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A **BELDEN** BRAND

# NV9604

NV9000 CONTROL PANEL

## User's Guide

VERSION 1.2

UG0042-02

2015-07-02

[www.grassvalley.com](http://www.grassvalley.com)

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## Electrostatic Discharge (ESD) Protection



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

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

## Protection contre les décharges électrostatiques (DES)



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

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

## Précautions pour les écrans LCD et TFT



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

Si l'écran LCD ou TFT est brisé, manipulez les fragments de verre avec précaution au moment de vous en débarrasser. veillez à ce que le cristal liquide n'entre pas en contact avec la peau ou la bouche. En cas de contact avec la peau ou les vêtements, laver

immédiatement à l'eau savonneuse. Ne jamais ingérer le liquide. La toxicité est extrêmement faible, mais la prudence demeure de mise en tout temps.

## Recycling

Visit [www.grassvalley.com](http://www.grassvalley.com) for recycling information.

## Certification and Compliance

### Safety Compliance



C

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

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

### Electromagnetic Compatibility



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

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

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

- EN 55022 Class A Radiated and conducted emissions
- EN 61000-3-2 Limits for harmonic current emissions
- EN 61000-3-3 Limitation of voltage fluctuations and flicker
- EN 61000-4-2 Electrostatic discharge immunity
- EN 61000-4-3 Radiated, radio-frequency, electromagnetic field immunity
- EN 61000-4-4 Electrical fast transient immunity
- EN 61000-4-5 Surge transient immunity
- EN 61000-4-6 Conducted disturbances immunity
- EN 61000-4-8 Power frequency magnetic field immunity
- EN 61000-4-11 Voltage dips, short interruptions and voltage variations immunity

# toc

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# 1

## Preface

Chapter 1 is an introduction to the NV9604 User's Guide.

### Summary

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## Chapter Structure

The following chapters provide detailed information regarding the NV9604 control panel:

- Chapter 1, [Preface](#), (this chapter) outlines ways to use this guide.
- Chapter 2, [Introduction](#), provides a functional description of the NV9604.
- 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, [Technical Details](#), provides electrical, mechanical, and environmental specifications, product drawings, and default settings.
- An [index](#) and [glossary](#) are also provided for your reference.

## The PDF Document

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

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

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

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#### Note:

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

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

## Terms, Conventions and Abbreviations

The following conventions are used throughout this guide:

- The symbol ▲ 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 NV9604 control panel and to NV96xx control panels, in general.
- "High tally" means that a button is brightly illuminated.
- "Low tally" means that a button is illuminated at low intensity. Most buttons assume a low tally state until selected.
- "MD" is an abbreviation for multi-destination.
- "SE" is an abbreviation for NV9000-SE Utilities.

## Other Documentation and Software

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

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

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



# 2 Introduction

Chapter 2 provides a functional description of the NV9604.

## Summary

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## Summary

The NV9604 is a 1RU control panel, slightly over 9 inches deep, overall. It has 32 backlit function buttons.

The NV9604 can operate either by itself as a stand-alone panel or as an extension of an NV9602 control panel. By itself, it can operate in one of two modes. As an extension to an NV9602, it can operate in any of the 4 modes configured for that particular NV9602. See [Modes of Operation](#), following.

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



Fig. 2-1: NV9604 Front

When the panel is stand-alone, the function buttons either select sources or select destinations. When the panel is used as an NV9602 extension, the buttons can execute a small set of additional functions. (When the panel is used as an extension of an NV9602) physical source selection buttons represent one of two sets of sources. Physical destination selection buttons (if present) represent one of two sets of destinations. An operator can toggle between the two sets.

At the rear are power, serial, and network connectors:

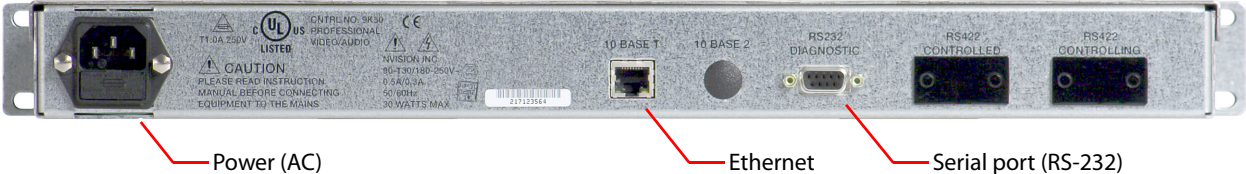


Fig. 2-2: NV9604 Rear

The ports labeled 10base2 and RS-422 are non-operational and are covered. Only the serial port and the Ethernet port are available.

- ▲ The AC connector has a compartment in which you can find a spare fuse.  
(The Ethernet port is 10baseT. The NV9000 supports 10baseT as well as 100baseT.)

## Panel Organization

### Function Buttons

The NV9604 has an array of 32 function buttons. There is a limited set of button functions when the panel is stand-alone. When it is an NV9602 extension, the buttons' functions are slightly different in each of the 4 operating modes of the NV9602. (See [Modes of Operation](#), next.)

When the panel is an NV9602 extension, source buttons represent one of two sets of sources. Destination buttons (if present) represent one of two sets of destinations. The panel can be configured with a 'Source Shift' button that toggles between the two source sets and a 'Destination Shift' button that toggles between the two Destination sets.

When the panel is stand-alone, each source button represents a single source and each destination button represents a single destination.

Each button has *three* operational levels: high and low tally (green or amber), and off. Configurers can adjust the high- and low-tally levels in increments of 10%. Buttons that are turned off are said to be dark. (Physically, they are actually white or gray.)

- ▲ Generally, green represents a source or a source function and amber represents a destination or a destination function.

The function buttons each have clear plastic keycaps under which you may place plastic inserts for button legends. It is a simple matter to change button legends.

## Modes of Operation

By itself, the NV9604 operates in one of 2 modes:

- [Single-Destination Mode](#).
- [Limited X-Y Mode](#).

An NV9602 can operate in one of 4 modes:

- [Single-Destination Mode](#).
- [Single-Destination Mode with Breakaway](#).
- [Limited X-Y Mode](#).
- [Multi-Destination Mode](#).

As a NV9602 extension, the NV9604 can operate in any mode configured for the NV9602. The NV9604 has limited use when the NV9602 is in multi-destination mode.

The modes (or behavioral models) are determined at configuration for both the NV9604 and the NV9602. The operator cannot switch between different modes.

## Single-Destination Mode

In single destination mode, the panel's destination is the configured default destination and there are no destination buttons. Takes are performed on all levels.

When the panel is an NV9602 extension, operators can use a 'Source Shift' button on the NV9602 to toggle between two sets of sources.

Takes occur as soon as a source button is pressed.

### Under NV9602 Control

The single destination is the one configured for the NV9602. The default destination for the NV9604 is ignored.

## Single-Destination Mode with Breakaway

This mode is an extension of single-destination mode that includes level buttons on the NV9602 panel. This mode is not available when the NV9604 is stand-alone.

Here too, the single destination is configured as the default destination *for the NV9602*. The default destination for the NV9604 is ignored. There are no destination buttons.

The NV9602's level buttons selected the levels on which the take is to occur. Takes occur on all levels when either no levels are selected or when all levels are selected.

Operators can use a 'Source Shift' button to toggle between two sets of sources.

Levels selected on the NV9602 affect sources selected on either the NV9602 or NV9604.

### Limited X-Y Mode

In limited X-Y mode, takes occur from a single source to a single destination. Destinations are selectable.

Takes are all level. Pressing a source button completes the take.

