ALLEN & HEATH GPIO
USING GPIO TO CONTROL MICROPHONES

What is a GPIO?

A GPIO is a General Purpose Input/Output. Essentially a logic port with a High/Low state or a variable in or out, the function of a GPIO is typically defined by the user.

In the AV industry and professional audio, a GPI is normally active when connected to ground (High) and is not active when the voltage goes above a certain value (Low). The threshold voltage for changing the logic state differs per brand/device. The Allen & Heath AHM-64 and GPIO interface define a threshold of +8.6V (anything below 8.6V is Active, anything above is not active).

How can we use GPIOs?

GPIOs can be used to interface two devices. Examples include:

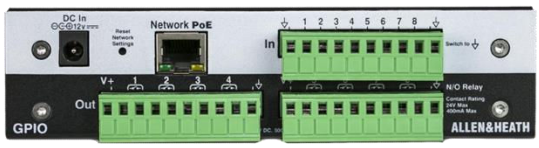
- An architectural wall switch to start an event.
- A logic output from the fire alarm system to mute all audio or start an EVAC sequence.
- An “On Air” light outside a studio.
- A micro-switch triggered by wall partitions to recall room combining presets.
- A custom panel for a radio presenter to switch microphones on/off.

This document focuses on the use of GPIOs to control the Mute button and LED indicator of a tabletop microphone from an AHM-64.

GPIO in Allen & Heath devices

The AHM-64 GPIO offers 2 inputs switching to ground and 2 relay outputs in addition to a +10V DC output. Output 1 can be wired as normally closed (N/C) or normally open (N/O) whilst output 2 is normally open (N/O).

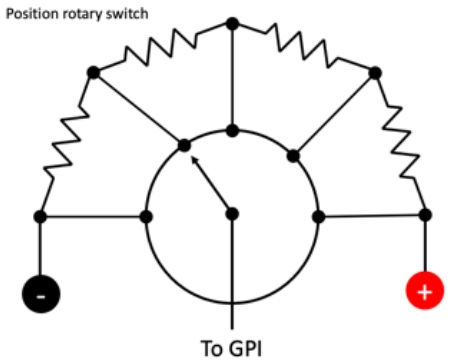
Also available is a GPIO interface for AHM, Avantis and dLive. Fully networkable and PoE enabled, it can be deployed wherever required in a building, with up to 8 units in a single system. It provides 8 opto-isolated inputs, 8 normally open (N/O) relay outputs and two 10V lines.



Variable GPIOs?

Other manufacturers might offer a variable GPIO. Variable GPIO can be used with a potentiometer for volume control, often as an alternative to VCA ports, or with a rotary switch and resistors for preset or source selection.

Multiple steps can be defined from High to Low, for example 128 steps (7 bits).



