NV9700

This brief guide describes the NV9700 Remote Diagnostic and Changeover Panel, a small and simple device that is part of a redundant NV9000 control system.

Please refer to the NV9000 documentation for information about NV9000 and its operation.

Introduction

The NV9700 is a slim 1RU device that allows an NV9000 operator these capabilities:

- See at a glance which NV9000 system controller is active.
- See at a glance whether an NV9000 system controller has an abnormal condition.
- Force a switch from one system controller to the other at any time.
- Hear an alert signal when an alarm condition occurs.

In addition, the NV9700 has a set of relay (GPO) outputs at the rear that can control fairly heavy-duty external circuitry. The relays reflect the status conditions that are indicated at the front of the panel. (See the Specifications on page 10.)

This is the front of the panel:

There are two large push-button switches and 3 status LEDs for each of the two redundant system controllers. Pressing the button forces the system active. The 3 LEDs indicate:

- Left, green LED—system controller is “healthy.”
- Middle, amber LED—the system controller is active. Normally, one controller is active.
- Right, red LED—the system controller has an alarm condition.

Buzzer

The front of the panel has an internal buzzer that sounds when an alarm condition arises. The buzzer is behind the speaker icon imprinted on the panel. The buzzer can be disabled.

Next to the buzzer is a mute button. When the buzzer sounds and an operator responds to the alarm, the operator may press the mute button to turn off the buzzer. (The mute is not a toggle. The buzzer remains muted until another alarm condition occurs.)

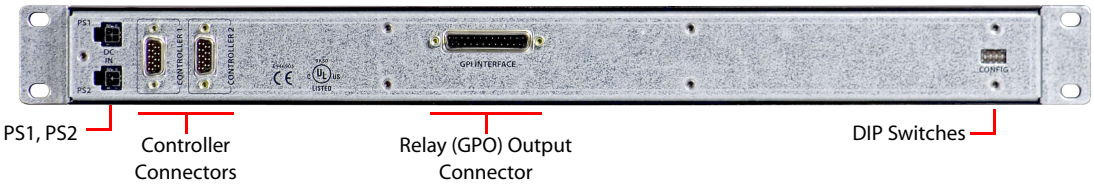
Panel Health

At the right end of the panel are 3 more LEDs. Two represent the two (redundant) power supplies and are illuminated when the power supply is connected and power is good. The remaining LED

("Panel Health") is green when the NV9700 itself is functioning properly and red if the NV9700 is malfunctioning.

Panel Rear

This is a view of the rear of the panel:



At the left end are two power supply connectors. The NV9700 uses one or two PS0001 power supplies—two for redundancy. The connectors are keyed 4-pin Molex connectors. It is not possible to connect the power supplies incorrectly. The connectors are labeled PS1 and PS2. LEDs on the front of the panel are also labeled PS1 and PS2 and indicate whether a (good) power supply is connected.

Controller Connectors

Next to the power supply connectors are two DE9 connectors. These connect to the NV9000 system controllers. The protocol is RS-422.

See Controller Connections for detail.

Relay Outputs

In the middle is a DB25 connector that supports relay output. The connector is labeled 'GPI Interface'. (This is a bit of misnomer. The DB25 supports general-purpose *outputs* or GPOs.)

The connector presents 7 relay outputs:

- Three (health, active, alarm) for system controller 1.
- Three (health, active, alarm) for system controller 2.
- One (alarm) triggered when any alarm condition exists.

See Relay Connections for detail.

DIP Switches

At the far right is an exposed set of DIP switches. There are 4 switches. The up position means the switch is closed; the down position means the switch is open.

Switch 1 (on the left) enables the buzzer, when the switch is up.

Switch 4 (on the right) enables a technician to install new firmware in the panel. This switch should be down under normal operation (and up to allow the firmware installation).

Switches 2 and 3 are unused at present.

