



APPLICATION NOTES

DMD LEVEL & SOURCE OPERATIONS, SYSTEM STANDBY AND PRIORITY INPUT VIA
GPI AND VCA & REMOTE ON/OFF OPERATIONS

QUATTROCANALI, DUECANALI, OTTOCANALI & MEZZO

VCA AND REMOTE ON/OFF OPERATION, DYNAMIC MUSIC DISTRIBUTION SYSTEM STANDBY AND PRIORITY INPUT VIA GPI

This document has been prepared to explain how to configure VCA operation, System Standby and Priority Input selection in a Dynamic Music Distribution system. It is then explained the setup and operation of Voltage Controlled Amplification (VCA) and Remote On/Off functionality in the Canali Series (Quattro & Due) and in the Mezzo Series amplifiers by using the amplifier's General Purpose Inputs (GPI), for basic channel and overall volume attenuation controls. By deploying a 10k Ω linear taper potentiometer across the GPI on Due & Quattrocanali, or across the GPI on Mezzo, the user can control volume. In Duecanali, Quattrocanali and Ottocanali amplifiers, Remote On/Off functionality is also available on a separate terminal and is actuated deploying a voltage differential.

Applicable Models and Connections

GPI for level control can take (2) configurations in Powersoft amplifiers.

In Duecanali and Quattrocanali amplifiers the Level GPI are labelled "LEVEL" and are directly above the analog audio LINE inputs. The Remote On and Remote Off GPI are found to their right. Remote On/Off pins can be found also in Ottocanali series (Figure 1).

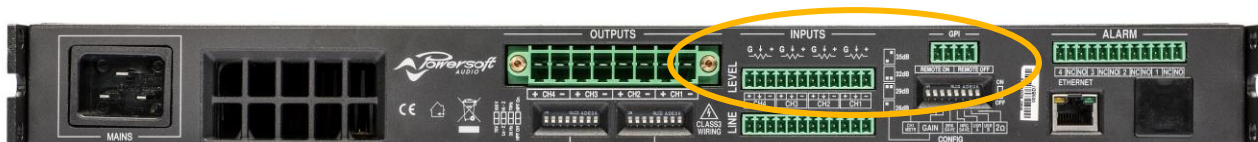


Figure 1 – "LEVEL" GPI on Rear of Quattrocanali DSP+D.

The following zoomed in photo is of a Duecanali which has the same section available for its (2) channels (Figure 2).

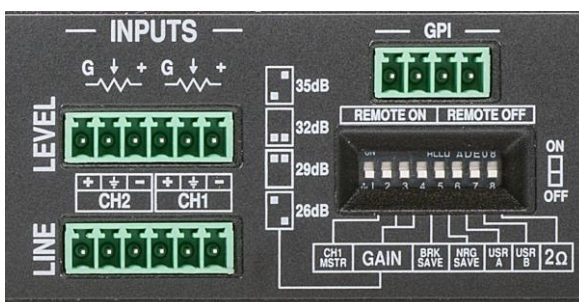


Figure 2 – Close up of GPI Section on Duecanali.

Volume Level control using the GPI can be achieved by wiring a 10k Ω linear taper potentiometer across the LEVEL connection. Remote On and Remote off functionality can be achieved by applying a differential voltage of greater than 5VDC across the labelled GPI terminals.

On Mezzo Series Amplifiers the GPI takes a different format by making use of a shared voltage and a shared ground pin (Figure 3).



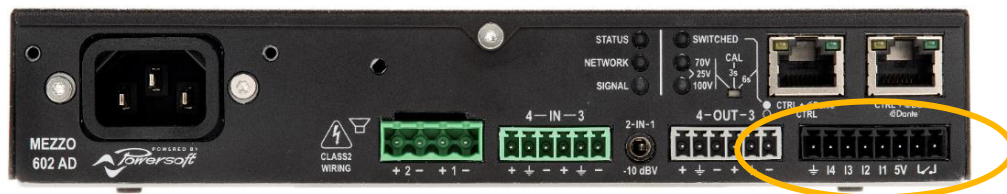


Figure 3 – GPI Section of Mezzo 602 AD.

The different GPI pin configuration on Mezzo will require a different connection scheme which will be reviewed later in this document. Below is a zoomed in picture of the GPI on Mezzo Series amplifiers (Figure 4).