ALLEN & HEATH LIMITED, KERNICK INDUSTRIAL ESTATE,
PENRYN, CORNWALL, TR10 9LU, UNITED KINGDOM.
www.allen-heath.com

ALLEN&HEATH®

ALLEN & HEATH GPIO
USING GPIO TO CONTROL MICROPHONES

SHURE MX SERIES

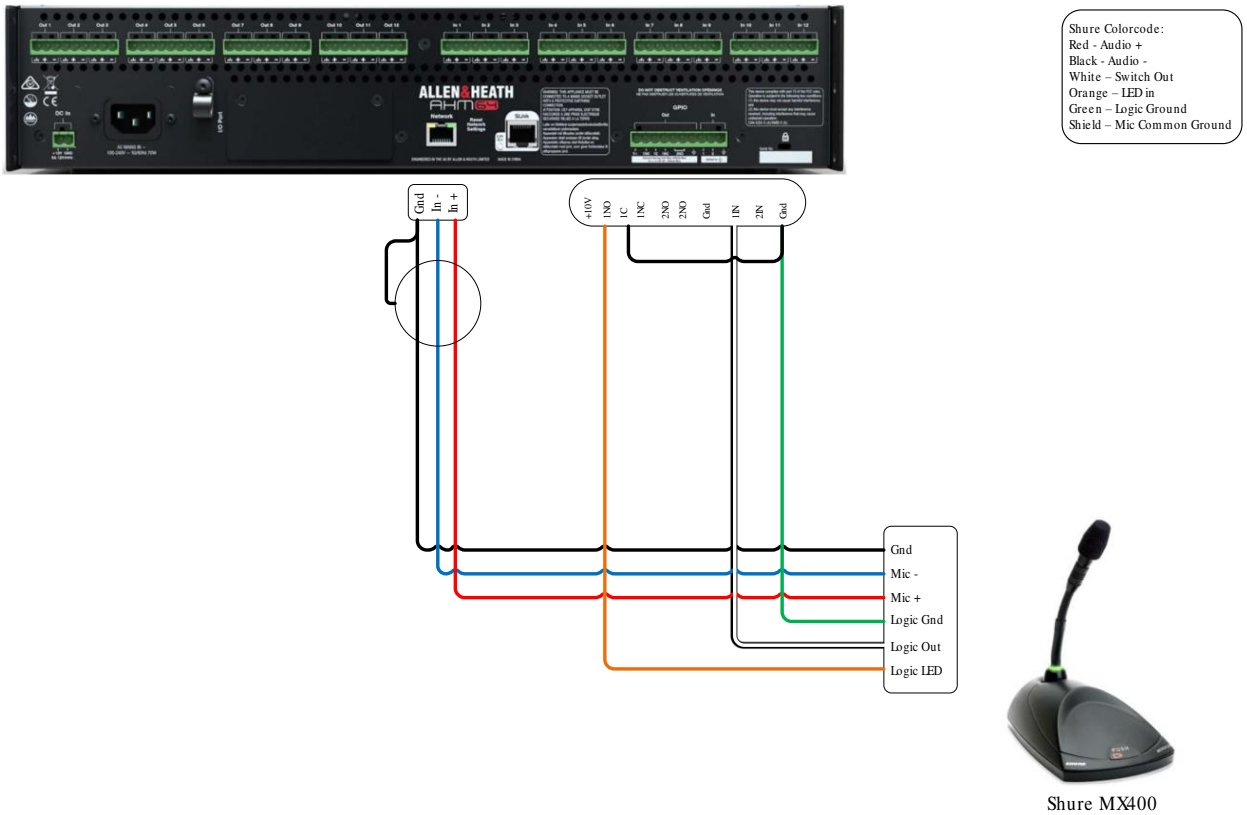
The Shure MX series has a simple interface to control the LED and receive information from the switch on the base.

Phantom power (48V) is used to power the LED and electronics inside the base.

The white wire is the logic out from the switch and is connected to GPI 1 on the AHM unit.

The LED input is connected to the NO (Normally Open) GPO. The Ground is connected to 1C, making the GPO connect to ground on active. The Shure LED has 2 modes: LED green for Active, LED red for Not-active.