Connections

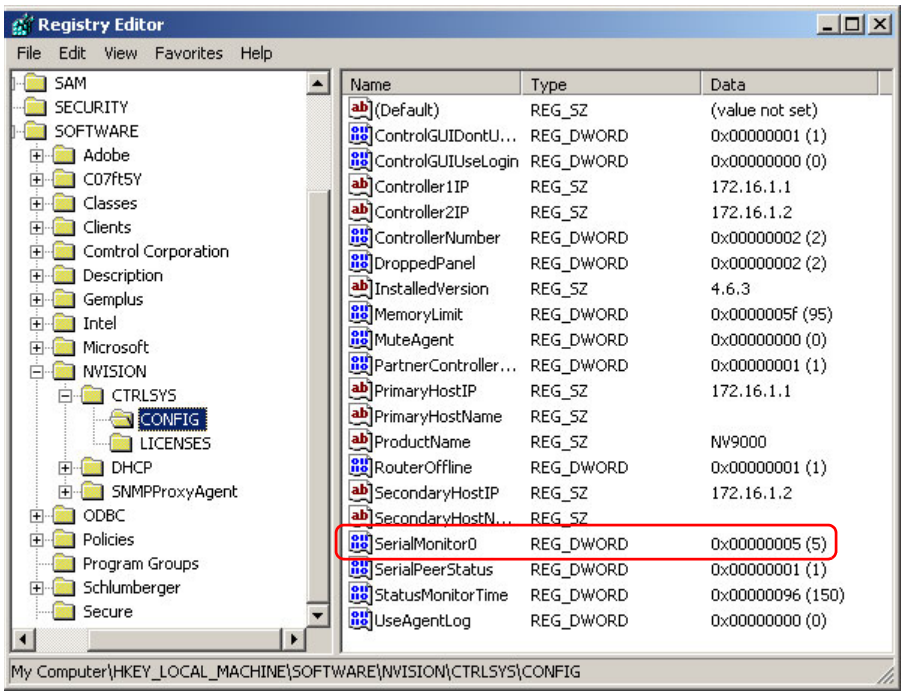
For it to be useful, you must connect the NV9700 to both system controllers. You have the option of using any or all of the relays to control external circuitry.

Controller Connections

The first step is to connect one serial (controller) port to one NV9000 system controller and the other serial port to the other NV9000 system controller.

Each of the NV9000 system controllers must have a serial card installed. (There are several options regarding the serial cards. Consult your service representative to determine your options.) Depending on the serial card installed in the NV9000, you will need either a straight-through serial cable or a cross-over cable. See Cabling, next page.
These are two 8-port examples. There are other types of serial cards. In any case, the protocol is RS-422, 9600 Baud, 8 data bits, 1 stop bit, no parity.

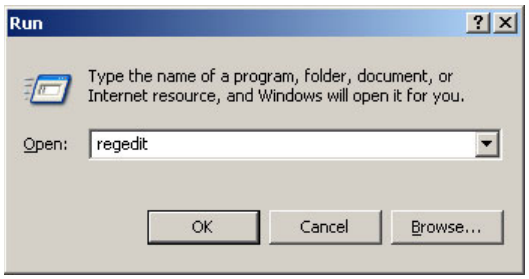
The second step is to create a registry variable in each of the NV9000 controllers:



The registry variable allows the NV9000 software to monitor the serial port.

The variable is named `SerialMonitor0`, a DWORD, and its value is the serial port number used by the NV97000 connection. In the preceding illustration, the port number is 5.

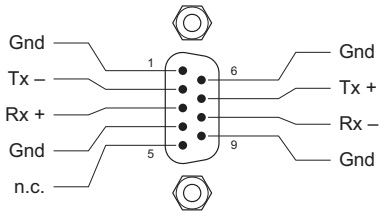
▲ The numbering of the serial monitors starts at 0.
To launch the registry editor, choose ‘Run...’ from the Start menu, type ‘regedit’ and click OK:



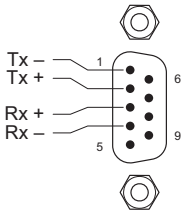
Refer to the *NV9000-SE Utilities User’s Guide* for additional information.

