

## Using GPIs with an NK Series Routing System

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### Introduction

When incorporated into an NK Series routing system, the NK-GPI General Purpose Interface offers users a vast range of options for interfacing to the routing system with the outside world. This application note describes how equipment can be connected to the NK-GPI's inputs and outputs and configured from Phoenix software, with some practical application examples.

### What is a GPI?

A General Purpose Interface is a peripheral which provides inputs for control of a routing system by external equipment and outputs which allow the routing system to control external equipment. This may be as simple as a switch closure on an input controlling a router crosspoint, or an LED on an output indicating which particular source has been selected. More sophisticated applications may involve interfacing to third party manufacturer's equipment, for example, camera control units, vision mixers, production switchers, automation systems, and under monitor displays which are usually equipped with similar GPI inputs and outputs.

### The NK-GPI

The Codan Broadcast NK-GPI is a universal General Purpose Interface for the NK Series family of routers, providing 16 optically isolated inputs and 16 open collector outputs to accommodate a wide variety of interfacing options.

The NK-GPI connects to the NK Series T-Bus control system using RJ45 connectors, and standard off the shelf Cat 5 cable, which also carries phantom power for the unit. Loop through connections allow the NK-GPI to reside at any point on the control bus. Multiple NK-GPIs can exist in the same system, and can be mapped across 32 levels. Input and output connections to the NK-GPI are via a DB-37 port.



*The NK-GPI*

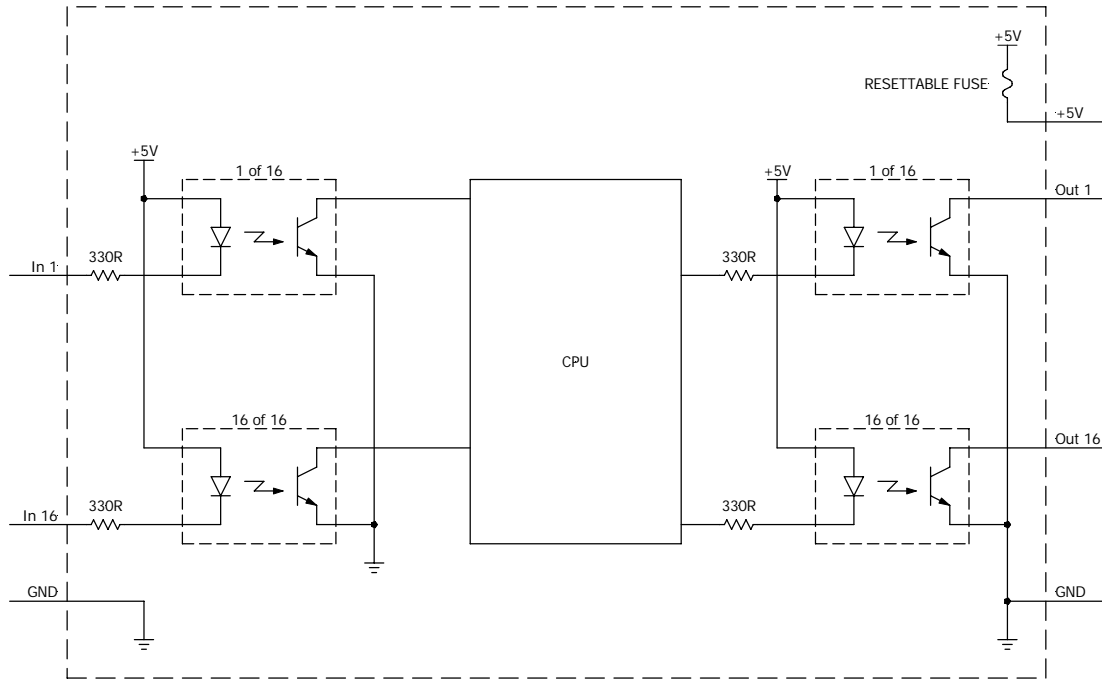
The primary functions of the NK-GPI are to:

- switch a specified crosspoint (input-output pair) on a specified level or group of levels when a GPI input is triggered. The crosspoint can be held momentarily (GPI In Return Mode) or held until another switch is activated (GPI In Latch Mode).

- activate a GPI output when a specified crosspoint is switched on a specified level or group of levels.