Wiring Diagram | Shure MX400 Logic



Shure MX400

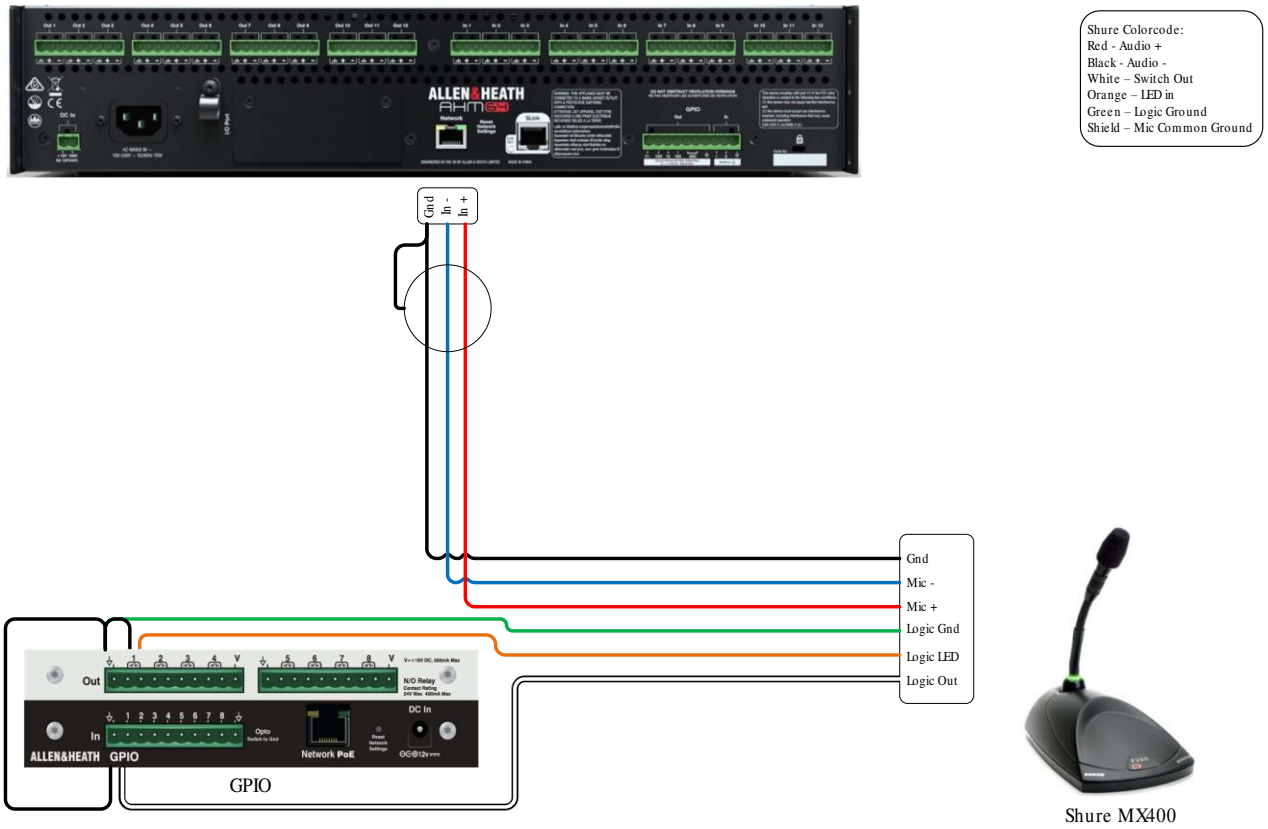
ALLEN & HEATH LIMITED, KERNICK INDUSTRIAL ESTATE,
PENRYN, CORNWALL, TR10 9LU, UNITED KINGDOM.
www.allen-heath.com

ALLEN & HEATH GPIO
USING GPIO TO CONTROL MICROPHONES

The same setup but with the A&H external GPIO unit. Up to 8 units are supported giving a total of 64x64 GPIOs in addition to those on the AHM unit.

This is an ideal and scalable solution for multiple microphone setups.