When the panel is an NV9602 extension, operators can use a 'Source Shift' button to toggle between two sets of sources. Similarly, operators can use a 'Destination Shift' button to toggle between two sets of destinations.

### Under NV9602 Control

Both sources and destinations can be selected on the NV9604. The 'Source Shift' button and the 'Destination Shift' button of the NV9602 affect source and destination selections on the NV9604.

## Multi-Destination Mode

This mode is not available when the NV9604 is stand-alone. In this mode, source buttons of the NV9602 are configured with destinations as well as sources.

Each NV9602 source button completes a route to an individual destination. If each button had a different destination, it would be possible to route to 38 destinations. The typical NV9602 configuration would have fewer destinations.

The NV9604's source buttons do not support multi-destination operations. The only button functions available in this mode are salvo buttons.

Takes are all-level.

Operators can use a 'Source Shift' button to toggle between two sets of sources.

### **Under NV9602 Control**

The NV9604 can be used only for salvo buttons when it is under control of a NV9602 configured in multi-destination mode.

## **Secondary Modes**

The NV9604 of itself has no secondary modes.

The NV9604 has a limited self-test capability, but no setup mode in which to change its panel ID. To change the panel ID, you must use NV9000-SE Utilities. See [Self-Test](#) on [page 31](#).

## **Other NV9604 Functions**

The NV9604 can be configured to perform the following additional functions:

- Previous source.
- System salvos.

# 3 Installation

Chapter 3 provides installation and connection instructions.

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## Package Contents

If you have ordered one or more NV9604 control panels from Grass Valley, inspect the shipping container for damage. If you find any container damage, unpack and inspect the contents. If the contents are damaged, notify the carrier immediately.

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

Depending on your order, the NV9604 items that can ship include:

- One or more NV9604 control panels.
- An AC power cord.

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

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

This document does not address the shipment or installation of any other equipment or software that can be used in conjunction with the NV9604 (including any system controllers, other NV96xx control panels, EC9700 GUI, EC9710 GUI, and configuration programs such as UniConfig, MRC, or NV9000-SE Utilities).

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

## Installation

Follow these steps to install a NV9604 control panel:

- 1 Mount, and secure, the panel in the rack.  
The NV9604 is designed to mount in a 19" rack. Rack-mounting is not a requirement.
- 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 NV9604.
- 3 Connect power.

## Installing Software and Documentation

This document is available through the Grass Valley web site.

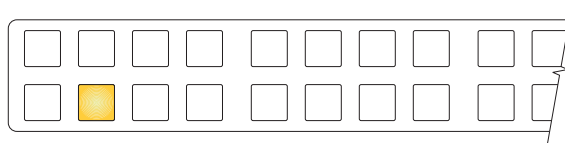
You must use NV9000-SE Utilities to configure the NV9604 control panel. Contact Grass Valley if you need to obtain the latest version of this NV9000 configuration software.

You may use the Panel IP Configuration Utility if you want your NV9604 to have a static IP address (with respect to the system controller) or to use DHCP. The panel, as it comes from the factory, defaults to DHCP.

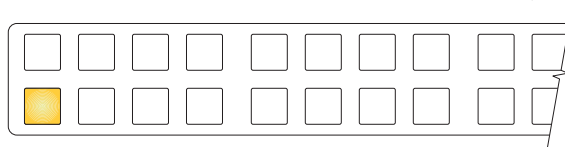
## Initialization

Your NV9604 will go through a brief initialization sequence as it starts up.

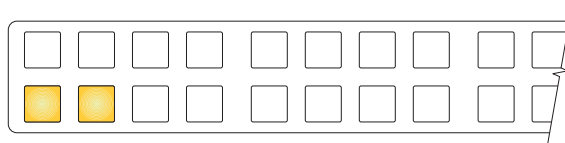
If your panel has been configured and has a panel ID, it will reach its operating state in a few seconds. If the panel ID is wrong, the second button in the lower row will light:



When the panel ID is correct and the panel is connected to the system controller, the first button in the lower row will light momentarily:



While the panel establishes communication with the system controller, both of those buttons will light:



After that, if all is well, the panel buttons will illuminate as they have been configured.

Otherwise, the second button will remain amber, indicating a panel error. These are the potential panel errors:

Error	Solution
The panel ID is incorrect	Set the panel ID in NV9000-SE Utilities.
The panel is disconnected from the NV9000 system	Make sure that the panel is connected to an Ethernet switch that supports 10baseT and that the Ethernet switch is connected to the system controller's panel and router net.
The panel has a panel ID already assigned to another panel.	Set the panel ID in NV9000-SE Utilities.

You can now prepare an NV9604 configuration in NV9000-SE Utilities and upload the configuration to the NV9604. You need a panel ID to create a NV9604 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.

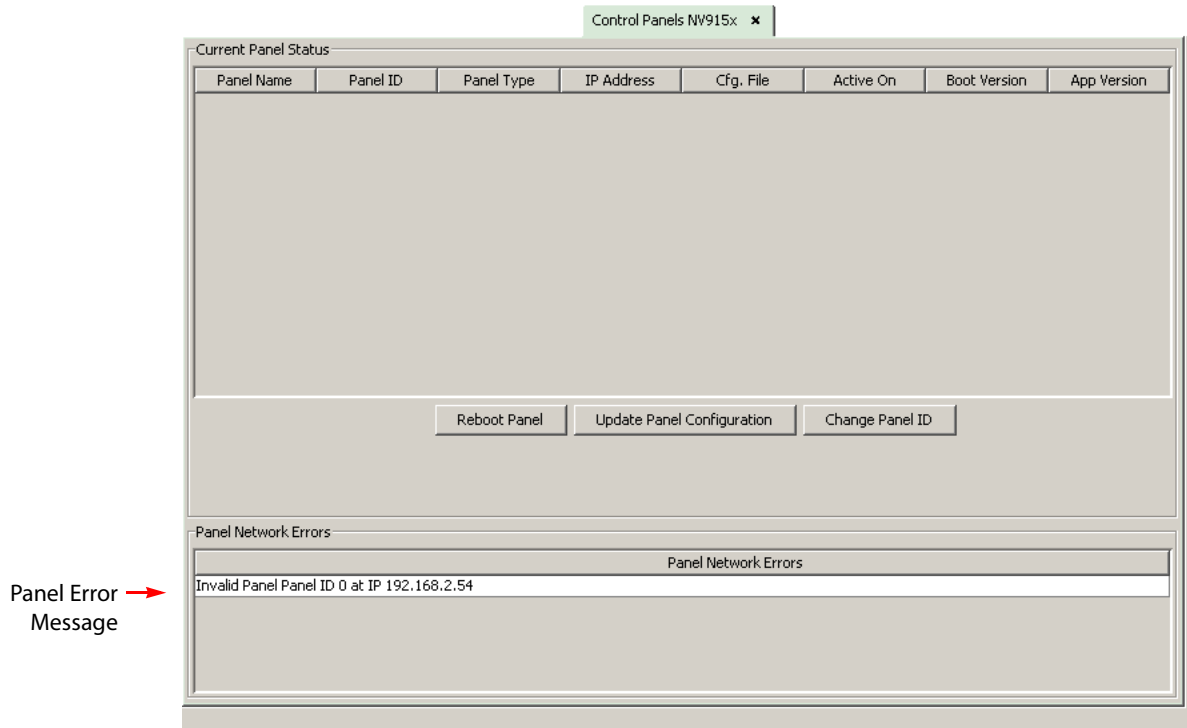
## Setting the Panel ID

- ▲ It is not possible to set the panel ID of an NV9604 at the panel itself. You must use NV9000-SE Utilities to set the panel ID.

