make Color Darker' button, whichever is available.

If you make a change, press 'Save' to commit the change or press 'Cancel' to discard the change. Pressing either button returns you to the panel menu.

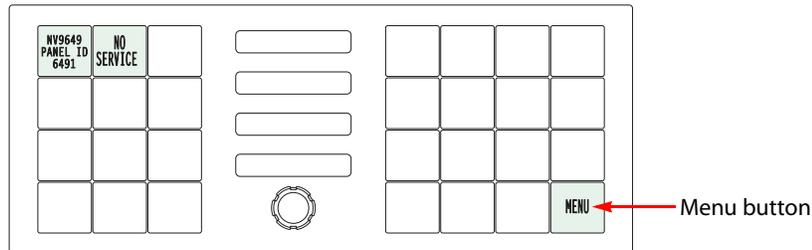
The actual colors cannot be represented accurately in print or in a PDF file displayed on your screen. There is a small amount of variation in color from button to button. See [LCD Buttons](#) on page 117 for a better color chart.

## Setup Mode

Setup mode occurs when the NV9649 is disconnected from its network and is freshly powered up. In setup mode, you can set or change the panel ID, identify the software version, and perform a test of the panel's buttons. It is in setup mode that you must initially set the panel ID.

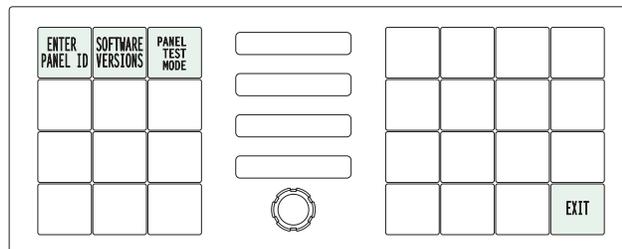
▲ It can take several seconds for the buttons to appear.

The panel powers up with 2 buttons at the top left, and a 'Menu' button at the lower right, illuminated in green. The button at the top left shows the current panel ID. The panel ID is usually set to 0 at the factory:

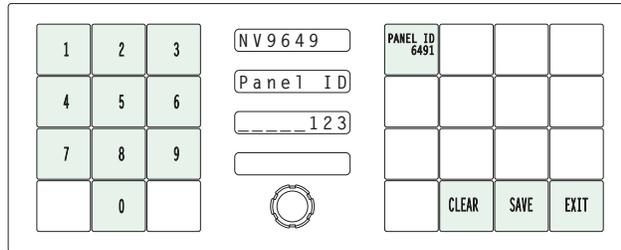


## Panel ID

Press the menu button to proceed to the first part of setup which is to set the panel ID:



Now press the 'Enter Panel ID' button. The buttons on the left side of the panel light up and form a numeric keypad:



The current panel ID is shown on the top-left button of the right-hand button section. At the lower right are 'Clear', 'Save', and 'Exit' buttons.

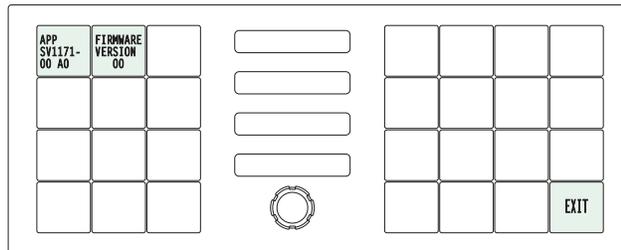
Enter a panel ID (up to 8 digits). The ID you enter appears in the third display (the 'Preset' display). Press 'Clear' if you make a mistake.

Press 'Save' to complete your entry and leave the submenu.

Press 'Exit' to leave the panel ID submenu without changing the panel ID.

## Software Versions

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



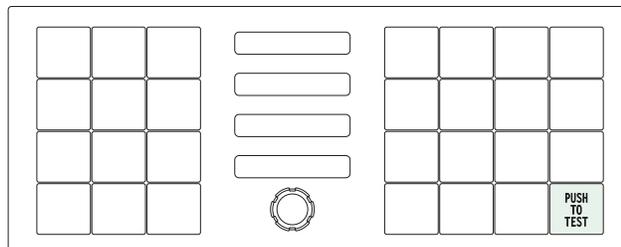
The software part number and its revision number and the firmware version appear on the two top-left buttons.

Press 'Exit' to leave the submenu.

## Panel Test

Press the 'Panel Test Mode' button to perform a panel test. The test reveals the color and viability of the 4 displays and the 28 function buttons.

The submenu shows a 'Push to Test' button at the lower right:

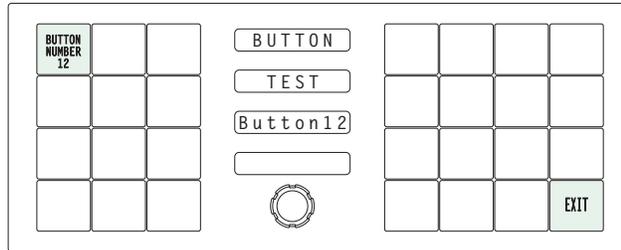


Press that button to proceed to the display test.

The display test should show that the pixels of the character elements of the displays are brightly lit.

Press the 'Push to Test' button again to start the color test. The first segment of this test shows all the buttons illuminated in high-tally green. Press the 'Push to Test' button again. The next segment shows low-tally green.

Keep pressing that button until all the colors have been displayed — green, amber, yellow, red, blue, purple, grey, and white and high and low-tally for each. At this point, the displays now read button test. Pause for a moment. Do not press 'Exit':



Press any button — except the 'Exit' button — to test it. The button will flash a few times rapidly and the number of the button will appear on the display.

Pressing the exit button will terminate the button test and return you to the initial display of setup mode. At this point — if you have assigned your NV9649 a suitable panel ID — you may connect your NV9649 to the panel network of your NV9000 system.



# 6 GPIO

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

## Topics

<i>The Interface</i> .....	105
<i>GPIO Configuration Concepts</i> .....	106
<i>Configuring Outputs</i> .....	107
<i>Configuring Inputs</i> .....	109

## 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 NV9649—in the router control system. The router control system can trigger events that—through the relays in the NV9649—switch your tally devices.

The DB25 connector, labeled “GPI Interface” at the rear of the NV9649 presents the tally signals. There are 8 input signals and 4 pairs of output signals.