## NK-GPI Input and Output Architecture

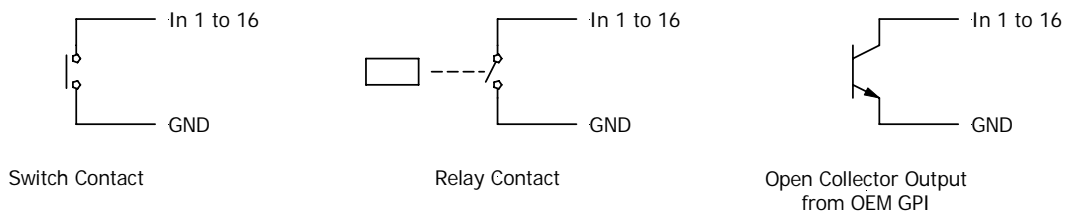
The NK-GPI uses photocouplers on inputs and outputs to guarantee reliable operation and provide isolation from high voltages.



**NK-GPI Input/Output Architecture**

### GPI Inputs

16 optically isolated inputs provide for direct connection of contact closures or open collector outputs. Inputs are active-low, requiring a pull to ground to activate the input's opto LED.

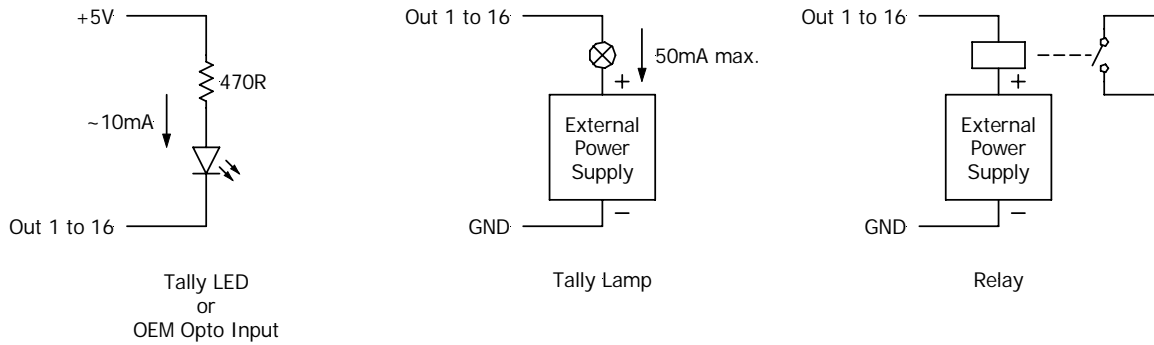


**Typical GPI Input Connections**

A configuration option sets a programmable debounce delay to prevent false triggering of inputs using mechanical switch contacts.

## GPI Outputs

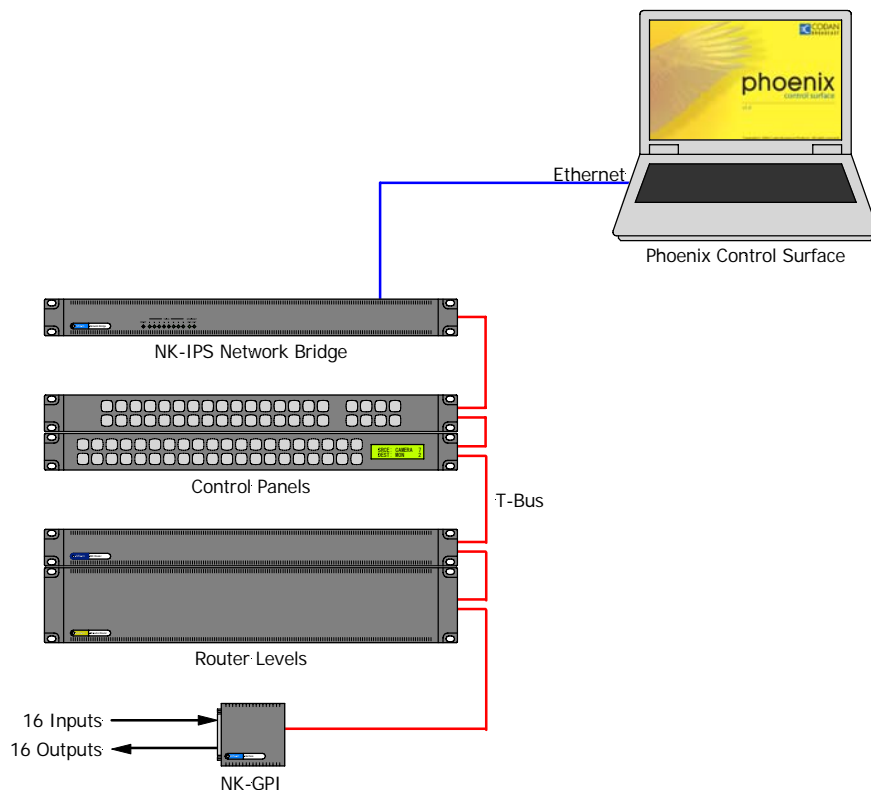
There are 16 open collector outputs each capable of sinking 50mA to ground with a maximum Collector-Emitter voltage of 35V. A 500mA resettable fuse prevents excessive current from being drawn from the GPI's internal +5V supply when used as a power source for outputs. The maximum current that can be drawn from the internal +5V supply for driving LED's, relays etc is 100mA. For high current applications it is recommended an external power supply is used along with external output drivers if necessary.