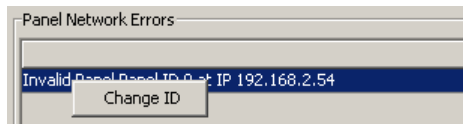
Follow these steps to set the panel ID.

- 1 If you have more than one NV9604 to set up, choose one of them.
- 2 Apply power to the panel. Connect one panel to the appropriate panel/router network of your system controller.
- 3 In NV9000-SE Utilities, click 'System Management' in the navigation pane. Click the "+" sign next to the icon for the applicable system in the 'System management' tree at the left. Doing that expands the information "tree" associated with the system. Then click the 'Control Panels ...' entry in the tree.

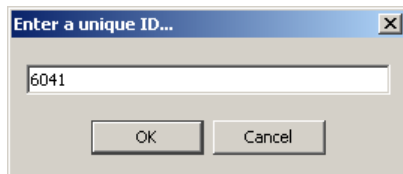
The control panels page appears:



- 4 Observe the 'Panel Network Errors' list in that window. You should see a network error message for the NV9604 you have connected.  
This example shows a panel ID of 0. Usually, NV9604 panels from the factory have an ID of 0.
- 5 Right-click that list entry. You will get a message allowing you to change the panel ID:



- 6 Click 'Change ID'. A window appears in which you can enter a new panel ID:

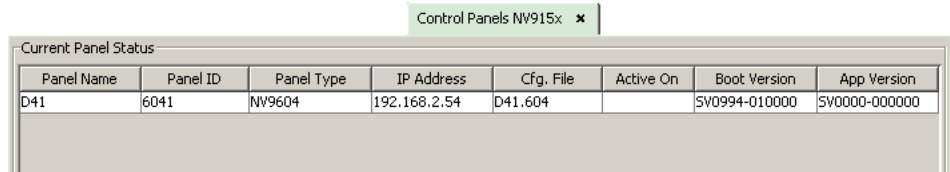


- 7 Change the panel ID to a suitable value. Make a note of the value.
- 8 Now click 'Configuration' in the navigation pane. Under 'Configuration', choose 'Control Panels'.
- 9 Click 'Add Control Panel' in the 'Control Panels' page to create an NV9604 control panel configuration. It is important to give it the panel ID you just assigned to the NV9604. You do not have to complete the configuration at this time.



- 10 Return to the 'System Management' page for your system. Click 'Write Configuration ...' to write the updated configuration to the NV9000. The NV9000 will now include a panel configuration for, and an panel ID for, the NV9604.

If you view the system's control panel page, the 'Current Panel Status' list shows the panel you just added.



Panel Name	Panel ID	Panel Type	IP Address	Cfg. File	Active On	Boot Version	App Version
D41	6041	NV9604	192.168.2.54	D41.604		SV0994-010000	SV0000-000000

- 11 Repeat steps 2 through 10 for any additional NV9604s.
- ▲ You must set the panel ID of only one NV9604 at a time. If you connect multiple NV9604s (that do not have proper panel IDs) to the system controller, it cannot determine to which NV9604 you want to assign a panel ID.
  - ▲ You can also right-click the panel entry in the 'Current Panels' list (under 'System Management') if you want to change its ID again. If you change its ID, you will have to create another panel configuration with that panel ID. The easiest way to do that is to create a copy of the old configuration that has the new panel ID.

## Testing

A panel test function is available when the NV9604 is disconnected from the system controller. Run the test to determine the health of your NV9604. See [Self-Test](#) on [page 31](#) for detail.

These are points to consider after you install your NV9604 control panel(s):

- 1 Do the buttons illuminate? When an NV9604 powers up, one or more of its buttons are supposed to turn green or amber. Did it pass the panel test mentioned above?
- 2 When the NV9604 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 the panel has a single high-tally amber button lit (the second button in the lower row), there is a problem.

- ▲ The NV9604, by default, acquires its IP address through DHCP on the system controller's panel/router network. You can use the Panel IP Configuration Utility to force the panel to have a static IP address.
- 3 Is the system controller actually running? With the typical noise levels in a facility, it can sometimes be difficult to tell. Use the 'System' pages of NV9000-SE Utilities to make the determination.
  - 4 Is NV9000-SE Utilities installed and operating? If so, can you upload a configuration to the specified panel?
  - 5 Does the configuration actually work? Is it useful? Can the operator perform tasks and perform other operations?

- 6 If the NV9604 is intended to be an extension to an NV9602, ensure that in its configuration, the 'Use as Slave Panel' checkbox is checked and that an NV9602 has been selected.

You can test a take using the NV9602/NV9604 pair. Press a destination or a source on the NV9604 to see if the destination or source is identified in the display of the NV9602.

# 4 Configuration

Chapter 4 provides configuration instructions for the NV9604.

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This chapter addresses configurers. Operators and other persons not interested in NV9604 configuration need not read this chapter.

## Summary

The NV9604 is a relatively simple panel. It has 32 function buttons. It can operate stand-alone as a single-destination panel or as a limited X-Y panel. It can also operate as an extension to an NV9602 control panel. As an extension, it follows the mode in which the NV9602 was configured. The NV9602 has 4 operating modes:

- [Single-Destination Mode](#).
- [Single-Destination Mode with Breakaway](#).
- [Limited X-Y Mode](#).
- [Multi-Destination Mode](#).

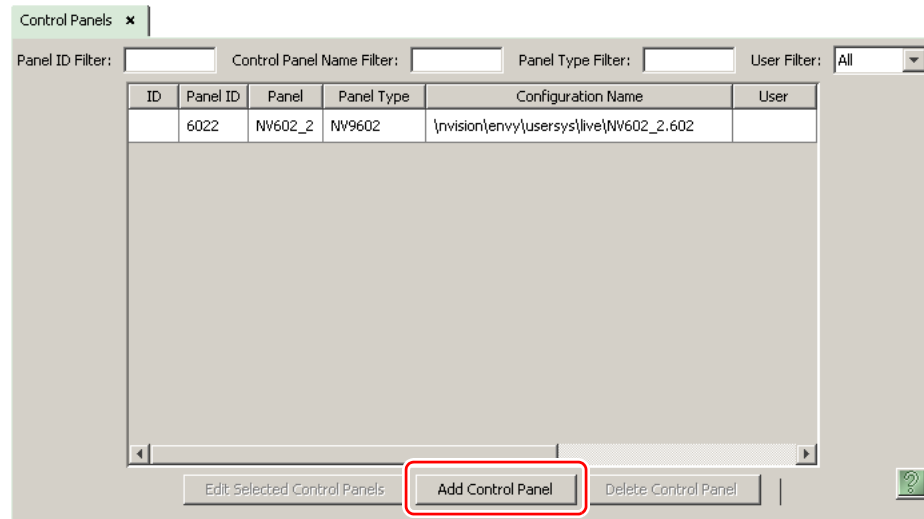
NV9000-SE Utilities is the software with which to configure the NV9604. Figure 4-1, following, shows the default NV9604 panel configuration page from NV9000-SE Utilities.