Wiring Diagram | Shure MX400 Logic GPIO



ALLEN & HEATH LIMITED, KERNICK INDUSTRIAL ESTATE,
PENRYN, CORNWALL, TR10 9LU, UNITED KINGDOM.
www.allen-heath.com

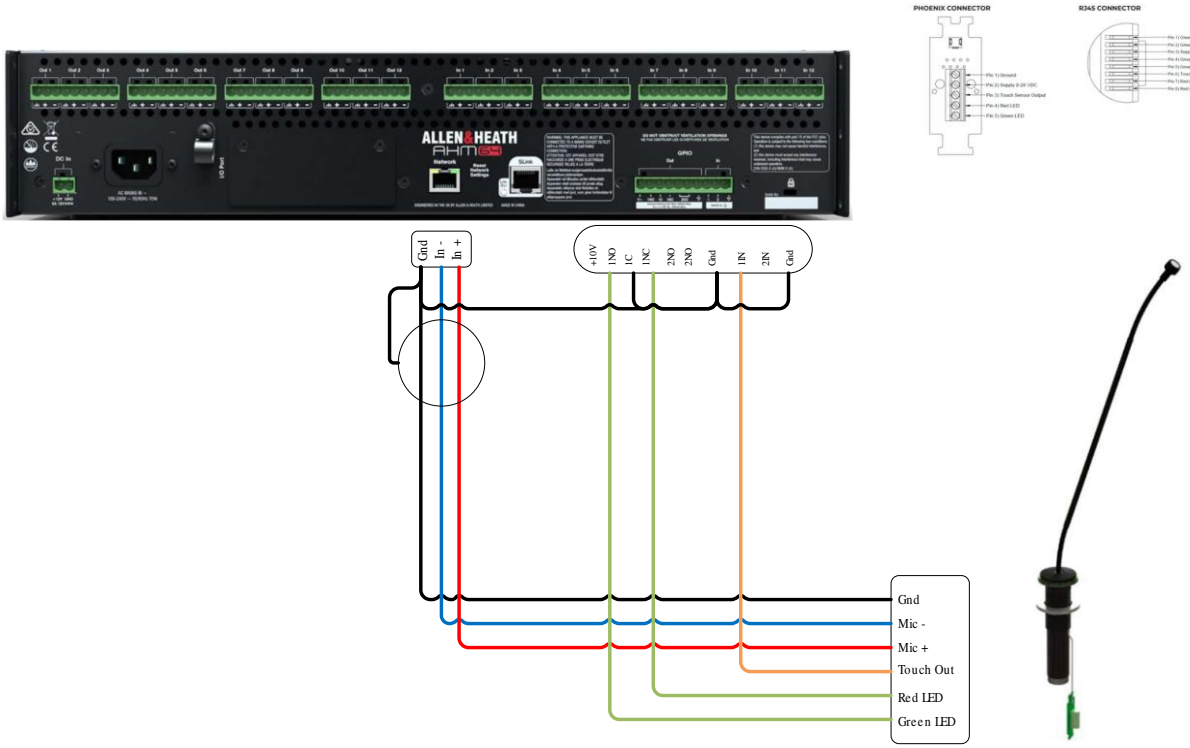
ALLEN & HEATH GPIO
USING GPIO TO CONTROL MICROPHONES

EARTHWORKS IMLR

The Earthworks IMLR has 2 inputs for the LED, so we can use the NO (Normally Open) and the NC (Normally Closed) options to drive two colours. 1C is connected to ground as well as the ground of the logic In. LED Green is connected to the NO contact and the LED Red to the NC contact.

If the Mic is muted the Green LED is activated.
If the Mic is unmuted the Red LED is activated.