### Typical GPI Output Connections

## Configuring the NK-GPI

NK-GPI configuration is via the NK-IPS Network Bridge and a PC running Phoenix Control Surface software or a web browser.



### NK Series System with NK-GPI

## GPI Input Table

The GPI Input Table (**GPI Ins**) determines which router crosspoint and level combination will be switched when triggered by each GPI input. The example Phoenix configuration below is configured so that a trigger on GPI Input 1 will switch Input 1 to Output 1 on any router(s) assigned to Level 1.

Crosspoint switched                      Router Levels switched

**NKseries**  
NK-GPI  
Serial Num: 16539 Version: 2.01

**Device Details**  
Name: NK - GPI      Details:   
Group:       Address: 39

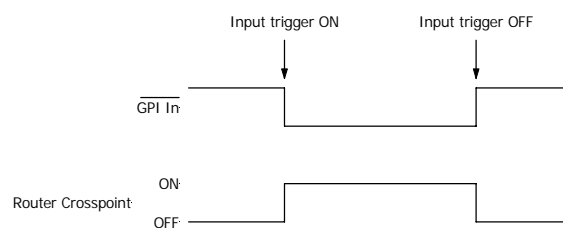
GPI Ins:

GPI In	Input	Output	Levels (L... +8)
1	1	1	1 2 3 4 5 6 7 8
2	2	2	1 2 3 4 5 6 7 8
3	3	3	1 2 3 4 5 6 7 8
4	4	4	1 2 3 4 5 6 7 8
5	5	5	1 2 3 4 5 6 7 8
6	6	6	1 2 3 4 5 6 7 8
7	7	7	1 2 3 4 5 6 7 8
8	8	8	1 2 3 4 5 6 7 8
9	9	9	1 2 3 4 5 6 7 8
10	10	10	1 2 3 4 5 6 7 8
11	11	11	1 2 3 4 5 6 7 8
12	12	12	1 2 3 4 5 6 7 8
13	13	13	1 2 3 4 5 6 7 8
14	14	14	1 2 3 4 5 6 7 8
15	15	15	1 2 3 4 5 6 7 8
16	16	16	1 2 3 4 5 6 7 8

GPI In Mode:  Return  Latch

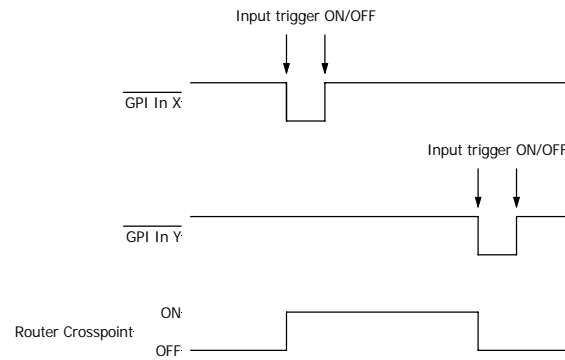
The **GPI In Mode** determines the type of signal which will trigger an input

When the **GPI In** mode is set to **Return**, the crosspoint will be held only while the input trigger is held. A momentary switch connected to a GPI input (from a joystick or production switcher for example) allows a router crosspoint to be momentarily switched to a different crosspoint for previewing or referencing. This concept can be extended to include more than one level (for example video and audio) resulting in a momentary breakaway.



### GPI In Return Mode

When the **GPI In** mode is set to **Latch**, the GPI input is triggered by an active-low pulse, and the crosspoint is held until a trigger on another GPI input removes the route to that output. This mode is commonly used by automation systems to trigger playback from a particular server via a router for example.



### ***GPI In Latch Mode***

### **GPI Output Table**

The GPI Output Table (**GPI Outs**) determines the router crosspoint and level combination which, when switched, will activate each GPI output. In the Phoenix configuration example below, GPI Out 1 will be activated when a router assigned to level 2 makes a switch from Input 1 to Output 1. If this switch was made on another level as well as level 2, the level mask would not match and the GPI output would not activate.