## Adding a Panel to an NV9000 Configuration

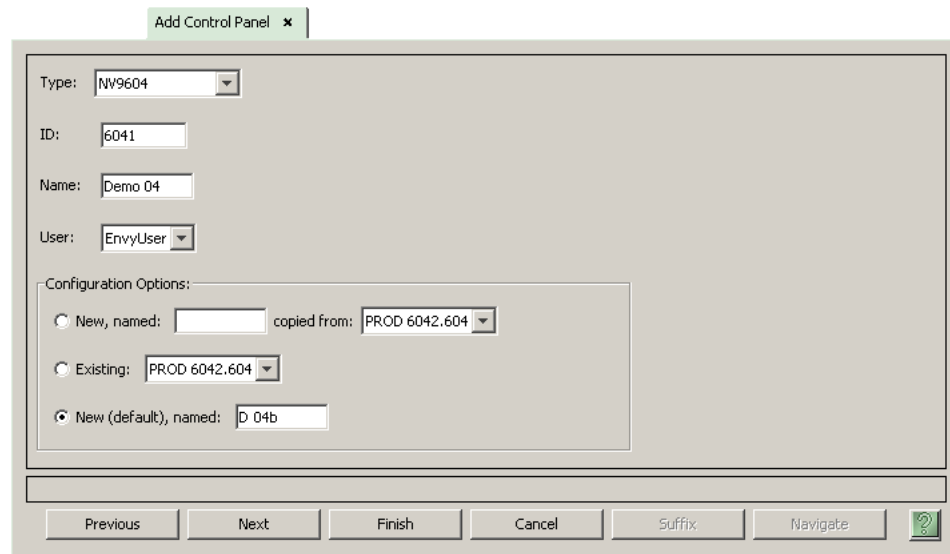
You must create configurations for the NV9604 using NV9000-SE Utilities. We assume that you are familiar enough with NV9000-SE Utilities that you can understand the following material. It is not difficult material, but some of the concepts might not be familiar to everyone.

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

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



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



Choose "NV9604" from the 'Type' field. In the ID field, enter the panel ID you assigned to the panel in the 'System Management' page. (You can change the panel ID of an NV9604 only in NV9000-SE Utilities.) Give a name to the panel in the name field and select a user.

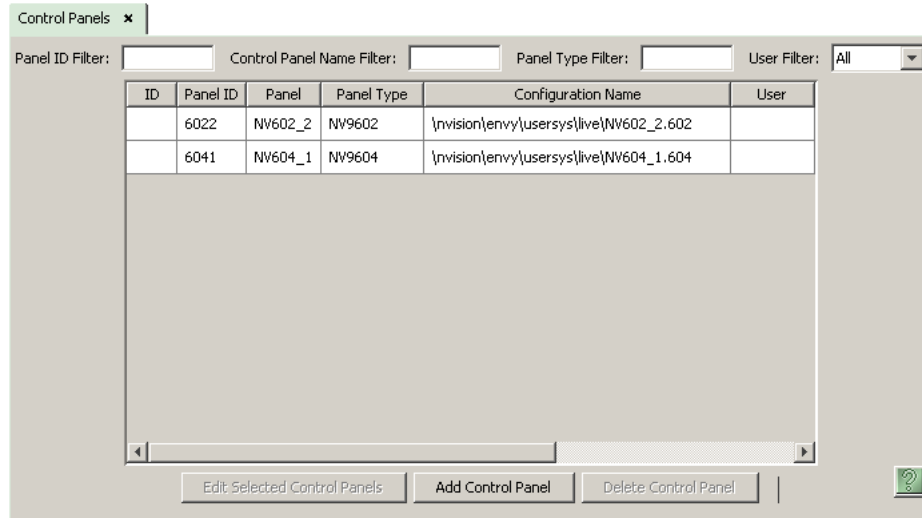
When you are creating a panel configuration you have 3 options. These options are presented in the 'Configuration Options' area:

- 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 NV9604 configuration file is .604. Click 'Next' or 'Finish' to proceed. Click 'Previous' to go back the previous page. Click 'Cancel' to terminate the entry operation.

- ▲ There are 2 other buttons, 'Suffix' and 'Navigate', both dim (disabled). These do not apply to the NV9604.

Return to the 'Control Panels' page to view your new entry. To edit an NV9604 configuration, double-click its list entry:



You will then see the panel configuration page for the selected NV9604.

Following is a discussion of how to use the panel configuration page in which you configure an NV9604.

## NV9604 Panel Configuration Page

This is the default NV9604 panel configuration page in NV9000-SE Utilities:

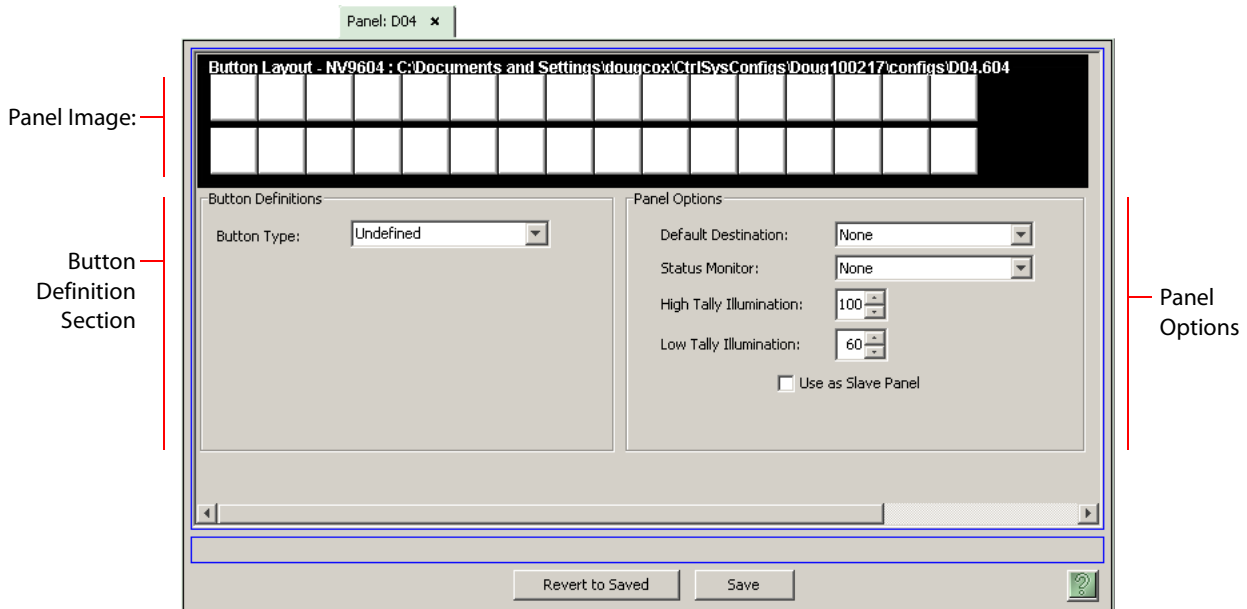


Fig. 4-1: NV9604 Configuration Page (Default)

After you configure buttons the appearance of the panel buttons will have changed. The panel buttons on this page will show legends, determined from the button type assigned to the button. (The panel's actual buttons have clear plastic keycaps that you can remove and insert button legends, graphic or text, of your own design.)

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

### Regions of the Configuration Page

Above the 'Revert to Saved' and 'Save' buttons (always present) there are 4 main regions:

- A graphic representation of the NV9604 panel.  
Configurers must click a button "proxy" to select the button for configuration.
- Button definitions.  
In this section, configurers make button assignments, using its pull-down menus and text fields. See [Button Definitions](#), following.
- Panel options.  
In this section, configurers may specify the behavioral characteristics of the panel. See [Panel Options](#), following.

## Configuration Tasks

The person configuring an NV9604 panel will want to consider how best to use the buttons to support the devices and routers in the router control system at hand. Trade-offs must be made.

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

- Determine whether the panel will run as an NV9602 extension.
- Determine in which mode the panel with this configuration will run.
- Select panel options.
- Assign functions to buttons.