Cabling

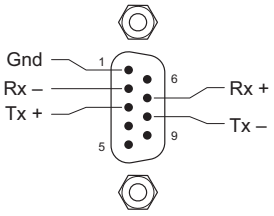
This is the pinout for each of the NV9700's controller ports:



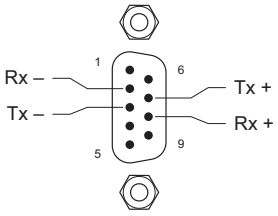
Depending on the serial card installed in your NV9000 controller, the DE9 ports to which you will connect the NV9700 will have any of 3 pinouts:



Moxa CP-118U and other Moxa breakout cables



Miranda WC0153 cable end for Moxa NPort 6650



(RocketPort) Non-SMPTE

Your cabling must accommodate the pinout. In all cases, Tx– connects to Rx– and Tx+ to Rx+.

(The NV9700's ports are female. The serial card's breakout ports might be either male or female.)

Making It Work

To make the NV9000 communicate with the NV9700 you must add the following registry entry:

```
\HKLM\SOFTWARE\NVISION/CTRLSYS/CONFIG/SerialMonitor0
```

The entry is a `REG_DWORD` and its value is that of COM port you are using for the NV9700. For instance, the value is `0x0000006` for COM port 6.

Repeat this on the secondary system controller too if your NV9000 system is redundant.

Important: restart NVAGENT so it can detect the registry change.

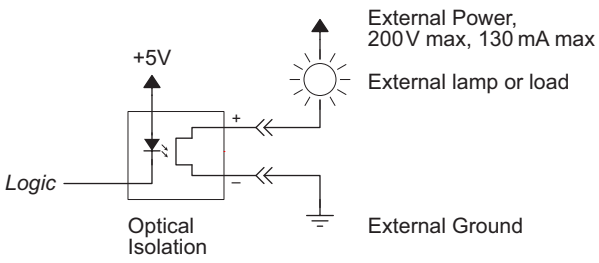
In the general case, the registry entry is:

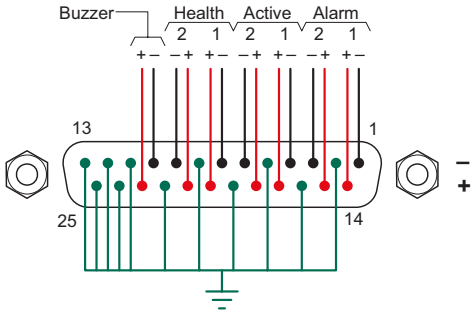
```
SerialMonitorN
```

where *N* is an integer starting at 0 and continuing contiguously until all the intended serial ports are listed. When these keys are nonzero, the system controller listens for status and monitoring queries on the port.

Relay Connections

There are 7 relay outputs. Each can switch a fairly heavy load:





(Relay specifications are on page 10.)

Each relay has power (+) and ground (–) terminals on the DB25 connector. The DB25 connector also has a number of additional ground terminals which you might want to connect to earth ground.

There are ‘alarm’ relays for controllers 1 and 2, ‘active’ relays for controllers 1 and 2, and ‘health’ relays for controllers 1 and 2. The relays are active when the LEDs are on and inactive when the LEDs are off.

A seventh relay is analogous to the buzzer: that relay switches on during any alarm condition for either controller and switches off if there is no alarm condition. Unlike the buzzer, the relay is not deactivated by the mute button and is not enabled or disabled by a DIP switch.

Discussion Points

The NV9700 is a *very simple* device. It displays the status of your system controllers. It illuminates an alarm LED when a system controller has a problem. If the buzzer is enabled, an alarm condition sounds the buzzer. The buzzer continues to sound until someone mutes it.

When Failure Occurs

The NV9700 itself could fail. If the power supply LEDs are not illuminated, the panel has lost power. If the ‘Panel Health’ LED is not illuminated, the NV9700 is malfunctioning. Ensure that the NV9700 is powered up and functioning before continuing.

If a system controller fails (i.e., the red alarm LED is on), you will probably need to use the ‘System Management’ page of *NV9000-SE Utilities* to review system status and to restart system controllers.