# NKseries

NK-GPI

Serial Num: 16539    Version: 2.01

Device Details

Name:     Details:

Group:     Address:

GPI Outs:

GPI Out	Input	Output	Levels (L...L+8)
1	1	1	<input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8
2	2	2	<input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8
3	3	3	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8
4	4	4	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input checked="" type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8
5	5	5	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input checked="" type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8
6	6	6	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input checked="" type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8
7	7	7	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input checked="" type="checkbox"/> 7 <input type="checkbox"/> 8
8	8	8	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input checked="" type="checkbox"/> 8
9	1	1	<input type="checkbox"/> 1 <input checked="" type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8
10	2	2	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8
11	3	3	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input checked="" type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8
12	4	4	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input checked="" type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8
13	5	5	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input checked="" type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8
14	6	6	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input checked="" type="checkbox"/> 7 <input type="checkbox"/> 8
15	7	7	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input checked="" type="checkbox"/> 8
16	8	8	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8

GPI Out Mode:     Follow GPI Ins     Use GPI Out table

The GPI Out **Mode** configures the GPI outputs to either Follow GPI Ins, as configured in the GPI Input Table, or to use GPI Out Table for crosspoint configuration.

## Linking the NK-GPI to a Control Panel

The **Panel Link Address** configuration option is used when users wish to use a control panel to select destinations (outputs), rather than defining destinations in the **GPI Input Table** or **GPI Output Table**. When linked to a control panel the 16 GPI inputs can now control up to 16 x (# destinations on control panel) crosspoints, compared to just 16 crosspoints when not linked to a panel, and the 16 GPI outputs can be controlled by up to 16 x (# destinations on control panel) crosspoints, compared to just 16 crosspoints when not linked to a panel. This becomes a particularly powerful tool for larger systems with many crosspoints, where multiple GPIs would otherwise be required.

When setting up a NK Series system, each device is normally given a unique address, and the **Panel Link Address** is ignored (set to 0). However, when linking the NK-GPI to a control panel, the address must be the same for both the NK-GPI and the control panel, while the **Panel Link Address** must be different for each device (set to between 1 and 255), as shown in the configurations below:

**NKseries**  
RCP-NK1  
Serial Num: 21265 Version: 2.01

**Device Details**  
Name: RCP - NK1 Details:   
Group:  Address: 48

Machine Control Enabled:   
Machine Control Level: 8  
Panel Link Address: 1  
Clear Protect(s):   
First Input: 1  
First Output: 1  
Comms Retry Delay: 5  
Level Position: 1->8  
Virtual Routing Enabled:   
Protect Mode:  Block Other Panels  Block All Panels

**Alarms**  
Protect:  No Protect

# NKseries

NK-GPI

Serial Num: 16539 Version: 2.01

**Device Details**

Name:  Details:

Group:  Address:

GPI Outs:

GPI Out	Input	Output	Levels (L...L+8)
1	1	1	<input type="text" value="1"/> <input style="border: 2px solid blue;" type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/> <input type="text" value="6"/> <input type="text" value="7"/> <input type="text" value="8"/>
2	2	2	<input type="text" value="1"/> <input style="border: 2px solid blue;" type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/> <input type="text" value="6"/> <input type="text" value="7"/> <input type="text" value="8"/>
3	3	3	<input type="text" value="1"/> <input style="border: 2px solid blue;" type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/> <input type="text" value="6"/> <input type="text" value="7"/> <input type="text" value="8"/>
4	4	4	<input type="text" value="1"/> <input style="border: 2px solid blue;" type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/> <input type="text" value="6"/> <input type="text" value="7"/> <input type="text" value="8"/>
5	5	5	<input type="text" value="1"/> <input style="border: 2px solid blue;" type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/> <input type="text" value="6"/> <input type="text" value="7"/> <input type="text" value="8"/>
6	6	6	<input type="text" value="1"/> <input style="border: 2px solid blue;" type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/> <input type="text" value="6"/> <input type="text" value="7"/> <input type="text" value="8"/>
7	7	7	<input type="text" value="1"/> <input style="border: 2px solid blue;" type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/> <input type="text" value="6"/> <input type="text" value="7"/> <input type="text" value="8"/>
8	8	8	<input type="text" value="1"/> <input style="border: 2px solid blue;" type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/> <input type="text" value="6"/> <input type="text" value="7"/> <input type="text" value="8"/>
9	1	1	<input type="text" value="1"/> <input style="border: 2px solid blue;" type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/> <input type="text" value="6"/> <input type="text" value="7"/> <input type="text" value="8"/>
10	2	2	<input type="text" value="1"/> <input style="border: 2px solid blue;" type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/> <input type="text" value="6"/> <input type="text" value="7"/> <input type="text" value="8"/>
11	3	3	<input type="text" value="1"/> <input style="border: 2px solid blue;" type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/> <input type="text" value="6"/> <input type="text" value="7"/> <input type="text" value="8"/>
12	4	4	<input type="text" value="1"/> <input style="border: 2px solid blue;" type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/> <input type="text" value="6"/> <input type="text" value="7"/> <input type="text" value="8"/>
13	5	5	<input type="text" value="1"/> <input style="border: 2px solid blue;" type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/> <input type="text" value="6"/> <input type="text" value="7"/> <input type="text" value="8"/>
14	6	6	<input type="text" value="1"/> <input style="border: 2px solid blue;" type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/> <input type="text" value="6"/> <input type="text" value="7"/> <input type="text" value="8"/>
15	7	7	<input type="text" value="1"/> <input style="border: 2px solid blue;" type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/> <input type="text" value="6"/> <input type="text" value="7"/> <input type="text" value="8"/>
16	8	8	<input type="text" value="1"/> <input style="border: 2px solid blue;" type="text" value="2"/> <input type="text" value="3"/> <input type="text" value="4"/> <input type="text" value="5"/> <input type="text" value="6"/> <input type="text" value="7"/> <input type="text" value="8"/>