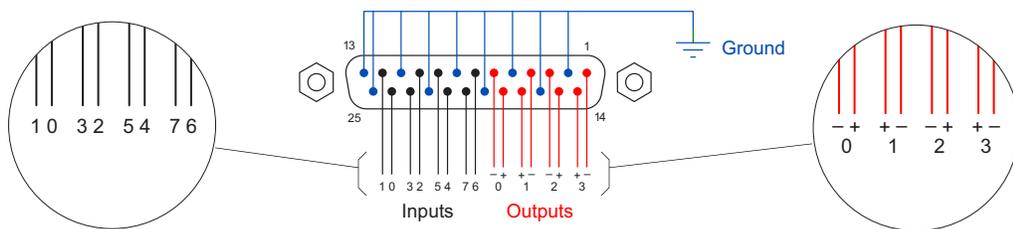


Fig. 6-1: GPI Interface

## Input

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

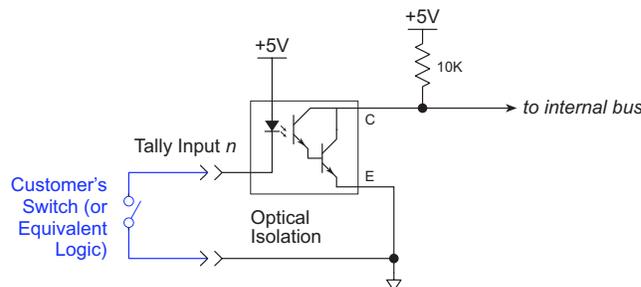


Fig. 6-2: GPI Input

When the input transitions off or transitions on, the NV9649 notifies the router control system, which carries out the task defined for the input (if a task has been configured).

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

## Output

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

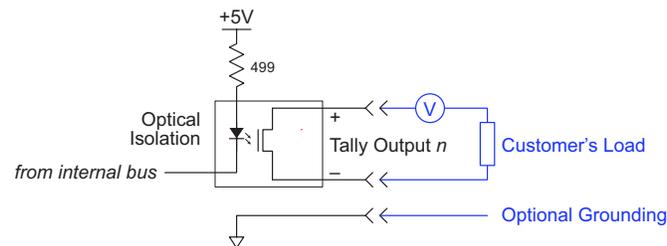


Fig. 6-3: GPIO Output

When a condition (defined for the relay) occurs, the router control system notifies the NV9649 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.)

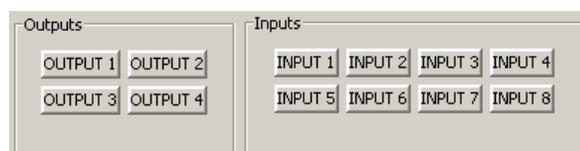
## GPIO Configuration Concepts

These are the I/O characteristics of the NV9649'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 NV9649 Page

SE's NV9649 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 NV9649 control panel.

## Configuring Outputs

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

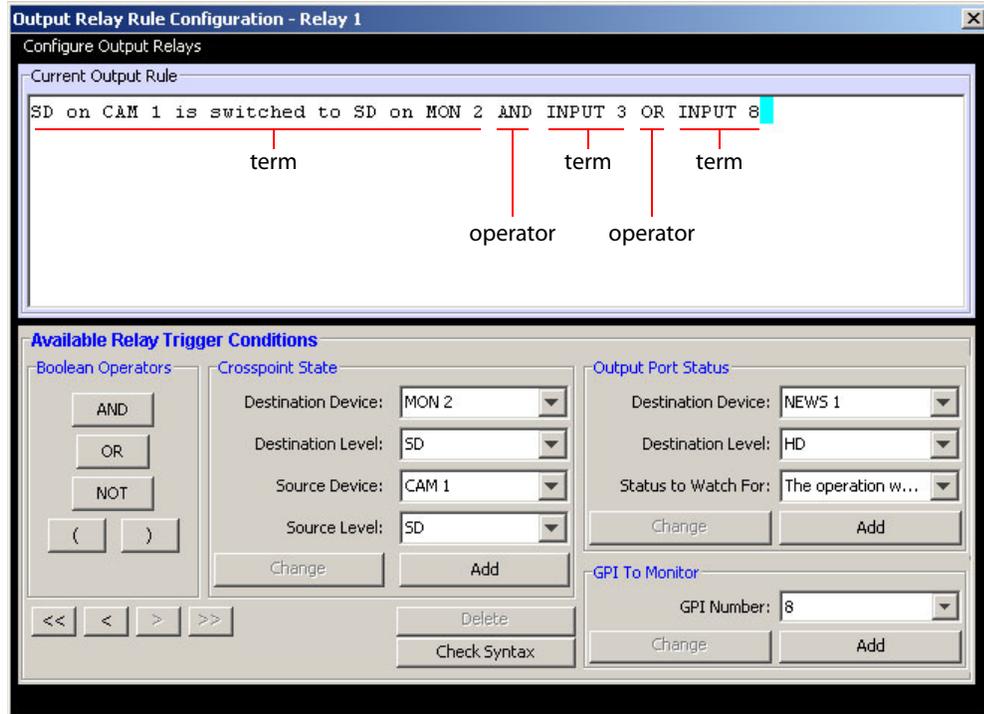


Fig. 6-4: Relay Rule Dialog

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 NV9649 inputs and other system-wide events. The router control system sends signals to the NV9649 instructing it to open or close its relays.

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



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

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

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

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

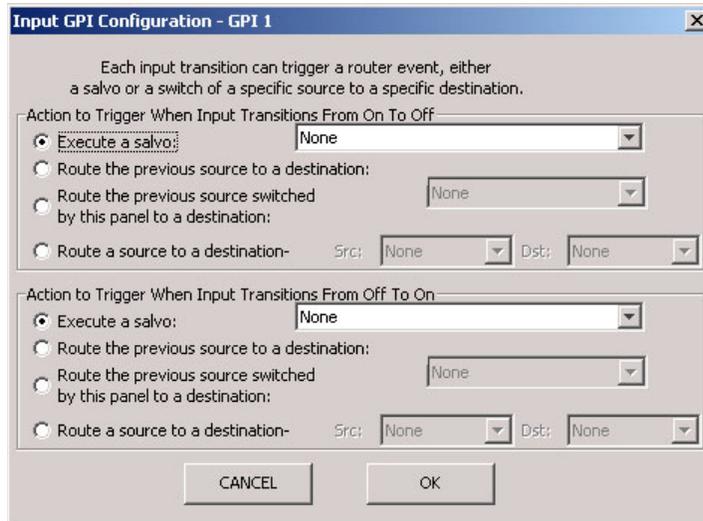
This is a summary of Boolean operations:

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

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

## Configuring Inputs

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



An event is signalled when a transition occurs on the input from on to off or from off to on. You can configure the NV9649 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 NV9649 has 4 relays that can switch on or off your external devices, based on (1) NV9649 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 NV9649 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 the following:

## Topics

<i>Power Specifications</i> .....	111
<i>NV9649 Specifications</i> .....	112
<i>Environmental Specifications</i> .....	113
<i>Defaults</i> .....	113
<i>Drawings</i> .....	114

## Power Specifications

Table provides power specifications for the NV9649 control panels.