Figure 4 – Closeup of GPI on Mezzo 602 AD.

System Standby and Priority Input via GPI is applicable to both Mezzo and Canali Series. This function must be configured via our software ArmoniaPlus.

The following table (Figure 5) indicates what functionality is available on various models of Powersoft amplifiers.



		VCA "LEVEL" Control	VCA GPI	Remote On/Off	System Standby and Priority Input via GPI
Duecanali Series	804/804 DSP	✓		✓	✓
	804 DSP+/DSP+D	✓		✓	✓
	1604/1604 DSP	✓		✓	✓
	1604 DSP+/DSP+D	✓		✓	✓
	4804/4804 DSP	✓		✓	✓
	4804 DSP+/DSP+D	✓		✓	✓
	6404 DSP	✓		✓	✓
	6404 DSP+/DSP+D	✓		✓	✓
Quattrocanali Series	1204/1204 DSP	✓		✓	✓
	1204 DSP+/DSP+D	✓		✓	✓
	2404/2404 DSP	✓		✓	✓
	2404 DSP+/DSP+D	✓		✓	✓
	4804/4804 DSP	✓		✓	✓
	4804 DSP+/DSP+D	✓		✓	✓
	8804 DSP	✓		✓	✓
	8804 DSP+/DSP+D	✓		✓	✓
Ottocanali Series	4K4			✓	
	4K4 DSP+D			✓	
	8K4			✓	
	8K4 DSP+D			✓	
	12K4			✓	
	12K4 DSP+D			✓	
Mezzo Series	322 A		✓		✓
	322 A+/AD		✓		✓
	324 A		✓		✓
	324 A+/AD		✓		✓
	602 A		✓		✓
	602 A+/AD		✓		✓
	604 A		✓		✓
	604 A+/AD		✓		

Figure 5 – GPI Capabilities Based On Model.



Dynamic Music Distribution: Level Control and Source Operation, System Standby and Priority Input.

It is possible to integrate in a Dynamic Music Distribution system the use of a potentiometer to do Level Control and Source/Scene operations.

It is also possible to integrate the functions of System Standby and Priority Input.

• Level Operation

It's useful and intelligent to connect a WMP Level control to one of GPI input (I1, I2, I3, I4 for Mezzo series or 'Input Level' pins for Quattrocanali and Duecanali amplifiers) and then assigning the control of different zones as desired.

In this way the user can control simultaneously, with a single potentiometer (or more than one) and a single connection, the Level of multiple zones that have assigned speakers connected to different physical output from the GPI pin used.

This can be done in the "Controls" tab under "Design" as shown in Figure 6 and 7 below.