GPI Out Mode:  Follow GPI Ins  Use GPI Out table

Debounce delay (ms):

Panel Link Address:

First Input:

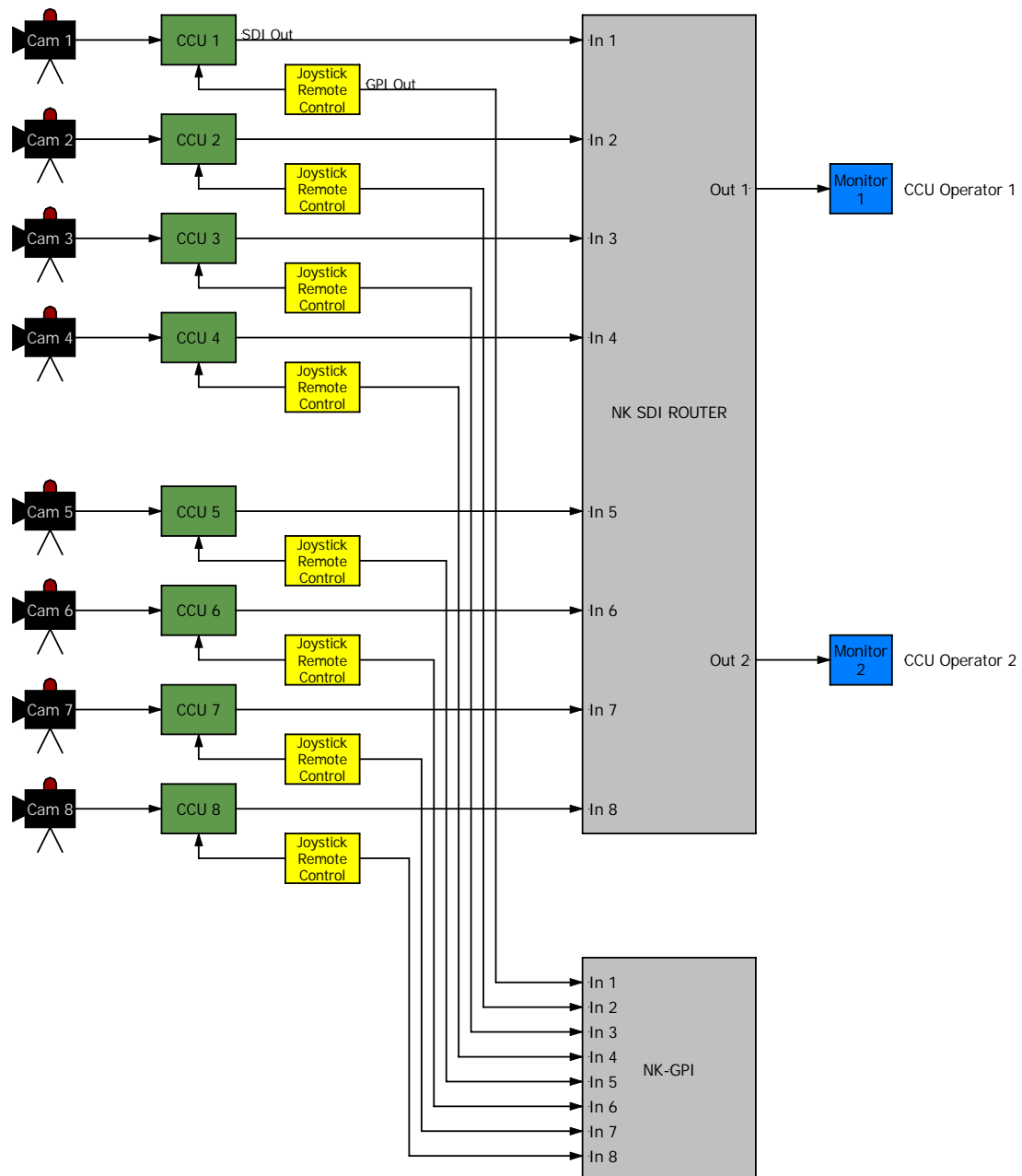
The output column is ignored in both the GPI Input Table or GPI Output Table when the NK-GPI is linked to a control panel.