## Commitment Buttons

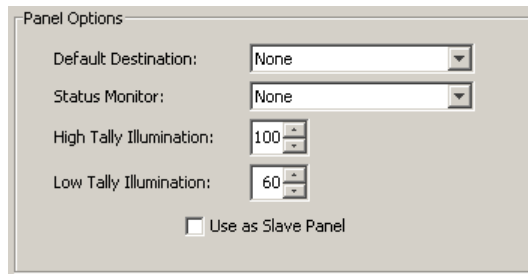
Two buttons at the bottom of the configuration page are self-explanatory and appear on most configuration pages:

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

Neither of these actions is reversible.

## Panel Options

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



Panel Options

Default Destination: None

Status Monitor: None

High Tally Illumination: 100

Low Tally Illumination: 60

Use as Slave Panel

These are its drop-down menu options:

Default Destination	None	After a reset, the panel has no default destination and displays no destination device. (This is not recommended in single-destination mode or single-destination-with-breakaway mode.)
	<device>	The panel uses the specified device as the destination after a reset. (The 'Default State' button also returns the panel to this destination.) A specific device is essential for operation in single-destination mode or single-destination-with-breakaway mode.)

Status Monitor	None <device>	The current source video is not sent to a monitor. The current source video for the selected destination appears on the specified monitor (device).
High-Tally Illumination	(The default is 100.)	Sets the panel's button illumination for high-tally. Use the arrow buttons to scroll to a value. The values range from 10 to 100 in increments of 10 (percent).
Low-Tally Illumination	(The default is 60.)	Sets the panel's button illumination for low-tally. Use the arrow buttons to scroll to a value. The values range from 0 to 90 in increments of 10 (percent).
Use as Slave Panel	(The default is unchecked.)	Check this box if the NV9604 for which this configuration applies is to be used as an extension to an NV9602. When you do check this box, a drop-down menu appears in which you can select the NV9602 to which this NV9604 will be an extension. If there are no entries in the drop-down menu, you cannot use the NV9604 as an extension.

## Button Definitions

There are only a few button functions:

- Source.
- Destination.
- Previous Source.
- Salvo.

'Previous Source' and 'Salvo' buttons are available only when the panel is an NV9602 extension.

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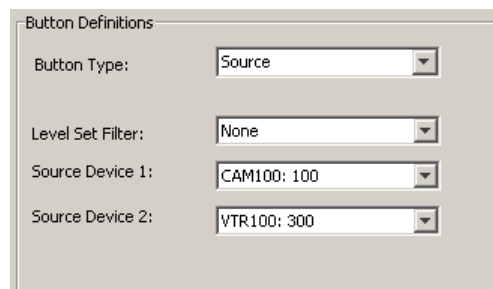
### Note:

During configuration, 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.

---

## Button Specification

The button definition section configures the button you have selected in the image of the NV9604:



The screenshot shows a window titled "Button Definitions" with four configuration fields, each with a dropdown arrow:

- Button Type: Source
- Level Set Filter: None
- Source Device 1: CAM100: 100
- Source Device 2: VTR100: 300



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.

When the NV9604 is used as an NV9602 extension, the use of the buttons depends on the mode in which the NV9602 is configured.

Four such modes (or behavioral models) apply. These letter codes identify, below, the NV9602 modes in which a button can operate:

- S—single-destination mode
- B—single-destination mode with breakaway
- X—limited X-Y mode
- M—multi-destination mode
- Any—any mode

When the NV9604 is used by itself, the NV9604 has no modes, but can operate either as single-destination panel (using the default destination) or as an X-Y panel.

## Button Types

These are the button types available for NV9604 configurations:

Type	Modes	Description
Destination	X	<p>The button selects a destination.</p> <p>When the panel is an NV9602 extension, the destination name appears in the 'Destination' display of the NV9602. The destination is the target of a pending take, which will route a source to that destination.</p> <p>The nature of destination buttons differs according to your configuration:</p> <ul style="list-style-type: none"><li>• Stand-alone panel. When you assign a source button, one drop-down menu appears: 'Destination Device'.</li><li>• NV9602 extension (you have checked 'Use as Slave Panel'). When you assign a destination button, two drop-down menus appear: 'Destination Device 1' and 'Destination Device 2'. These correspond to the two destination sets. If there is a 'Destination Shift' button on the NV9602 panel, the operator can switch between the two sets. When the first set is selected, pressing the button selects device 1. When the second set is selected, pressing the button selects device 2.</li></ul> <p>Note that when an NV9602 is in multi-destination mode, the only operable buttons on the NV9604 are salvo buttons.</p>
Previous Source	S, B, X	<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.</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 type is not available unless you have checked 'Use as Slave Panel'.</p>
Salvo	Any	<p>The salvo button executes a system salvo immediately.</p> <p>During configuration, when you assign a salvo button, a drop-down menu appears: 'Salvo'. Choose a salvo from the list. The 'None' entry is merely a placeholder. Do not choose 'None'.</p> <p>The button type is not available unless you have checked 'Use as Slave Panel'.</p>

Type	Modes	Description
Source	Any	<p>The button selects a source. The source name appears in the 'Status' display. <b>Pressing a source button completes a take.</b> When the panel is an NV9602 extension, the source name appears in the 'Status' display of the NV9602. The nature of source buttons differs according to your configuration:</p> <ul style="list-style-type: none"> <li>• Stand-alone panel. When you assign a source button, one drop-down menu appears: 'Source Device'.</li> <li>• NV9602 extension (you have checked 'Use as Slave Panel'). When you assign a source button, two drop-down menus appear: 'Source Device 1' and 'Source Device 2'. These correspond to the two source sets. If there is a 'Source Shift' button on the panel, the operator can switch between the two sets. When the first set is selected, pressing the button selects device 1. When the second set is selected, pressing the button selects device 2. Note that when an NV9602 is in multi-destination mode, the only operable buttons on the NV9604 are salvo buttons.</li> </ul>
Undefined	Any	<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>



# 5 Operation

Chapter 5 provides operating instructions for the NV9604 control panel.

## Summary

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<i>Self-Test</i> .....	31

This chapter is intended specifically for the NV9604 panel **operator**.

## Summary

As an NV9604 operator, you will be confronted initially with a relatively small and simple panel—just 32 buttons (and no display). The NV9604 can operate either as a stand-alone panel or as an extension to an NV9602. As an NV9602 extension, it follows the mode and methods of the NV9602.

The panel's buttons can have arbitrary legends (using plastic inserts under the button caps). A button's legend should indicate its function. Operators and configurers will have to communicate about the meaning of the buttons.

At any particular time, some of the buttons are high-tally; some are low-tally; and some might be undefined. Active buttons are of two colors, green and amber. Green generally represents sources and source functions; amber generally represents destinations and destination functions, but the colors are also used for other functions.

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

## Modes of Operation

As a stand-alone panel, the NV9604 has no modes, but can operate either as a single-destination panel (using the default destination) or it can operate as an X-Y panel. As an NV9602 extension, it operates in one of 4 modes (or behavioral models) of the NV9602:

- [Single-Destination Mode](#).
- [Single-Destination Mode with Breakaway](#).
- [Limited X-Y Mode](#).
- [Multi-Destination Mode](#).

The panel's set of button functions varies slightly with the mode (or behavioral model).

Generally, to operate the panel, you press a destination button and then press a source button. Choosing a source for a destination completes a take. This paradigm has slight variations in the different modes.

- ▲ There is no 'Take' button in any mode.