### NV9649 Power Specifications

Specification	Detail
DC power	External power supply: 12VDC $\pm$ 10%, 5 A.
Power consumption	10.2 W
Regulatory	UL listed and CE compliant.

Table provides specifications for the PS0001 power supply.

### 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	$\leq$ 60W, 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 Miranda PS0001-00:

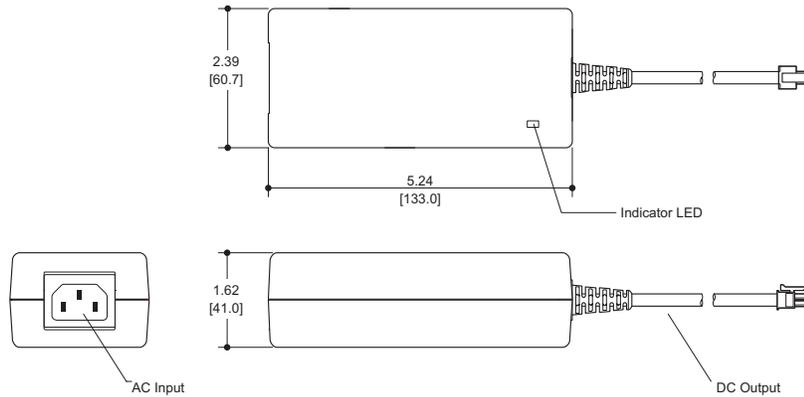


Fig. 7-1: The power output has Molex 4-pin plug. See [Power Cord Retention](#) on page 117.

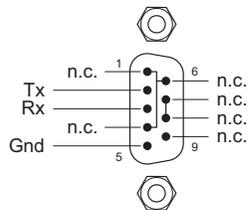
## NV9649 Specifications

Table provides specifications for the NV9649.

### NV9649 Physical Specifications

Specification	Detail
Dimensions	Height: 3.47" (88.1 mm), fits EIA 2 RU (3.5" or 88.9 mm), Width: 8.7" (221.0 mm). The panel mounts in one of the two apertures of the main bracket of the NV9648-48-RMK (rack-mounting kit) which is 19" wide and 3.47" high (2RU).
Depth	2.46 ± 0.01" (62.5 mm), enclosure. 2.99" (75.9 mm) overall.
Power	10.2 W
Weight	1.022 kg (2.25 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

Table provides environmental specifications for the NV9649.

### NV9649 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

Destination: the configured default.

Buttons: low-tally is 40% brightness by default and stays at its most recent setting.

### Configuration Page

The initial NV9649 configuration has no buttons defined. The default panel options are:

Behavioral model: LCD XY/MD mode.

Default mode: Multi-destination mode.

Release mode: Normal.

Default destination: None.

Preset monitor: None

Status monitor: None

Data routing: Automatic.

Salvo list: None

Default name set: System names

Use continuous scroll: Enabled (check box checked)

Other options: All disabled (check boxes clear) except 'Src/Dst Immediate Take'.

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

These drawings identify features and provide overall and critical dimensions:

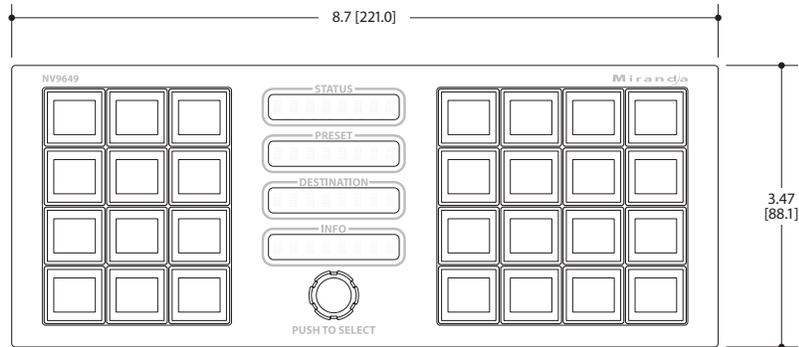


Fig. 7-2: Front View of the NV9649

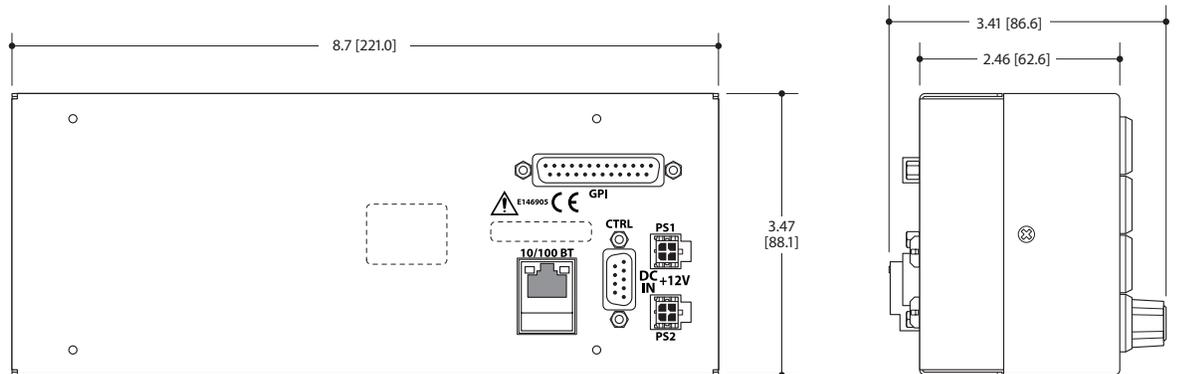


Fig. 7-3: Rear and Side View of the NV9649

This is the NV9649's rack mounting filler plate:

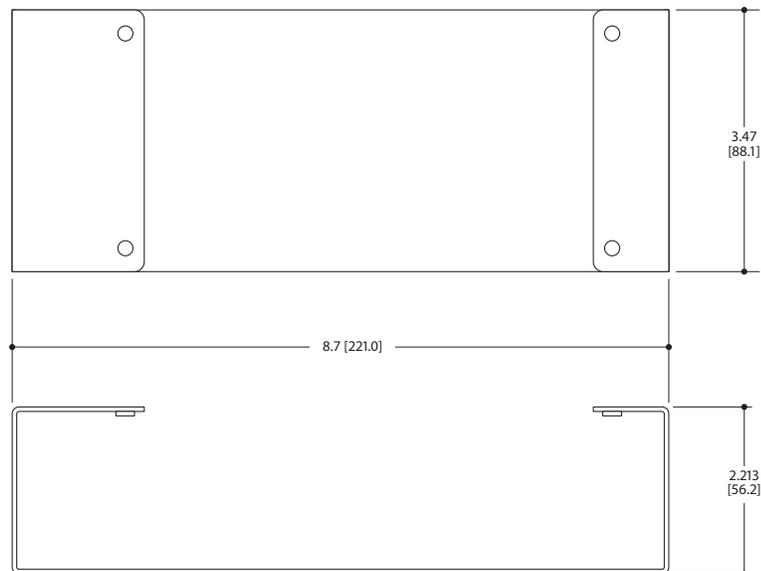


Fig. 7-4: NV9649 Rack Mounting Filler Plate

This drawing provides overall dimensions of the NV9649's rack mounting bracket:

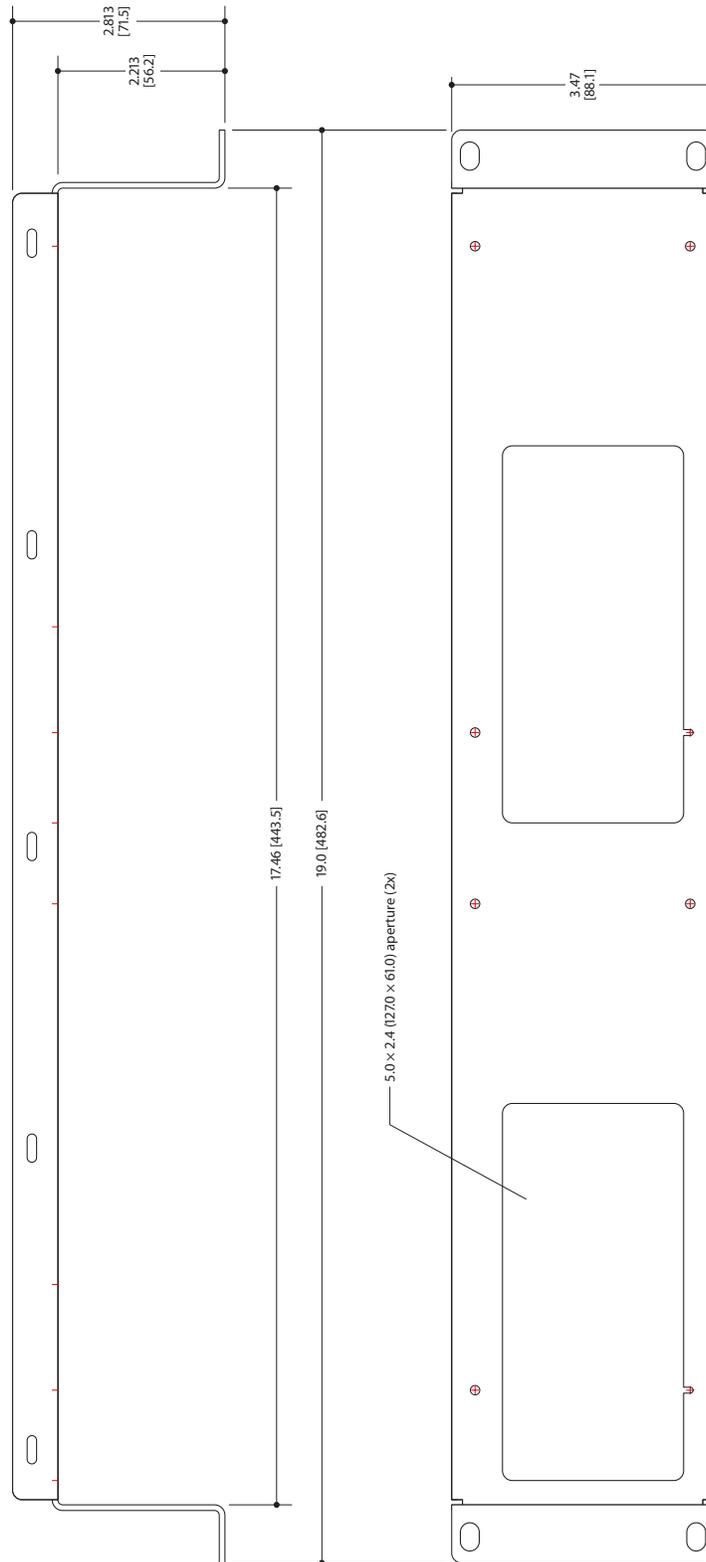


Fig. 7-5: NV9649-48-RMK Rack Mounting Bracket

For reference, this is a view of the NV9648:

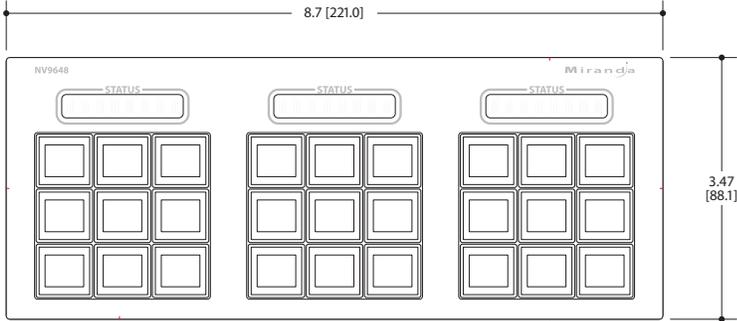


Fig. 7-6: Front View of the NV9648

# 8

## Misc. Topics

Chapter 8 provides the following:

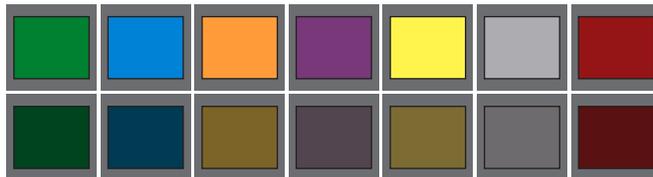
### Topics

<i>LCD Buttons</i> .....	117
<i>Power Cord Retention</i> .....	117
<i>Ordering Information</i> .....	119

## 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 NV9649 components:

PS0001	12V power supply, 4-pin Molex connector, with cord, and cord retention strap.
NV9649	NV9000 control panel. 30 button, 2RU, XY/MD, hierarchical.
WC0053	Optional breakout cable for the tally interface