Before doing anything else, check the obvious:

- Are the serial cables (between the NV9700 and the system controllers) connected?
- Are both system controllers powered up and running?

If both these conditions are met, and the alarms are still present, then you must perform further investigation to determine the cause of the failure and correct it.

Failure Detection

The NV9000 has an watchdog timer that can be used to detect failures of the NV9700. Its use is optional. To enable the watchdog, create a registry entry:

```
\HKLM\SOFTWARE\NVISION/CTRLSYS/CONFIG/SerialWatchdogEnable
```

This entry is a `REG_DWORD`. Set its value to 1 to enable the watchdog and set its value to 0 to disable the watchdog. The time-out period is 100 ms. If the NV9000 does not receive a status poll from the NV9700 every 100 ms, it signals a fault condition.

Failure Conditions

The following table lists the causes of failure (the reasons for the red alarm light to go on).

Condition	Failover?	Alarm?
Loss of communication between system controllers	No[a]	Yes
Failed network connection (hub, switch, or NIC)	Yes	Yes
Active system controller failed	Yes	Yes
Inactive system controller failed	No	Yes
Lost contact with a router (all types)	Yes	Yes
Lost contact with a (configurable) number of control panels	Yes	Yes
Lost contact with third-party external interface	Not applicable	
Solid state “hard drive” failed[b]	Yes	Yes
(Spinning) hard disk failed	No	No
Lost 1 AC main or 1 power supply	No	No
Active system controller restarted	Yes	Yes
Inactive system controller restarted	No	Yes
Both system controllers restarted	Yes	Yes
Detection of system resource degradation	Yes	Yes

a. Both system controllers go active.

b. A solid state “hard drive” contains the operating system as well as data. A standard hard disk contains data only.

▲ Routers have their own system and power alarms.

Details

Although not exhaustive, these points provide some detail regarding system failures:

- Loss of communication between system controllers.

  A communication link between the two system controllers is required. That link can be a cross-over Ethernet cable, straight cables with an Ethernet switch, or a serial connection.

  If the cabling is absent or broken, or if an Ethernet switch is present and it malfunctions, each system controller begins to operate as a stand-alone controller and attempts to operate as the active controller. Eventually, one or both system controllers will malfunction in this condition.

  Both ‘Active’ LEDs of the NV9700 go on. Both ‘Alarm’ LEDs go on. If you see this condition, reconnect or replace the crossover cable.

- Failed network connection (hub, switch, or NIC).

Any failed network will result in a fail-over and an alarm. (That includes the network supported by the crossover cable.)

Generally, you will notice (in SE Utilities or in actuality) the failure of routers or panels in the system at the same time or before you notice a hub failure.

If multiple routers or panels fail at the same time, it is probably that a hub, switch, or NIC failure occurred.

- Active system controller failed.

  There are many reasons why a system controller could fail. In any case, such a failure results in a fail-over and an alarm.

  First, check whether the system controller is powered up and running. (Connect a keyboard, mouse and monitor to verify that it is running properly.) If necessary, reboot the controller. That will probably fix all but the most severe problems (such as a disk crash).

- Inactive system controller failed.

  Again, there are many reasons why a system controller could fail. A fault in an inactive system controller does ***not*** result in a fail-over but does generate an alarm.

  Again, check whether the system controller is powered up and running. (Connect a keyboard, mouse and monitor to verify that it is running properly.) If necessary, reboot the controller. That will probably fix all but the most severe problems (such as a disk crash).

- Lost contact with a router (any and all types).

  The system controller is otherwise healthy but either a router "died" or its network "died." The system fails over (in case it is a network failure) and generates an alarm.

  Check the router's power and control card(s) first. The control cards should show green 'Health' LEDs and one of the control cards should be active (the amber LED is illuminated). If not, the router needs service.

  If the router is healthy, the network is probably at fault. Check the hub or switch and the NIC.

- Lost contact with 2 or more control panels.

  The system controller is otherwise healthy but two or more panels "died" or their network "died." (The problem is similar to a router failure, but the loss of a single panel is not considered a cause for alarm.) The system fails over (in case it is a network failure) and generates an alarm.