### **Single-Destination Mode**

In single destination mode, the panel's destination is configured as the default destination and there are no destination buttons. You cannot select a destination—it is already selected.

Takes are performed on all levels of the currently selected destination.

When the panel is an NV9602 extension, you can use a 'Source Shift' button to toggle between two sets of sources. For a stand-alone NV9604, a source button represents a single source.

Takes occur as soon as a source button is pressed.

### **Single-Destination Mode with Breakaway**

- ▲ This mode requires the NV9604 to be an NV9602 extension.

This mode is a variant of single-destination mode that includes level buttons on the NV9602 and that allows breakaway.

The single destination is configured as the default destination and you cannot select a destination because it is already selected.

Level buttons select the levels on which the take is to occur. Takes occur on all levels when either no levels are selected or when all levels are selected.

You can use a 'Source Shift' button (on the NV9602) to toggle between the two sets of sources.

### **Limited X-Y Mode**

In limited X-Y mode, takes occur from a single source to a single destination. Destinations are selectable.

Takes are all level. Pressing a source button completes the take.

When the panel is an NV9602 extension, operators can use a 'Source Shift' button (on the NV9602) to toggle between two sets of sources. Similarly, operators can use a 'Destination Shift' button (on the NV9602) to toggle between two sets of destinations.

### **Multi-Destination Mode**

- ▲ This mode requires the NV9604 to be an NV9602 extension.

Although an NV9602 can be configured in multi-destination mode, the buttons of the NV9604 do not function as multi-destination buttons.

When the NV9602 is in multi-destination mode (and the NV9604 is its extension), it is possible to use the NV9604 for salvo buttons, but nothing else.

Takes are all-level.

## Button Legends

The NV9602 has about 20 different button functions. The NV9604 has at most 4. Some might not be available on your panel depending on the operating mode in which it was configured. Typically, buttons have graphic or text legends that are plastic inserts placed under the clear button caps.

There are button templates. Use these or your own to create button graphics. Print the graphics on clear plastic, cut the button graphics apart and insert these under the button caps.

Buttons are also color-coded to a limited degree. Green represents sources. Amber represents destinations. Those colors are used for other functions, however. High-tally (bright) buttons are those that are selected; low-tally (dim) buttons are those that are not selected. Dark (white or gray) buttons are those that are disabled.

## Operating Concepts

When the NV9604 is a stand-alone panel, the only possible operation is to perform a take:

- In single-destination mode, by pressing a source button.
- In X-Y mode, by pressing a destination button, then a source button.

The following concepts stem from the NV9602 and apply only when the NV9604 is an NV9602 extension.

### Source Shift

Each source button can represent two sources. A 'Source Shift' button selects which of the two sources the source button will select. (The concept is similar to the shift key or the 'caps lock' key on a keyboard.)

A source shift button is a toggle that enables either the first or second source of source buttons. The source shift button is low-tally when it has enabled the first source. It is high-tally when it has enabled the second source.

A source shift button toggles all source buttons — on the NV9602 and NV9604.

### Destination Shift

Destination shift applies only in 'Limited X-Y' mode. The concept is much like source shift.

Each destination button can represent two destinations. A 'Destination Shift' button selects which of the two destinations the destination button will select.

A destination shift button is a toggle that enables either the first or second destination of destination buttons. The destination shift button is low-tally when it has enabled the first destination. It is high-tally when it has enabled the second destination.

A destination shift button toggles all destination buttons — on the NV9602 and NV9604.

## 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 inter-level set mapping.

The effect of this is that when you, the operator, choose a destination, the NV9000 software 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. (That is because routers are not mixers.)

## Hold

Hold mode (and hold buttons) apply in 'Single Destination with Breakaway' mode and 'Limited X-Y' mode.

## Breakaway

In single-destination mode with breakaway, 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.

### Limited X-Y

In limited X-Y mode, this button allows you to perform a gang (or "dub") switch. In hold mode, destination selections are cumulative, and not mutually exclusive.

Follow these steps to route a source to more than one destination:

- 1 Select the first destination to which you want to route the source. Use a 'Destination Shift' button if necessary to access the destination. The destination tallies bright amber and its name appears in the destination display.
- 2 Press the hold button. If the panel is in hold mode, the hold button will be high-tally. (Press the hold button again if it is not.)



- 3 Select the additional destinations you require. As you select each destination, its name appears in the destination display. You can toggle these additional destinations on or off.
- 4 Select a source. Use a 'Source Shift' button if necessary to access the source. The take to the multiple destinations is immediate.
- 5 As long as hold remains enabled, you can route other sources to the same group of destinations.

**To clear hold mode:**

- 1 Press the hold button. If it does not go low-tally, press it again.
- 2 Select any destination.

## Buttons

As an NV9602 extension, the NV9604 has 4 button types:

- [Destination](#)
- [Previous Source](#)
- [Salvo](#)
- [Source](#)

If your NV9604 is a stand-alone panel, it can have only two button types: source and destination.

Just for comparison, the NV9602 has 21 button types, not including "undefined" which is not an actual button type:

Broadcast	Free Source	Previous Source
Chop	Hold	Salvo
Default State	Level	Source
Destination	Menu	Source is Master
Destination Lock	Name Set Toggle	Source/Destination
Destination Protect	None/All	Source/Dest Toggle
Destination Shift	Panel Lock	Source Shift

In the following few function descriptions, the modes in which the functions operate are indicated (to the left) as follows:

- S—single-destination mode
- B—single-destination mode with breakaway
- X—limited X-Y mode
- M—multi-destination mode.
- Any—any mode.

### X Destination

The button selects a destination. If the NV9604 is an NV9602 extension, the destination name appears in the 'Destination' display of the NV9602. The destination is the target of an upcoming take, which will route a source to that destination.

The nature of destination buttons differs according to the panel's configured operating mode:

- Stand-alone panel, X-Y operation only.  
A destination button selects a destination.
- NV9602 extension, limited X-Y mode only  
A destination button can select one of two destinations. The first destination belongs to destination set 1 and the second destination belongs to destination set 2. Pressing a 'Destination Shift' button (on the NV9602) toggles the panel between destination set 1 and set 2.
- NV9602 extension, multi-destination mode  
Multi-destination mode applies only when the NV9604 is an NV9602 extension and the NV9602 is in multi-destination mode. However, the NV9604 has no buttons that perform multi-destination operations. When the NV9602 is in multi-destination mode, only the NV9604's salvo buttons are available.

### **S, B, X 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.

### **Any Salvo**

The salvo button executes a system salvo immediately.

### **Any Source**

The button selects a source. The source name appears in the 'Status' display. **Pressing a source button completes a take.**

The nature of source buttons differs according to the panel's configured operating mode:

- Stand-alone panel, single-destination operation or X-Y operation  
A source button selects a source.
- NV9602 extension, single-destination, with or without breakaway, and limited X-Y modes  
A source button can select one of two sources. The first source belongs to source set 1 and the second source belongs to source set 2. Pressing a 'Source Shift' button (on the NV9602) toggles the panel between source set 1 and set 2.
- NV9602 extension, multi-destination mode  
Multi-destination mode applies only when the NV9604 is an NV9602 extension and the NV9602 is in multi-destination mode. However, the NV9604 has no buttons that perform multi-destination operations. When the NV9602 is in multi-destination mode, only the NV9604's salvo buttons are available.

## Any Undefined

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

## 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.

It is possible that you will find one or more sources locked or protected because other control panels can lock or protect sources and destinations. *The NV9604 does not provide lock or protect functions. An NV9604 cannot lock, unlock, protect, or unprotect any source or destination.*

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.