# G

## Glossary

<b>AES/EBU</b>	(Audio Engineering Society/European Broadcasting Union). AES and EBU are standards organizations.
<b>Breakaway</b>	A condition where a destination has multiple sources on different levels.
<b>Category</b>	A category represents a set of devices. (The concept of categories exists to make it easier to select devices at a control panel.) A category can contain sources, destinations, or devices that are both sources and destinations. Each device in the category has a unique selection index within that category. Each category has a mnemonic ID associated with it.
<b>Data Routing</b>	Data routing (a.k.a., machine control routing) is a bidirectional form of routing. Routes are characterized by a controlling device and controlled device(s). The NV9649 provides certain data routing options including a 'Broadcast' button.
<b>Device</b>	A "device" is a grouping of input and output ports that define a logical entity. (The logical entity often represents a real device, but it does not have to be a real entity.) For example, a system might have 3 levels: video, AES, and time code. A hypothetical device in this system is Camera 1, which consists of video on input port 1 of the video router, AES on input port 5 of the AES router, and time code on input port 8 of the time code router.
<b>GPIO</b>	General Purpose Input and Output. A generic term for the NV9649's tally interface. The tally interface is called the "GPI Interface" at the rear of the NV9649.
<b>Level set</b>	A level set is a group of virtual levels that are commonly used together when switching devices. A level set also defines the mapping of each virtual level within the level set to a single physical level. All levels in a level set have a unique display index within that level set.
<b>Multi-Destination (Mode)</b>	A mode on an NV9000 control panel that presents many destinations at once, in contrast to X-Y mode. An operator may route sources to multiple destinations in a single take. Multi-destination mode does not permit the selection of breakaway levels.
<b>Operator</b>	The term operator (a.k.a. user) usually refers to users other than the system administrator or configurator. An operator is responsible for making the routes.
<b>Physical Level</b>	Multiple routers provide different "physical levels" on which to switch the signals of devices. Any particular device might send or receive HD, SD, AES, time-code, or machine-code signals.
<b>PIN</b>	The system administrator may create a single "super user" personal identification number (PIN) that functions as a passcode. A PIN is 4–6 digits in length. The PIN allows certain operators to perform functions such as (1) forced release on a control panel that is configured for normal release or (2) changing the ID of a control panel.
<b>Port</b>	A port is the physical connection on a router. A port can only be an input port or an output port.
<b>Salvo</b>	A salvo is a stored group of commands that can be recalled and executed at a NV9000 control panel.
<b>Source/ Destination</b>	The term "source device" is used interchangeably with "source" and the term "destination device" is used interchangeably with "destination." A source is a device that is connected to one or more input ports. A destination is a device that is connected to one or more output ports. An example of such a device would be a monitor.

## Glossary

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

# Index

## A

ACQ IP (message)	13–14
Acrobat usage	
bookmarks	1
hyperlinks	1
navigating and searching	1
Add control panel (button)	18
Add HW panel (page)	18
AES (Audio Engineering Society)	121
AES/EBU	121
Africa, contact	131
agreement, license	iii
All level	34, 86, 92, 94
Alphanumeric display	67
Americas, contact	131
Asia, contact	131
Assign (button)	36, 77
Asterisk	6
Auto-fill options	
destination categories	50
destination devices	50
from category	50
manually fill devices	50
manually ordered buttons	50
salvos	50
source categories	50
source devices	49
starting with	50
Automatic data routing	76
Automatically generated lists	83

## B

Back (button)	36, 41, 49–50, 81, 83, 85
Behavioral model	22, 26, 32, 113
Bookmarks, Acrobat	1
Boolean	
expressions	107
operators	107
terms	107
Breakaway	6, 8–9, 34, 44, 58, 71–73, 87, 121
Breakout cable (WC0053)	6, 11, 13, 119
Brightness, LCD	68
Broadcast	47
Broadcast (button)	36, 41, 55, 75–77, 81, 88, 90, 95
Broadcast data routing	9

Broadcast mode	76
Broadcast routes	75
Button	
add control panel	18
assign	36, 77
back	36, 41, 49–50, 81, 83, 85
broadcast	36, 41, 55, 75–77, 81, 88, 90, 95
cancel	101
category	37, 42, 56, 77, 81, 90
chop	37, 42, 56, 78, 82, 91
clear	37, 57, 78, 91
clear preset	42, 65, 82
default state	42, 82
destination	43, 57, 83, 91
destination lock	29, 38, 43, 57, 74, 78, 83, 91
destination mode	38, 57, 79, 91
destination protect	29, 38, 43, 57, 74, 79, 83, 92
edit panel configuration	19
finish	19
forward	43, 49–50, 83, 85
free source	9, 43, 58, 83, 92
global navigate	43, 65, 83
hold	28, 44, 84
level	58, 72, 92
level map	44
level mode	58, 84, 92–93
menu	8, 38, 44, 58, 71, 85, 93, 99
name set toggle	5, 44, 59, 85, 93
navigate	30, 36, 44, 49, 85
next	19
page down	44, 59, 68, 81, 85, 90, 93
page up	45, 59, 68, 81, 86, 90, 93
panel lock	45, 60, 86, 94
preset release	45, 86
previous source	9, 45, 60, 86, 94
quick source	38, 45, 60, 79, 86, 94
revert to saved	20
salvo	38, 45, 60, 79, 87, 94
save	20, 101
save preset	28, 46, 87
selection	87
source	39, 46, 60, 79, 88, 94
source is master	34, 47, 61, 75, 77, 81, 88, 90, 95
source mode	39, 61, 80, 94
source/destination	39, 47, 61, 80, 88, 95
take	39, 47, 61, 80, 89, 95
take all	39, 80
undefined	39, 47, 61, 80, 89, 95