## Practical Applications

### Joystick Override for CCU Operators

In multi-camera productions it is a common requirement for a CCU operator to switch video from one of several cameras being controlled to a single monitor using a joystick remote control. The CCU operator would select a camera as the video source by pressing a button on the joystick, initiating a contact closure on the CCU's GPI port.

The NK-GPI accepts such a contact closure to switch the selected camera to the operators monitor, either momentarily (Return mode) or Latching (Latch mode).



*Joystick Override for CCU Operators Example*

The configuration for GPI Inputs in the above example is shown below:

## NKseries

NK-GPI

Serial Num: 16539 Version: 2.01

Device Details

Name:  Details:

Group:  Address:

GPI Ins:

GPI In	Input	Output	Levels (L...L+8)
1	1	1	1 2 3 4 5 6 7 8
2	2	1	1 2 3 4 5 6 7 8
3	3	1	1 2 3 4 5 6 7 8
4	4	1	1 2 3 4 5 6 7 8
5	5	2	1 2 3 4 5 6 7 8
6	6	2	1 2 3 4 5 6 7 8
7	7	2	1 2 3 4 5 6 7 8
8	8	2	1 2 3 4 5 6 7 8
9	0	0	1 2 3 4 5 6 7 8
10	0	0	1 2 3 4 5 6 7 8
11	0	0	1 2 3 4 5 6 7 8
12	0	0	1 2 3 4 5 6 7 8
13	0	0	1 2 3 4 5 6 7 8
14	0	0	1 2 3 4 5 6 7 8
15	0	0	1 2 3 4 5 6 7 8
16	0	0	1 2 3 4 5 6 7 8

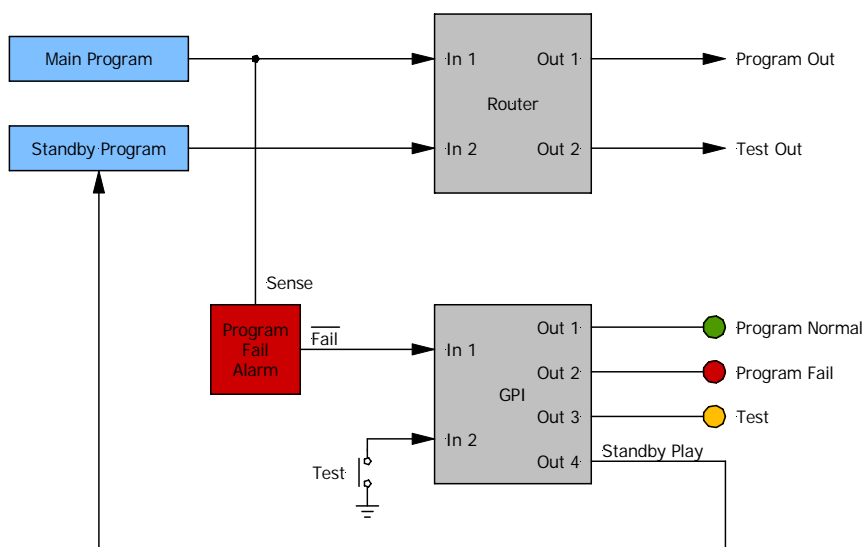
GPI In Mode:  Return  Latch

## Automatic Standby Program Switching

Broadcast facilities with remote transmitter sites or unmanned stations often require some means of automatic program switching in the event of a failure on the main program path. In the following example a Program Fail Alarm (PFA) detects loss of program, triggering the GPI to switch the router to the Standby Program source on In 2. The GPI inputs are in Return mode, so that as long as the Fail output of the PFA is held low, router Out 1 will take its source from the In 2. When the Main Program signal resumes (the PFA will have a threshold and a hold time to prevent erroneous triggering), the PFA Fail output will return high, and router Out 1 will take its source from the In 1, resuming normal operation.

An output from the GPI ensures that a Standby Program playback source is activated when the router is switched to the Standby source. Other GPI outputs are used to drive Program Normal, Program Fail and Test indicators, which could be local LEDs or tally outputs to a more sophisticated monitoring system.

A Test function allows the Standby program to be auditioned without interrupting the Main Program path.