## Takes

The NV9604 can operate by itself as a stand-alone panel or as an extension to an NV9602. As an extension to an NV9602, it operates according to the mode in which the NV9602 is configured.

Pressing a source button completes a take, in all cases. Following are brief instructions on how to perform a take under 4 cases.

### Case 1 — Stand-Alone Panel, Single-Destination Mode

The single destination is the one defined as the default destination. Takes all-level.

Press a source button to perform (and complete) a take.

### Case 2 — Stand-Alone Panel, X-Y Mode

Takes all-level. Follow these steps:

- 1 Press a destination button.
- 2 Press a source button to perform (and complete) a take.

### **Case 3—NV9602 Extension, Single-Destination Mode**

Takes in single-destination mode are all-level. Follow these steps:

- 1 Verify that the default destination appears in the 'Destination' field of the NV9602 display.
- 2 Optionally press 'Source Shift' (on the NV9602) to toggle between the source sets.
- 3 Press a source button on the NV9602 or NV9604 to complete the take. The 'Status' field of the NV9602 display shows the source you chose.

### **Case 4—NV9602 Extension, Single-Destination Mode, Breakaway**

Takes in single-destination mode with breakaway are meant to be on selected levels.

Follow these steps:

- 1 Verify that the default destination appears in the 'Destination' field of the NV9602 display.
  - 2 Press one or more level buttons on the NV9602 to select the levels you want to route. The levels that are available are those of the default destination. If your panel has a 'None/All' button, you can press that button to toggle between all levels being selected and no levels being selected.
  - 3 Optionally press 'Source Shift' (on the NV9602) to toggle between the source sets.
  - 4 Press a source button on the NV9602 or NV9604 to complete the take. The 'Status' field of the NV9602 display shows the source you chose.
- ▲ A take is all-level when all the level buttons are selected (high-tally) or when none of the level buttons are selected.
  - ▲ If your NV9602 has a 'Hold' button, you can use it to preserve the chosen breakaway levels after the take. Hold "mode" is active when the hold button is high-tally. When hold mode is inactive, the destination reverts to all levels after the take.

### **Case 5—NV9602 Extension, Limited X-Y Mode**

Takes in limited X-Y mode are all-level. Follow these steps:

- 1 Optionally press 'Destination Shift' (on the NV9602) to toggle between the destination sets.
- 2 Press a destination button on the NV9602 or NV9604 to start the take. The 'Destination' field of the NV9602 display shows the destination you chose.
- 3 Optionally press 'Source Shift' (on the NV9602) to toggle between the source sets.
- 4 Press a source button on the NV9602 or NV9604 to complete the take. The 'Status' field of the NV9602 display shows the source you chose.

### **Case 6—NV9602 Extension, Multi-Destination Mode**

Takes in multi-destination mode are all-level. Source buttons in multi-destination mode specify the destination to which the source is routed. Follow these steps:

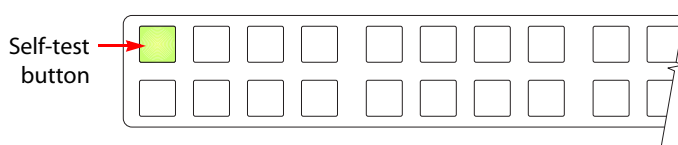
- 1 Optionally press 'Source Shift' (on the NV9602) to toggle between the source sets.
- 2 Press a source button on the NV9602 to complete the take. The 'Status' field of the NV9602 display shows the source you chose and the 'Destination' field of the display shows the destination assigned to that source.

- ▲ The NV9604 has limited use in multi-destination mode. Only its salvo buttons are usable.

## Self-Test

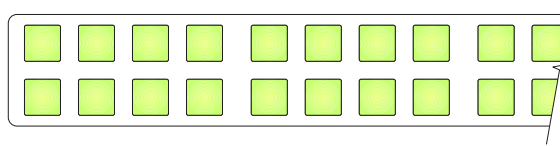
You can perform a short test of the NV9604 when it is disconnected from its network and powered up.

The panel powers up with 1 button illuminated in green. Here we call it the “self-test” button:



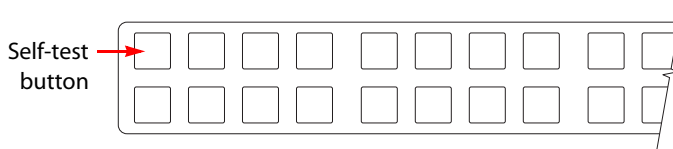
Press the self-test button to proceed to the color test. This test has 4 parts:

- All buttons turn low-tally amber.
- All buttons turn high-tally amber.
- All buttons turn low-tally green.
- All buttons turn high-tally green. This is an example:



To proceed through this test, press the self-test button (still in the same place although it is now changing color) 3 more times.

Finally, you will reach the button test:



All the buttons turn off. Press any button to test it. If the button is working properly, it will flash a few times rapidly.

Pressing the self-test button will terminate the button test and return your panel to its initial state.



# 6 Technical Details

Chapter 6 provides electrical and mechanical specifications for the NV9604.

## Summary

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## Power Specifications

### NV9604 Power Specifications

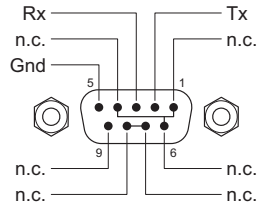
Specification	Detail
AC power	90–250 VAC, 50–60 Hz, auto-sensing. Inrush current < 50 A at 230 VAC, cold start, at 25 °C, Input current < 2.0 A rms at 115 VAC; < 1.0 A at 230 VAC.
Power consumption	≤ 14 W
Regulatory	UL listed and CE compliant.

## NV9604 Specifications

### NV9604 Physical Specifications

Specification	Detail
Dimensions	Height: 1.72 in (43.7.9 mm), fits EIA 1 RU (1.75 in or 44.5 mm), Width: 19.0 in (482.6 mm). Depth: 8.61 ± 0.01 in (218.7 mm), enclosure, 9.14 in (232.2mm) overall. Requires approximately .3 in cable clearance.
Weight	7.6 lb (3.447 kg).
Connectors	Power: AC. Ethernet: 1 connector, 10baseT, RJ-45 jack. RS-232: 1 connector, 9-pin D type, for diagnostics and upgrades.
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

NV9604 Environmental Specifications

Specification	Detail
Operating temperature	0–30 °C, ambient.
Relative humidity	0 to 90%, non-condensing.
Cooling	No fan required.

## Defaults

### Initial Panel State

Destination: the configured default.

### Configuration Page

The initial NV9604 configuration has no buttons defined. The default panel options are:

Default destination: None.  
Status monitor: None  
High-tally illumination: 100%.  
Low-tally illumination: 60%.  
All other options: Disabled (check boxes clear).