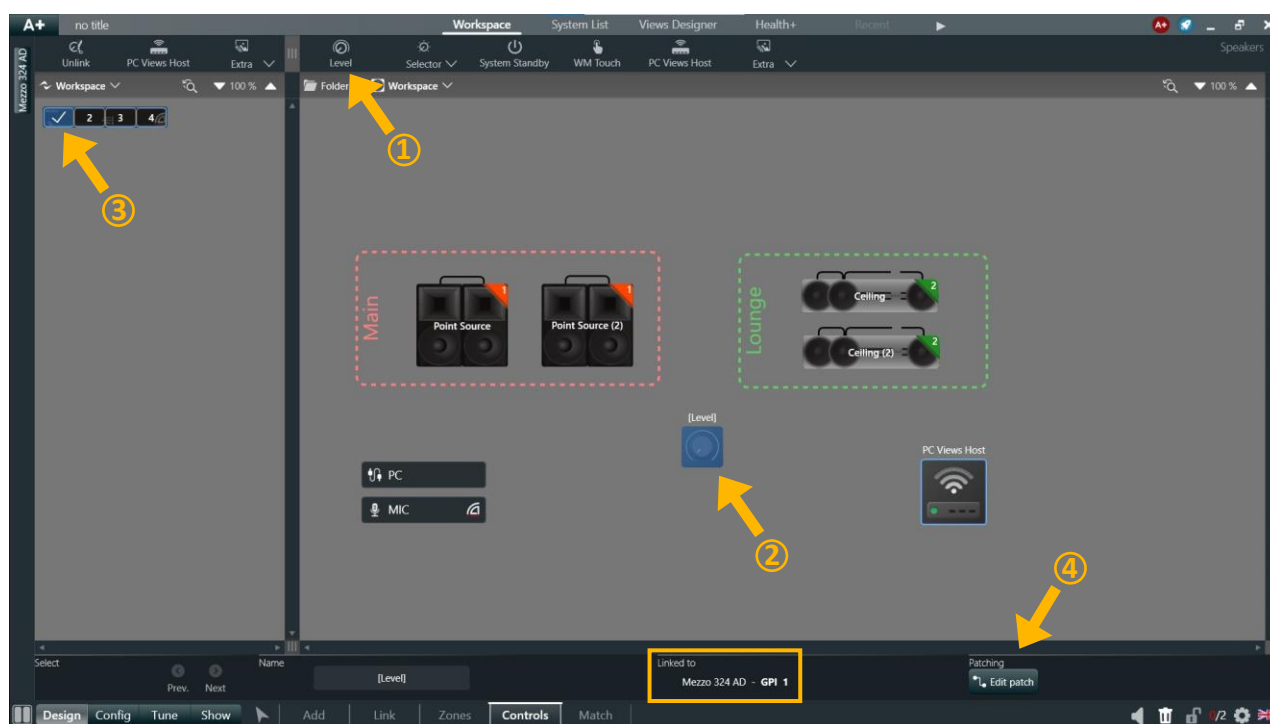


Figure 6 - Steps to link a WMP Level controller to a GPI input of an amplifier

1. Click on 'Level' icon to add a 'Level' control
2. Click on 'Level' control added to link to a GPI input
3. Click on the desired GPI input to complete the link
4. Edit the patching to select the zones to be controlled by the Level controller



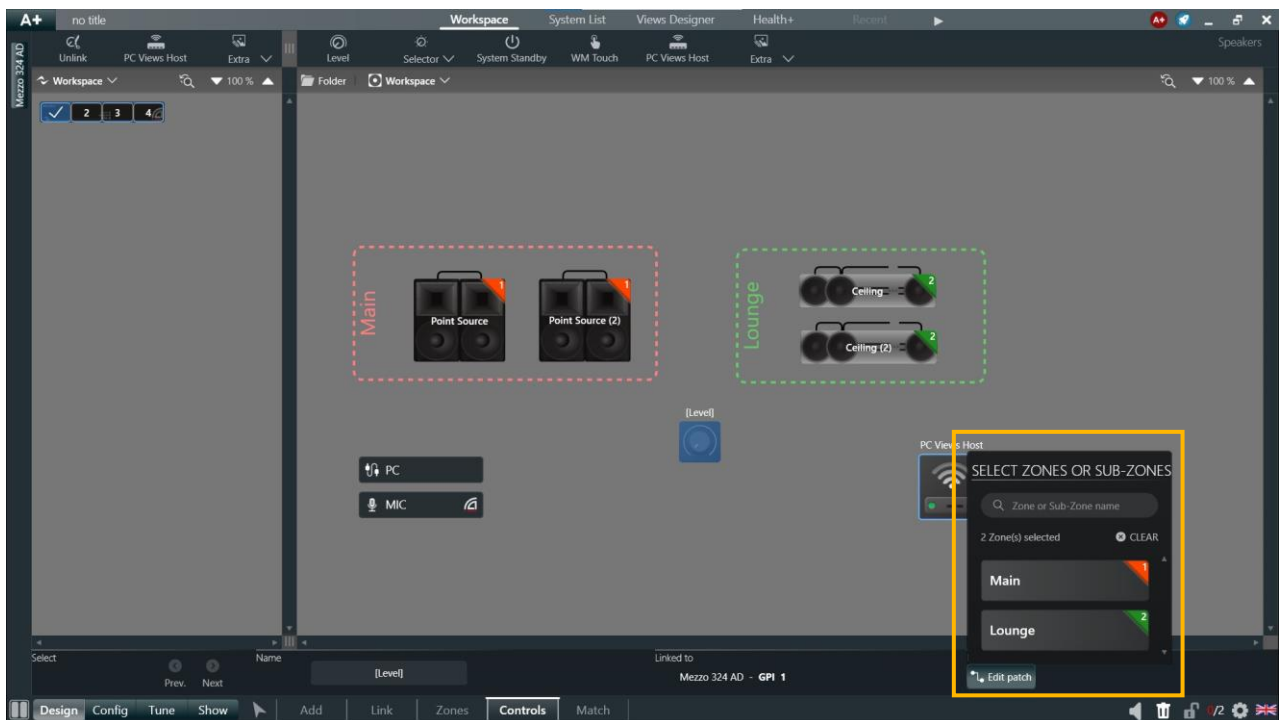


Figure 7 – Multi zones selection for a single WMP Level control

• Source Selection

It's also useful to connect a WMP Source/Scene control to one of GPI input (I1, I2, I3, I4 for Mezzo series or 'Input Level' pins for Quattrocanali and Duecanali amplifiers) and then assigning the control of different sources for different zones as desired.