Wiring Diagram | Earthworks IMLR



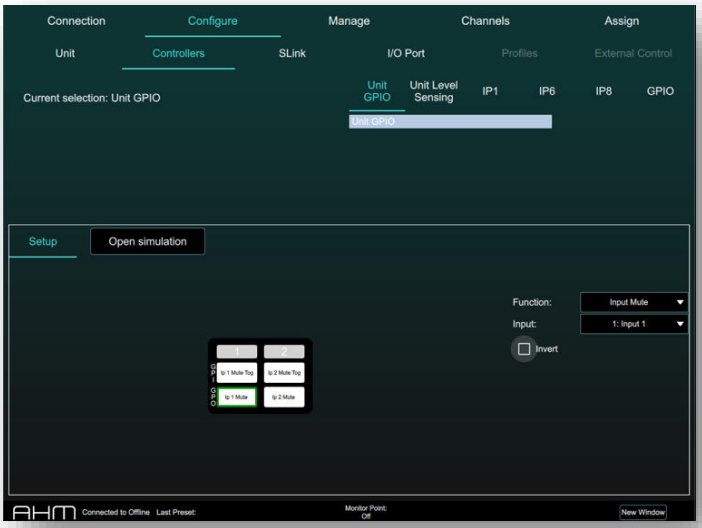
Earthworks IMLR

ALLEN & HEATH GPIO
USING GPIO TO CONTROL MICROPHONES

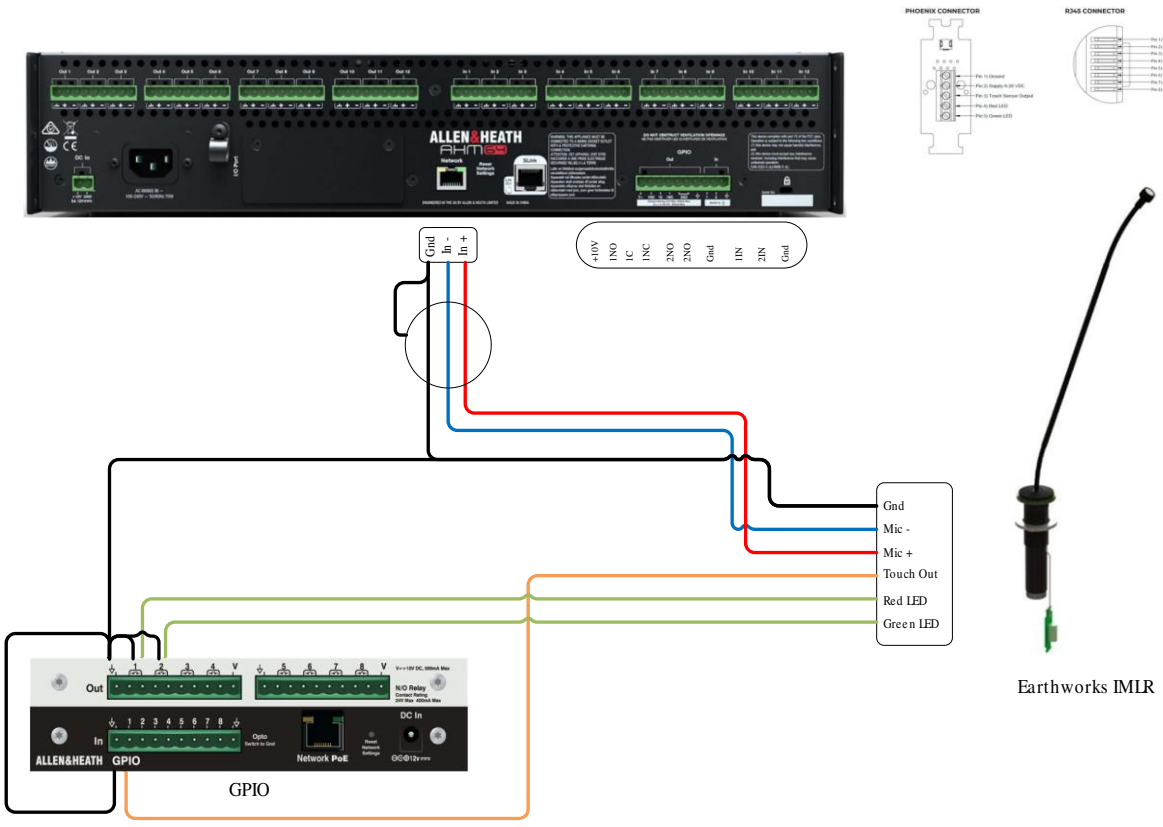
We can invert the colours by selecting the **Invert** option for the GPO settings in AHM System Manager.

We can also use 2 GPOs to control the LED. In the case below