  Check power on all malfunctioning panels first. Restart any non-responsive panel that has good power. If you get no response, either the panel needs service or the network has failed. Check the hub or switch and the NIC.

- Lost contact with third-party external interface.

  This condition — although serious — is not applicable to the NV9700. Fail-over does not occur and alarms are not signaled.

- "Hard drive" failed.

  A system controller will stop functioning or start malfunctioning if there is a hard drive failure. If it stops functioning, the system fails over and generates an alarm. If the controller merely malfunctions, the result is indeterminate. However, malfunctions typically cause the controller to stop quickly.

  If the drive is a solid state drive, it is possible that the operating system is corrupt. A reinstallation would be required.

If the drive is a normal disk drive, data might be corrupt and a configuration reload would be required.

It is also possible that the disk itself has been damaged.

Reboot the system controller. When you do, you will probably find out quickly what the problem is.

- Lost one AC main or one power supply.

  Losing a single power supply or AC connection is not a cause for fail-over or an alarm unless it is the only power source for the system controller.

  The newer version of the NV9700 system controller will have a red lamp that indicates that one of the two required power supplies has failed. The older NV9700s have an internal green LED that does the same thing, but you might not be able to see it without dismantling the NV9700.

  A fail-over occurs on full loss of power for the active controller and does not occur for the inactive controller.

  The remedy might be as simple as plugging the AC cable back in. It is probable that the internal power supply failed when you have AC power but the system controller still does not run.

- System controller restarted.

  A restart of any system controller takes about 30 seconds. During that time, the controller is effectively disconnected from the NV9700 and from NV9000-SE Utilities (from which you must execute the restart).

  Restarting the active controller causes a fail-over and an alarm.

  Restarting the inactive controller does not cause a fail-over but does generate an alarm.

  The alarm condition disappears after a successful restart (although the NV9700 buzzer might continue to sound).

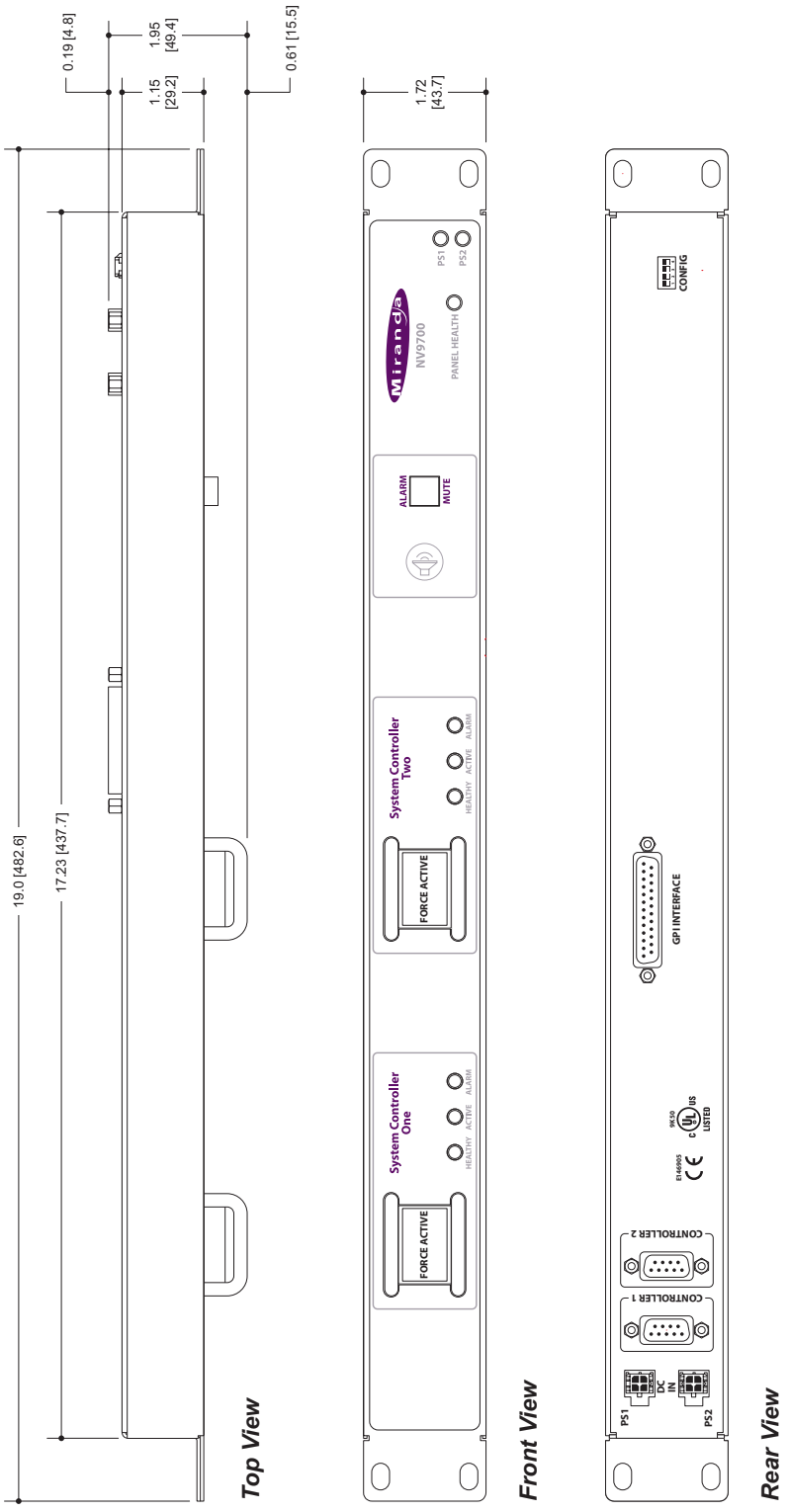
  If you restart both system controllers at the same time (in NV9000-SE Utilities), system controller number 1 starts first and becomes active.