- X-Y display ..... 47, 89
  - XY/MD mode ..... 47–48, 68, 89
  - Button captions ..... 35, 48
  - Button classes ..... 34
  - Button color ..... 35, 68, 89, 117
  - Button definition section ..... 21, 24, 31
  - Button definitions ..... 34
  - Button legends ..... 68
  - Button page list ..... 49
  - Button pages ..... 48, 83
    - deletion ..... 30
    - renaming ..... 30
  - Button tree ..... 68
  - Button types ..... 35, 55
  - Buttons
    - commitment ..... 20
    - control panel ..... 2
    - function ..... 4
    - LCD ..... 68
    - menu ..... 68
    - selection ..... 46, 51, 68
    - system-generated ..... 35
- C**
- Cable, breakout (WC0053) ..... 6, 11, 13, 119
  - Cable, Ethernet ..... 12–13
  - Cancel (button) ..... 101
  - Captions, button ..... 35, 48
  - Categories ..... 59, 68
  - Category
    - destination ..... 50
    - source ..... 50
  - Category (button) ..... 37, 42, 56, 77, 81, 90
  - Category (defined) ..... 121
  - Category lists ..... 35, 44–45, 85
  - cautions ..... v
  - CE ..... iii
  - change history ..... ii
  - Chapter structure ..... 1
  - Chapters
    - 1, Preface ..... 1
    - 2, Introduction ..... 3
    - 3, Installation ..... 11
    - 4, Configuration ..... 17
    - 5, Operation ..... 67
    - 6, GPIO ..... 105
    - 7, Technical Details ..... 111
    - 8, Misc. Topics ..... 117
  - Checkbox ..... 36
  - Checkbox options ..... 23, 28, 33
  - China, contact ..... 131
  - Choices
    - navigation button ..... 48
  - Chop (button) ..... 37, 42, 56, 78, 82, 91
  - Clear (button) ..... 37, 57, 78, 91
  - Clear preset (button) ..... 42, 65, 82
  - Color, button ..... 35, 68, 89, 117
  - Commitment buttons ..... 20
  - Configuration ..... 2
    - NV9649 ..... 17
    - options ..... 18
    - page ..... 21, 24, 31
    - page, default ..... 21, 24, 31, 113
    - pane ..... 18
    - tasks ..... 20
  - Connectors
    - DB25 ..... 3, 6, 20, 62, 105
    - Ethernet ..... 12
    - GPIO ..... 3, 6, 20, 62, 105
    - power ..... 12
    - RJ-45 ..... 12
    - RS-232 ..... 112
    - tally ..... 3, 6, 20, 62, 105
  - contact Miranda ..... 131
  - Continuous scrolling ..... 23, 34
  - Control panel ..... 2, 11–12, 121
    - buttons ..... 2
    - installation ..... 12
    - NV96xx ..... 11, 121
  - Control panels (page) ..... 18–19
  - Control system, NV9000 ..... 122
  - Controlled device ..... 77, 81, 90
  - Controlling device ..... 77, 81, 90
  - corporate office, contact ..... 131
  - customer support ..... 131
- D**
- Data routing ..... 9
  - Data routing (defined) ..... 121
  - Data routing (options) ..... 76
  - Data routing mode ..... 113
    - MD ..... 27
    - XY ..... 27
  - DB25 connector ..... 3, 6, 17, 20, 62, 105
  - Declaration of Conformance ..... iii
  - Default
    - destination ..... 22, 26, 33, 113
    - hold preset ..... 28
    - NV9649 configuration page ..... 21, 24, 31, 113
    - page ..... 30
    - save preset ..... 28
    - source is master ..... 23, 29, 34
  - Default mode ..... 113
  - Default name set (option) ..... 28, 33, 113
  - Default state (button) ..... 42, 82
  - Defaults ..... 113
  - Deselect all destinations and turn off hold
    - after take (option) ..... 29

Destination	29
categories	50
default	22, 26, 33, 113
devices	50
lists	85
lock, enabled	29
locks	74
protect, enabled	29
protects	74
Destination (button)	43, 57, 83, 91
Destination (defined)	121
Destination (display)	5, 82–83, 90–91
Destination lock (button)	29, 38, 43, 57, 74, 78, 83, 91
Destination mode	8, 38–39, 56–57, 61, 72, 79–80, 88, 91, 95
Destination mode (button)	38, 57, 79, 91
Destination protect (button)	29, 38, 43, 57, 74, 79, 83, 92
Device (defined)	121
Device limit, MD mode	28
Device lists	35, 44–45
Devices	
destination	50
source	23, 29, 34, 49
switching	121
DHCP	11, 13–14, 100, 113
Dialog, edit navigation button	45, 48
Dimensions	114–115
Display	67
destination	5, 82–83, 90–91
information	5
preset	5, 60, 79, 81–82, 88, 90, 94
status	5–6
Display index	46
Display indexes	52
document	
notice of use	ii
part number	ii
revision	ii
Documentation	13
other	2
Drawings	114
NV9648, front view	116
NV9649, front view	114
NV9649, rear view	114
NV9649, side view	114
NV9649-48-RMK bracket, front view	115
NV9649-48-RMK bracket, top view	115
NV9649-48-RMK filler plate, top view	114
NV9649-48-RMK, front view	114
Dubbing applications	77, 81, 90

## E

EBU	121
EC9700 (GUI)	11

EC9710 (GUI)	11
Edit navigation button, dialog	45, 48
Edit panel configuration (button)	19
Electrical specifications	
NV9649	111–112
power supply	111
Electrostatic discharge	11
e-mail address	131
Enable	
destination lock	29
destination protect	29
force release	29
Environmental specifications, NV9649	113
ESD	11
Ethernet cable	12–13
Ethernet connector	12
Europe, contact	131
European broadcasting union (EBU)	121
Examples, symbol for	2
Expressions, Boolean	107

## F

fax number	131
FCC statement	ii
Figures	
NV9648, front view	116
NV9649, front view	114
NV9649, front, photo	3
NV9649, rear view	114
NV9649, rear, photo	3
NV9649, side view	114
NV9649-48-RMK bracket, front view	115
NV9649-48-RMK bracket, top view	115
NV9649-48-RMK filler plate, top view	114
NV9649-48-RMK, front view	114
Find, Acrobat	2
Finish (button)	19
First Page, Acrobat	2
Flip-flop source to preset after take	29
Forced release	22, 26, 29, 33, 74, 78, 83, 86, 91, 121
Forward (button)	43, 49–50, 83, 85
France, contact	131
Free source (button)	9, 43, 58, 83, 92
From category (option)	50
Function buttons	4

## G

Global navigate (button)	43, 83
Global navigation	62
Global navigation (button)	65
Global navigation templates	64–65
Go to next view, Acrobat	1

Go to previous view, Acrobat ..... 1  
 GPI interface ..... 6, 105  
 GPIO ..... 13, 17, 62, 113  
   connector ..... 3, 6, 20, 62, 105  
   inputs ..... 3, 6, 13, 17, 105, 109, 113  
   interface ..... 6  
   options ..... 106  
   outputs ..... 3, 6, 105–106, 113  
 GPIO definitions ..... 21, 24, 31

## H

hardware symbols ..... iv  
 hazardous substance ..... iii  
 Hide sources not configured on this panel ..... 23, 29, 34  
 High tally ..... 2  
 Hold (button) ..... 28, 44, 84  
 Hold (mode) ..... 73  
 Hold mode ..... 28, 44, 52, 73, 84, 87–88  
 Hold preset as default ..... 28  
 hours of operation ..... 131  
 How to  
   create a level mapping ..... 84  
   initialize the NV9649 ..... 13  
   install the NV9649 ..... 12  
   make a broadcast route ..... 75  
   use selection buttons ..... 51  
   use semi-automatic data routing mode ..... 77  
 Hyperlinks, Acrobat ..... 1