we choose not to light the LED to indicate the system is off.

Most microphone systems have to turn off the Phantom power to dim the LED indicator completely.



Wiring Diagram | Earthworks IMLR GPIO



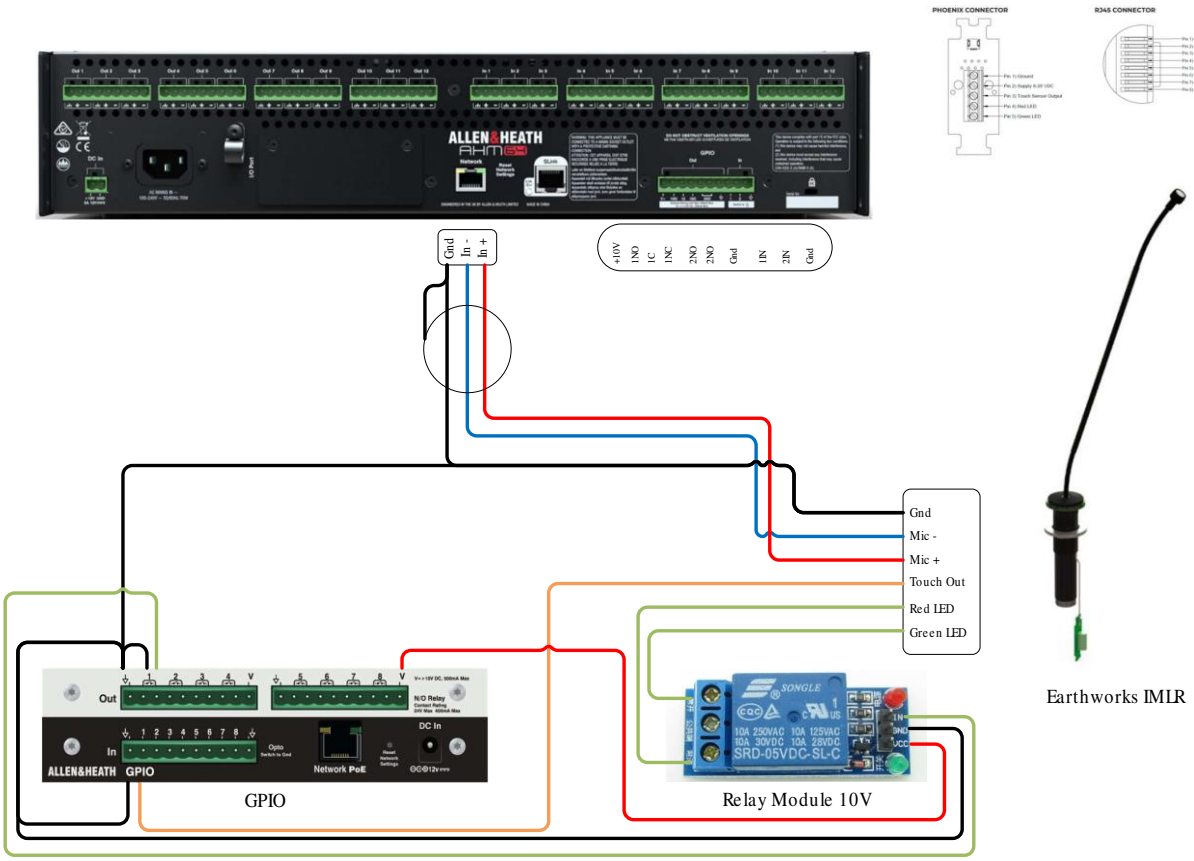
ALLEN & HEATH LIMITED, KERNICK INDUSTRIAL ESTATE,
PENRYN, CORNWALL, TR10 9LU, UNITED KINGDOM.
www.allen-heath.com