## DHCP

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

## Drawings

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



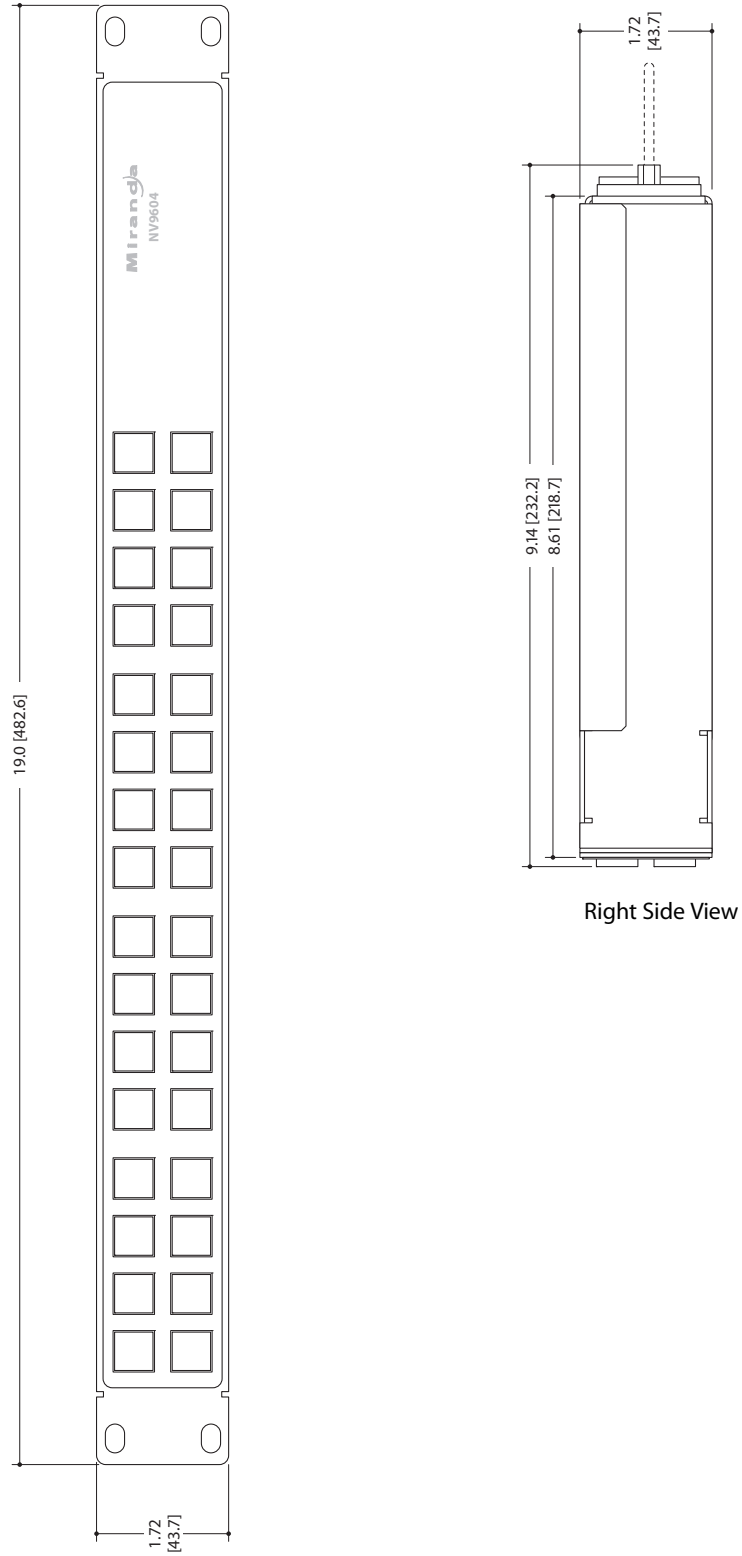


Fig. 6-1: Front and Side Views of the NV9604

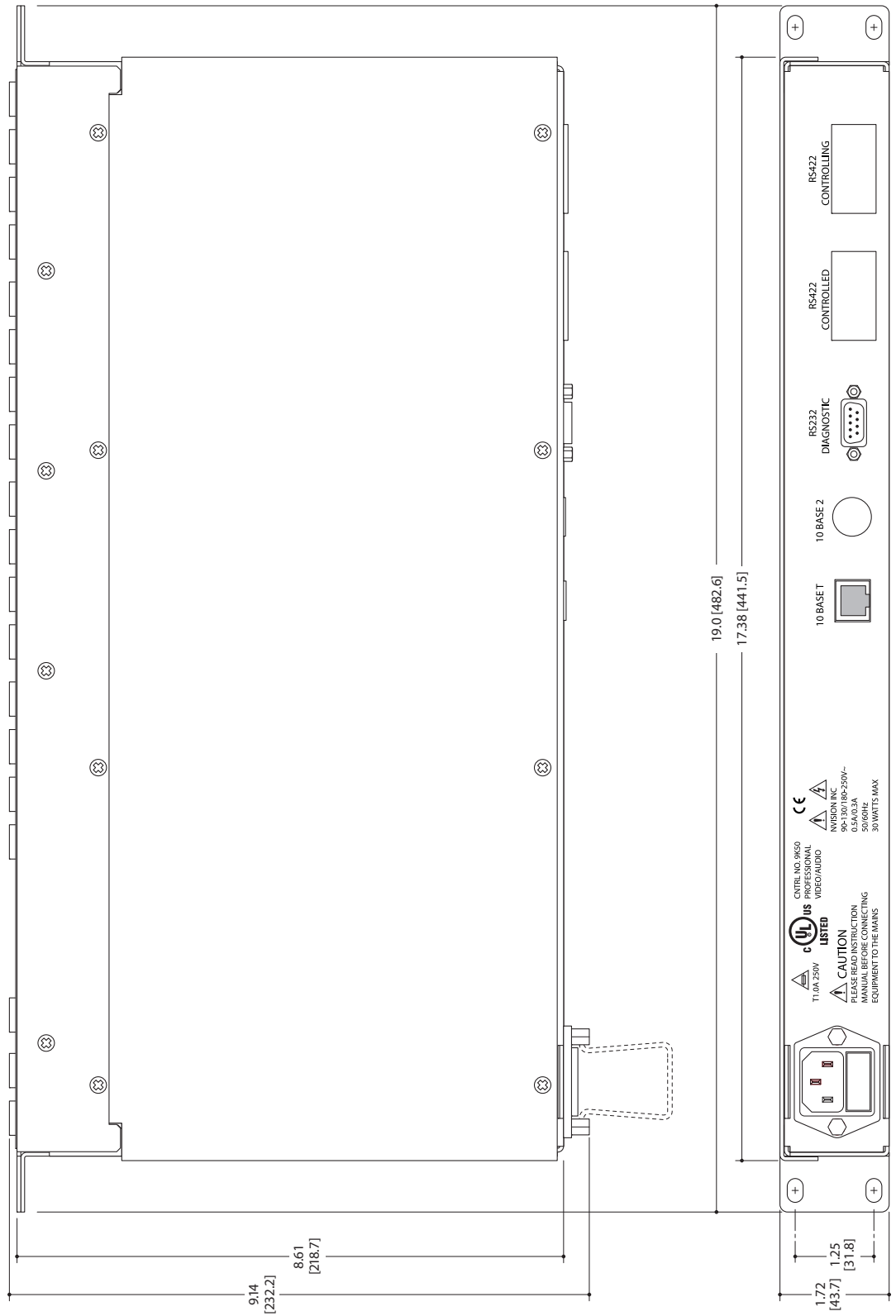


Fig. 6-2: Rear and Top Views of the NV9604

# abc

## Glossary

<b>AES/EBU</b>	(Audio Engineering Society/European Broadcasting Union). AES and EBU are standards organizations.
<b>Breakaway Category</b>	A condition where a destination has multiple sources on different levels. A category represents a set of devices. (The concept of categories exists to make it easier to select devices at a control panel.) A category can contain sources, destinations, or devices that are both sources and destinations. Each device in the category has a unique selection index within that category. Each category has a mnemonic ID associated with it. The NV9604 does not support categories or category selection.
<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 NV9604 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 NV9604's tally interface. The tally interface is called the "GPI Interface" at the rear of the NV9604.
<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 configurer. 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 an 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

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

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

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