## I

ID, panel 13–15, 23, 28, 33, 38, 44, 58, 68, 85, 93, 100, 103  
 Information (display) ..... 5  
 Initial panel state ..... 113  
 Initialization ..... 13  
 Initializing the NV9649 ..... 13  
 Inputs  
   GPIO ..... 3, 6, 13, 17, 105, 109, 113  
   tally ..... 6, 13, 17, 105, 113  
 Installation  
   NV9649 control panel ..... 12  
   package contents ..... 11  
   receiving and unpacking ..... 11  
 IP addresses ..... 11, 13–14, 100, 113  
 IP configuration ..... 11, 13, 113

## J

Jump back after destination selection (option) ..... 29  
 Jump back after source selection (option) ..... 29  
 Jump back after take (option) ..... 29

Jump to an empty new page (option) ..... 48  
 Jump to an existing page (option) ..... 49  
 Jump to multi-dest selection when  
   switching to XY (option) ..... 29

## K

Keypad ..... 56, 82, 90  
 Kit, rack-mount ..... 3, 11–12, 114–115

## L

Last Page, Acrobat ..... 2  
 LCD brightness ..... 38, 44, 68  
 LCD buttons ..... 38, 44, 68  
 LCD Min XY/MD mode ..... 22, 26, 32  
 Legends, button ..... 68  
 Level ..... 44  
   breakaway ..... 44, 73  
   mapping ..... 72, 84  
   physical ..... 121–122  
   sets ..... 121  
   virtual ..... 84, 121–122  
 Level (button) ..... 58, 72, 92  
 Level map (button) ..... 44  
 Level mode ..... 5, 8, 56, 58–59, 71, 86, 90, 92–94  
 Level mode (button) ..... 58, 84, 92–93  
 Level set ..... 72  
 Levels ..... 58, 72–73  
 license ..... iii  
 Limited X-Y (mode) ..... 77  
 Links to page numbers, in button page list ..... 31  
 Lists ..... 44–45  
   automatically generated ..... 83  
   category ..... 35, 44–45, 85  
   destination ..... 85  
   device ..... 35, 44–45  
   salvo ..... 85  
   source ..... 85  
 Locating network (message) ..... 14  
 Locks ..... 9, 29, 38, 43, 57, 74, 78, 83, 86, 91  
   destination ..... 74  
   source ..... 74  
 Low tally ..... 2

## M

Machine control ..... 47, 77, 81, 83, 88, 90, 92, 95  
 Manual data routing ..... 76  
 Manually fill devices (option) ..... 50  
 Mapping levels ..... 72, 84  
 Mapping, virtual to physical level ..... 121

MD	
device limit	28
MD destination	55
Menu	
software versions	99
user	99–100
Menu (button)	8, 38, 44, 58, 71, 85, 93, 99
Menu buttons	68
Menu mode	8, 38, 44, 58, 71, 85, 93, 99
Messages	89
acquiring IP address	13–14
locating network	14
no server	14
select dest level	84
select src level	84
Middle East, contact	131
Miranda, contact	131
Mode	
broadcast	76
data routing	27, 113
default	113
destination	8, 38–39, 56–57, 61, 72, 79–80, 88, 91, 95
hold	28, 44, 52, 73, 84, 87–88
level	5, 8, 56, 58–59, 71, 86, 90, 92–94
limited X-Y	77
menu	8, 38, 44, 58, 71, 85, 93, 99
multi-destination	26, 28–29, 44, 47–48, 51–52, 68, 73, 84, 87, 89, 113, 121–122
normal	8, 39, 61, 71, 98
operating	113
panel	26
release	22, 26, 33, 113
salvo	8, 39, 59, 61, 71, 85–86, 93, 98
save preset	87
setup	8, 71, 101
single-destination	40, 53
source	8, 39, 56, 61, 72, 80, 88, 91, 94–95
source is master	75
X-Y	26, 29, 47–48, 51–52, 68, 73, 84, 87, 89, 121–122
Model, behavioral	113
Modes of operation	6
Monitor	113
Monitor, preset	26, 33
Monitor, status	27, 33
Multi-destination mode	26, 29, 44, 47–48, 51–52, 68, 73, 84, 87, 89, 113, 121–122

## N

Name set toggle (button)	5, 44, 59, 85, 93
Name sets	28, 33, 44, 59, 75, 113
Navigate (button)	30, 36, 44, 49, 85
Navigation choices	48
Navigation options	48–49

Navigation, global	62
Next (button)	19
Next Page, Acrobat	2
Next view, Acrobat	1
No server (message)	14
Normal mode	8, 39, 61, 71, 98
Normal release	22, 26, 33
notice, use	ii
NV9000	
router control system	2
system controller	11, 13
user's guide	2
NV9000 configuration	17
NV9000-SE Utilities	2, 6, 11, 13–15, 17, 25, 48, 56, 67, 78, 82, 90
user's guide	2
NV915, system controller	11
NV9640	119
NV9648	
front view	116
NV9649	2, 11–13, 17
configuration	17
front view	114
initialization	13
rear view	114
side view	114
NV9649-48-RMK	3, 11–12, 114–115
front view	114
NV9649-48-RMK bracket	
front view	115
top view	115
NV9649-48-RMK filler plate	
top view	114
NV96xx control panels	11, 121

## O

office hours	131
Operating mode	22, 26, 32, 113
Operating modes	6
Operating temperature	113
Operator	121
Operators, Boolean	107
Options	
checkbox	23, 28, 33
configuration	18
default name set	28, 33
GPIO	106
panel	20
Ordering Information	119
Other documentation	2
Outputs	
GPIO	3, 6, 105–106, 113
relay	3, 6, 105–106
tally	17, 105–106, 113

## P

Package contents ..... 11

Page

- add HW panel ..... 18
- control panels ..... 18–19

Page (SE)