### *Automatic Standby Program Switching Example*

Assuming the above example uses a stereo analogue audio router assigned to Levels 6 and 7, the configuration for GPI Ins and GPI Outs is shown below:

# NKseries

## NK-GPI

Serial Num: 16539 Version: 2.01

**Device Details**

Name:  Details:

Group:  Address:

GPI Ins:

GPI In	Input	Output	Levels (L...L+8)
1	2	1	1 2 3 4 5 6 7 8
2	2	2	1 2 3 4 5 6 7 8
3	0	0	1 2 3 4 5 6 7 8
4	0	0	1 2 3 4 5 6 7 8
5	0	0	1 2 3 4 5 6 7 8
6	0	0	1 2 3 4 5 6 7 8
7	0	0	1 2 3 4 5 6 7 8
8	0	0	1 2 3 4 5 6 7 8
9	0	0	1 2 3 4 5 6 7 8
10	0	0	1 2 3 4 5 6 7 8
11	0	0	1 2 3 4 5 6 7 8
12	0	0	1 2 3 4 5 6 7 8
13	0	0	1 2 3 4 5 6 7 8
14	0	0	1 2 3 4 5 6 7 8
15	0	0	1 2 3 4 5 6 7 8
16	0	0	1 2 3 4 5 6 7 8

GPI In Mode:  Return  Latch

# NKseries

## NK-GPI

Serial Num: 16539 Version: 2.01

**Device Details**

Name:  Details:

Group:  Address:

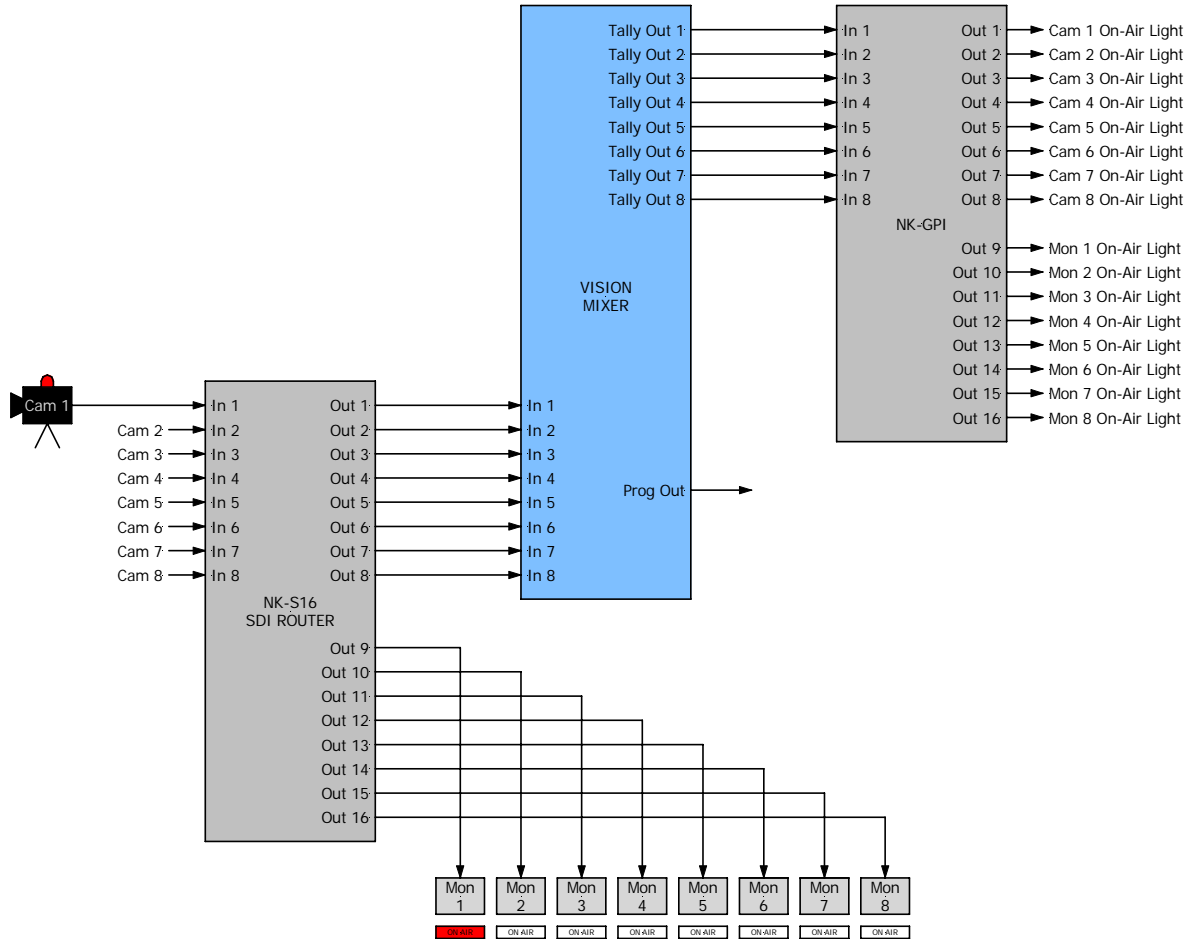
GPI Outs:

GPI Out	Input	Output	Levels (L...L+8)
1	1	1	1 2 3 4 5 6 7 8
2	2	1	1 2 3 4 5 6 7 8
3	2	2	1 2 3 4 5 6 7 8
4	2	1	1 2 3 4 5 6 7 8
5	0	0	1 2 3 4 5 6 7 8
6	0	0	1 2 3 4 5 6 7 8
7	0	0	1 2 3 4 5 6 7 8
8	0	0	1 2 3 4 5 6 7 8
9	0	0	1 2 3 4 5 6 7 8
10	0	0	1 2 3 4 5 6 7 8
11	0	0	1 2 3 4 5 6 7 8
12	0	0	1 2 3 4 5 6 7 8
13	0	0	1 2 3 4 5 6 7 8
14	0	0	1 2 3 4 5 6 7 8
15	0	0	1 2 3 4 5 6 7 8
16	0	0	1 2 3 4 5 6 7 8

GPI Out Mode:  Follow GPI Ins  Use GPI Out table

## Camera / Monitor Wall On-Air Tallies

In this example an SDI router switches camera video to a vision mixer used for on-air presentation. A monitor wall provides monitoring for each camera. On-air tally lights on cameras and monitors indicate which camera is on-air.



### Camera / Monitor Wall On-Air Tallies Example

Cameras 1 to 8 are normally routed to Monitors 1 to 8. When In 1 on the vision mixer is switched on-air to Prog Out, Tally Out 1 is activated, which triggers the NK-GPI to switch Cam 1 to Out 1 on the SDI router. This also activates NK-GPI Out 1 and Out 9, switching on Cam 1 and Mon 1 on-air lights.

When Input 1 on the mixer is de-selected, Tally Out 1 is de-activated, which triggers the NK-GPI to remove the route from Cam 1 to Out 1 on the SDI router. This de-activates NK-GPI Out 1 and Out 9, switching off Cam 1 and Mon 1 on-air lights.

The configuration for GPI Ins and GPI Outs for the above example is shown below:

# NKseries

## NK-GPI

Serial Num: 16539 Version: 2.01

**Device Details**

Name: NK - GPI    Details:

Group:     Address: 39

GPI Ins:

GPI In	Input	Output	Levels (L...L +8)
1	1	1	1 2 3 4 5 6 7 8
2	2	2	1 2 3 4 5 6 7 8
3	3	3	1 2 3 4 5 6 7 8
4	4	4	1 2 3 4 5 6 7 8
5	5	5	1 2 3 4 5 6 7 8
6	6	6	1 2 3 4 5 6 7 8
7	7	7	1 2 3 4 5 6 7 8
8	8	8	1 2 3 4 5 6 7 8
9	9	9	1 2 3 4 5 6 7 8
10	10	10	1 2 3 4 5 6 7 8
11	11	11	1 2 3 4 5 6 7 8
12	12	12	1 2 3 4 5 6 7 8
13	13	13	1 2 3 4 5 6 7 8
14	14	14	1 2 3 4 5 6 7 8
15	15	15	1 2 3 4 5 6 7 8
16	16	16	1 2 3 4 5 6 7 8

GPI In Mode:     Return     Latch

# NKseries

## NK-GPI

Serial Num: 16539 Version: 2.01

**Device Details**

Name: NK - GPI    Details:

Group:     Address: 39

GPI Outs:

GPI Out	Input	Output	Levels (L...L +8)
1	1	1	1 2 3 4 5 6 7 8
2	2	2	1 2 3 4 5 6 7 8
3	3	3	1 2 3 4 5 6 7 8
4	4	4	1 2 3 4 5 6 7 8
5	5	5	1 2 3 4 5 6 7 8
6	6	6	1 2 3 4 5 6 7 8
7	7	7	1 2 3 4 5 6 7 8
8	8	8	1 2 3 4 5 6 7 8
9	1	1	1 2 3 4 5 6 7 8
10	2	2	1 2 3 4 5 6 7 8
11	3	3	1 2 3 4 5 6 7 8
12	4	4	1 2 3 4 5 6 7 8
13	5	5	1 2 3 4 5 6 7 8
14	6	6	1 2 3 4 5 6 7 8
15	7	7	1 2 3 4 5 6 7 8
16	8	8	1 2 3 4 5 6 7 8

GPI Out Mode:     Follow GPI Ins     Use GPI Out table