ALLEN&HEATH®

ALLEN & HEATH GPIO
USING GPIO TO CONTROL MICROPHONES

Or we can use a simple relay board or transistor to switch between the 2 colours:

Wiring Diagram	Earthworks IMLR 1GPO relay



ALLEN & HEATH LIMITED, KERNICK INDUSTRIAL ESTATE,
PENRYN, CORNWALL, TR10 9LU, UNITED KINGDOM.
www.allen-heath.com

ALLEN & HEATH GPIO
USING GPIO TO CONTROL MICROPHONES

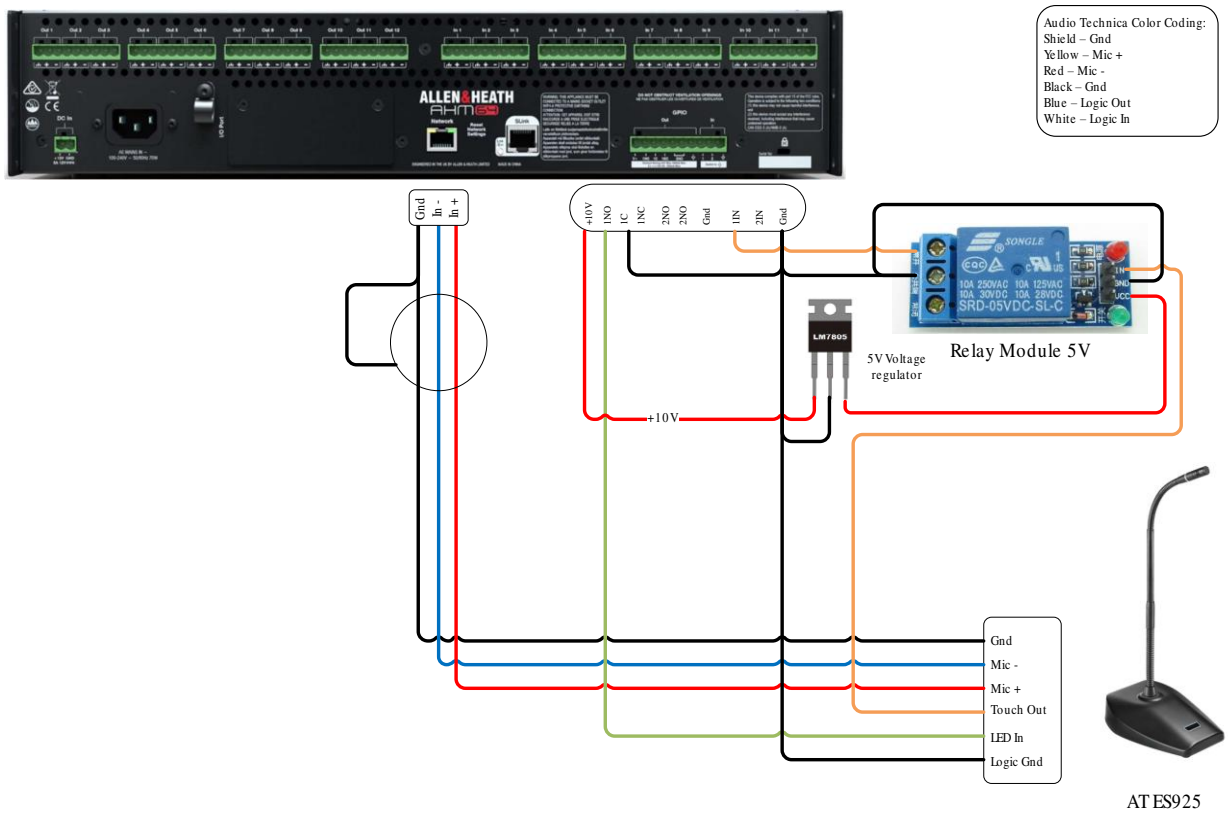
AUDIO-TECHNICA 925

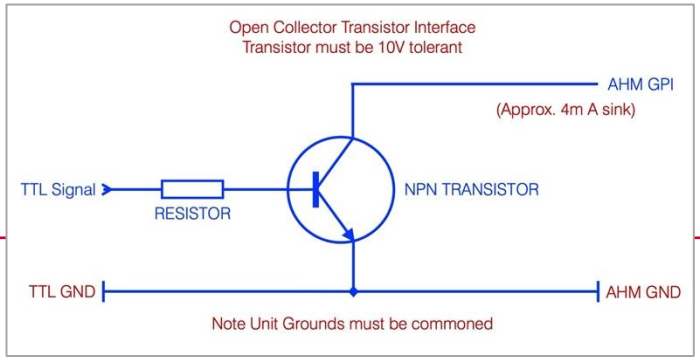
Audio-Technica microphones have a maximum +5V logic output so we need to use a small circuit to get to the 8.6V threshold required.

In this example we are using a small 5V relay board and a 5V voltage regulator. The voltage regulator (7805) will lower the AHM voltage from +10V to +5V. The Touch out (logic out) from the AT925 will trigger the relay module to switch the relay output to Ground. As the AHM GPI is pulled up to 10V internally, when connected to Ground the GPI will become active.

The GPO relay output can activate the logic input from the AT Microphone without voltage regulation.