- NV9649 configuration ..... 21, 24, 31

Page down (button) ..... 44, 59, 68, 81, 85, 90, 93

Page name ..... 48

- in tree window ..... 30

Page number, in tree window ..... 30

Page up (button) ..... 45, 59, 68, 81, 86, 90, 93

Pane, configuration ..... 18

Panel

- initial state ..... 113
- IP address ..... 100
- mode ..... 26

Panel behavioral model ..... 22, 26, 32

Panel configuration ..... 17

Panel configuration (page) ..... 19

Panel ID . 13–15, 23, 28, 33, 38, 44, 58, 68, 85, 93, 100, 103

Panel image ..... 21, 24, 31

Panel IP configuration utility ..... 11, 13, 113

Panel lock (button) ..... 45, 60, 86, 94

Panel options ..... 20–22, 24, 26, 31–32

Panel server mode ..... 22, 26, 32

Panel standalone mode ..... 22, 26, 32

Panel/router network ..... 14, 100

Panels, control ..... 2, 11–12, 121

- NV96xx ..... 11, 121

part number, document ..... ii

PDF documents ..... 1

- navigating and searching ..... 1

phone numbers ..... 131

Photos

- NV9649, front ..... 3
- NV9649, rear ..... 3
- power cord retention ..... 118

Physical level ..... 121–122

Physical specifications, NV9649 ..... 112

PIN ..... 121

Place this button on all child pages (option) ..... 36

Port (defined) ..... 121

Power connectors ..... 12

Power cord retention ..... 11, 117

Power specifications

- NV9649 ..... 111
- power supply ..... 111

Power supply ..... 11, 13, 111, 117, 119

Preface

- about PDF documents ..... 1
- chapter structure ..... 1
- terms, conventions and abbreviations ..... 2

Preset (display) ..... 5, 60, 79, 81–82, 88, 90, 94

Preset monitor ..... 26, 33, 113

Preset release (button) ..... 45, 86

Preset, clearing ..... 82

Previous Page, Acrobat ..... 2

Previous source (button) ..... 9, 45, 60, 86, 94

Previous view, Acrobat ..... 1

Protects ..... 9, 29, 74, 79, 83, 86, 92

- destination ..... 74
- source ..... 74

PS0001 (power supply) ..... 13, 111, 119

PS1, PS2 ..... 12

## Q

Quick source (button) ..... 38, 45, 60, 79, 86, 94

## R

Rack mount ..... 12

Rack mounting kit ..... 3, 11–12, 114–115

Receiving and unpacking shipments ..... 11

Referrers, in tree window ..... 30

Relay outputs ..... 3, 6, 105–106

Relay rule (dialog) ..... 107

Release ..... 9, 74

- forced ..... 22, 26, 29, 33, 74, 78, 83, 86, 91, 121
- mode ..... 22, 26, 29, 33, 113
- normal ..... 22, 26, 33

restrictions ..... iii

Return all-level after take and timeout (option) ..... 34

Return from breakaway status after timeout (option) ..... 34

Revert to saved (button) ..... 20

revision, document ..... ii

RJ-45 connector ..... 12

RoHS ..... iii

Router control system ..... 2

RS-232 connector ..... 112

Rules, relay ..... 107

## S

safeguards ..... iii

safety notices ..... iii

Salvo

- lists ..... 85

Salvo (button) ..... 38, 45, 60, 79, 87, 94

Salvo (defined) ..... 121

Salvo list ..... 113

Salvo lists ..... 22, 33, 98

Salvo mode ..... 8, 39, 59, 61, 71, 85–86, 93, 98

Salvos, system ..... 9, 50, 109

Save (button) ..... 20, 101

Save preset	
(button)	28
as default	28
Save preset (button)	46, 87
Save preset mode	87
Scrolling	8, 23, 34, 44–45, 59, 71, 81, 85–86, 90, 93, 113
SE (abbreviation for NV9000-SE Utilities)	
Search, Acrobat	2
Select dest level (message)	84
Select src level (message)	84
Selection, source	29
Selection (button)	87
Selection buttons	46, 51, 68
Semi-automatic data routing	76
Separator character	78, 82, 90
Server mode	22, 26, 32
Setup mode	8, 14, 71, 101
Single-destination mode	40, 53
Software	13
software license	iii
Software Versions (submenu)	99
Software, configuration	2
Source	
categories	50
devices	23, 29, 34, 49
lists	85
locks	74
protects	74
selection	29
Source (button)	39, 46, 60, 79, 88, 94
Source (defined)	121
Source is master	
as default	23, 29, 34
mode	75
Source is master (button)	34, 47, 61, 75, 77, 81, 88, 90, 95
Source mode	8, 39, 56, 61, 72, 80, 88, 91, 94–95
Source Mode (button)	80, 94
Source mode (button)	39, 61
Source/destination (button)	39, 47, 61, 80, 88, 95
Special messages, symbol for	2
Specifications	
environmental, NV9649	113
NV9649	111–112
power supply	111
Src/dst immediate take (option)	30
Standalone mode	22, 26, 32
Starting with (option)	50
Static	11
Status (display)	5–6
Status monitor	27, 33, 113
Strap, power cord retention	11, 117
Suffix templates	63, 65
Suffixes	56, 81, 90
support, contact	131
Switching devices	121

Symbols	
for examples	2
for special messages	2
symbols, meaning	iv
System administrator	122
System controller	2, 12, 14–15
NV9000	11, 13
NV915	11
System salvos	9, 50, 109
System-generated	
buttons	35

## T

Tables	
environmental specifications, NV9649	113
physical specifications, NV9649	112
power specifications, NV9649	111
power specifications, power supply	111
Take (button)	39, 47, 61, 80, 89, 95
Take all (button)	39, 80
Takes	29, 74, 121
Tally	
connector	3, 6, 20, 62, 105
high	2
inputs	6, 17, 105, 113
inputs, connecting	13
interface	6, 13, 17, 112–113
low	2
outputs	17, 105–106, 113
Technical support	131
Temperature, operating	113
Templates	62–65
Terms, Boolean	107
Terms, conventions and abbreviations	2
Testing your installation	14
Tielines	83, 92
Timeout	34
trademarks	iii
Tree window	30
Tree, button	68

## U

Undefined (button)	39, 47, 61, 80, 89, 95
UniConfig	11
United Kingdom, contact	131
Use auto-fill to create a new button page	49
Use continuous scrolling (option)	23, 34, 59, 113
Use custom button text (option)	36
User (submenu)	99–100
User's guide, chapter structure	1
User-programmable panel ID	23, 28, 33

User-selectable (option) ..... 55  
Using selection buttons ..... 51

## V

Velcro strap ..... 11, 117  
Virtual level group ..... 73  
Virtual levels ..... 84, 121–122

## W-X-Y-Z

Warnings, hardware ..... iv  
Warranty ..... iii  
WC0053 ..... 6, 11, 13, 119  
Web site ..... 131  
X-Y (mode) ..... 73  
X-Y display (button) ..... 47, 89  
X-Y mode ..... 26, 29, 47–48, 51–52, 68, 84, 87, 89, 121–122  
XY/MD mode ..... 22, 26, 32  
XY/MD mode (button) ..... 47–48, 68, 89



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