- Detection of system resource degradation.

  Performance degradation is gradual. It is possible for the controller to degrade to a point at which it can no longer function. The controller signals an alarm and the system fails over.

Drawings

The following drawing show the overall dimensions and features of the NV9700.



Specifications

Power Supply:	PS0001-00. External, 12 VDC at 2.5 A.
Dimensions:	19.0″ W × 1.72″ H × 1.95″ D. [482.6 mm × 43.7 mm × 49.4 mm]
Weight:	1.69 lb [0.765 kg].
Power:	≤ 4.5 W.
Relay limit:	V_{OFF} (output dielectric strength) ≤ 200 V Continuous load current ≤ 200 mA Recommended operation: Load current < 130 mA V_{OFF} < 200 V
Buzzer:	4 kHz; 87 dB at 12 VDC.

Technical Support

Miranda has made every effort to ensure that the equipment you receive is in perfect working order and that the equipment fits your needs. In the event that problems arise that you cannot resolve, or if there are any questions regarding this equipment or information about other products manufactured by Miranda, please contact your local representative or contact Miranda directly through one of the appropriate means listed here.

- Main telephone: 514-333-1772
  Fax: 514-333-9828

  In the Americas, call toll-free: +1-800-224-7882 (9 am to 9 pm EST)
  In Europe, the Middle East, African or the UK, call +44 (0) 1491 820222 (9 am to 6 pm, GMT)
  In France, call +33 1 55 86 87 88 (9 am to 5 pm, GMT + 1)
  In Asia, call +852-2539-6987 (9 am to 5 pm, GMT + 8)
  In China, call +86-10-5873-1814
- E-Mail:

  In the Americas, techsupp@miranda.com
  In Europe, the Middle East, African or the UK, eurotech@miranda.com
  In France, eurotech@miranda.com
  In Asia, asiatech@miranda.com
  In China, asiatech@miranda.com
- Website: http://www.miranda.com
- Mail

  Miranda Technologies, Inc.
  3499 Douglas B. Floreani
  Montreal, Quebec
  Canada H4S 2C6

  Shipping

  NVISION, Inc.
  125 Crown Point Court
  Grass Valley, CA 95945, USA

Note Return Material Authorization (RMA) required for all returns.