Wiring Diagram | Audio Technica ES925





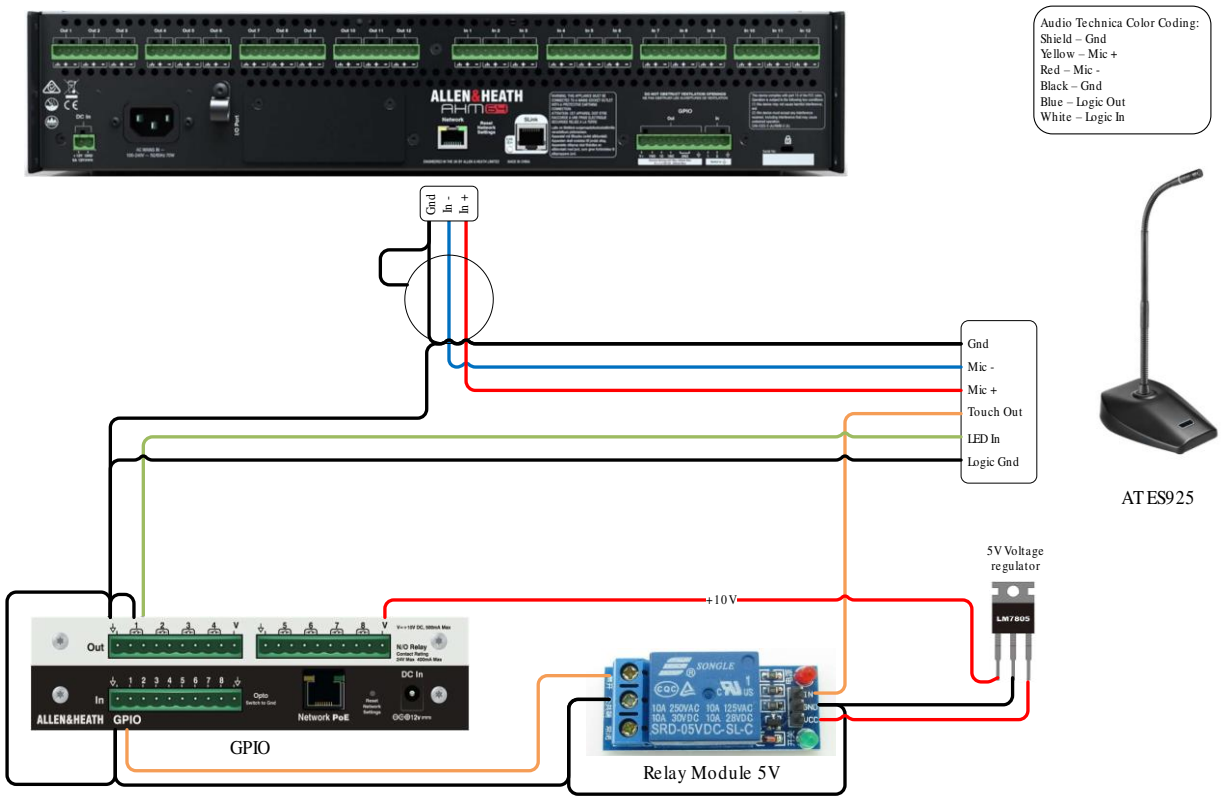
A transistor can be an alternative to a relay module for the switching. In this case, a 10kOhm resistor and a BC547 or 2N222 transistor can be used.

ALLEN&HEATH®

ALLEN & HEATH GPIO
USING GPIO TO CONTROL MICROPHONES

In this last example the Audio-Technica micro-phone is connected to the networkable GPIO unit. We only need 1 voltage regulator for the 8 inputs.

Wiring Diagram | Audio Technica ES925



ALLEN & HEATH LIMITED, KERNICK INDUSTRIAL ESTATE,
PENRYN, CORNWALL, TR10 9LU, UNITED KINGDOM.
www.allen-heath.com

ALLEN&HEATH®

ALLEN & HEATH GPIO
USING GPIO TO CONTROL MICROPHONES

Tech Insight – Pull-up Resistor

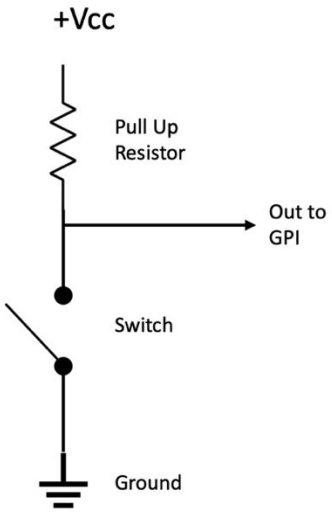
Most logic signals act on a connection to Ground (or 0Vcc) as an active state. If the logic port is not connected, the "floating" voltage can cause false readings. A Pull-up resistor is often used to avoid this. The resistor is there to ensure the logic sees the +Vcc when not connected to Ground (to pull-up the voltage).

We can use a resistor between the +Vcc and the logic input that uses a minimal amount of current, for example 1mA. To get the correct value we can use Ohm's law R=V/I, where R is the resistor value, V is the voltage and I the current in Amps.

Let's take a small current of 0.001A and a +10V +Vcc rail. The formula will be:

10/0.001= 10,000 Ohm (10 kOhm)

Allen & Heath devices always pull to +Vcc and therefore do not require a Pull-up resistor.



For further information, application guides, and recommended products please visit https://www.allen-heath.com/installation/

https://www.allen-heath.com/ahproducts/gpio/

https://www.allen-heath.com/ahm-64/

Don't hesitate to contact our Install team at support@allen-heath.com if you need assistance on which products to specify or if you have questions about an application.

ALLEN & HEATH LIMITED, KERNICK INDUSTRIAL ESTATE,
PENRYN, CORNWALL, TR10 9LU, UNITED KINGDOM.
www.allen-heath.com

ALLEN&HEATH®