In this way the user can control which source is delivered to a selected zone or which scene is activated for a selected zone by switching the Source/Scene controller between his different positions.

With "Multiselect" option it is also possible to simultaneously select more than one zone to which assign a source or scene.

This can be done in the "Controls" tab under "Design" as shown in Figure 8 and 9 below.



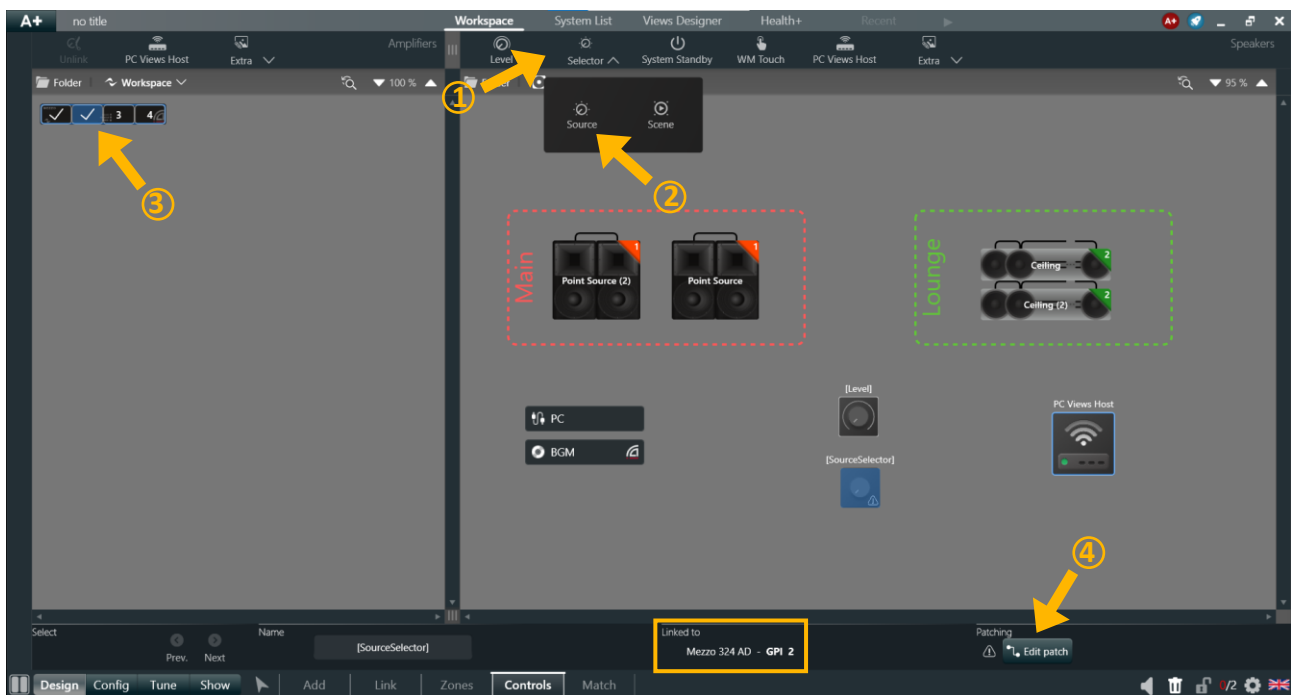


Figure 8 – Steps to link a WMP Source/Scene controller to a GPI input of an amplifier

1. Click on 'Selector' icon in the upper part of Controls tab
2. Choose between Source and Scene option. In this example we add a Source Selector to the Workspace
3. Click on the Source Selector icon in the workspace and then on a GPI of the desired amplifier to complete the link
4. Edit the patching of the Selector's positions as shown in the picture below (Figure 9)

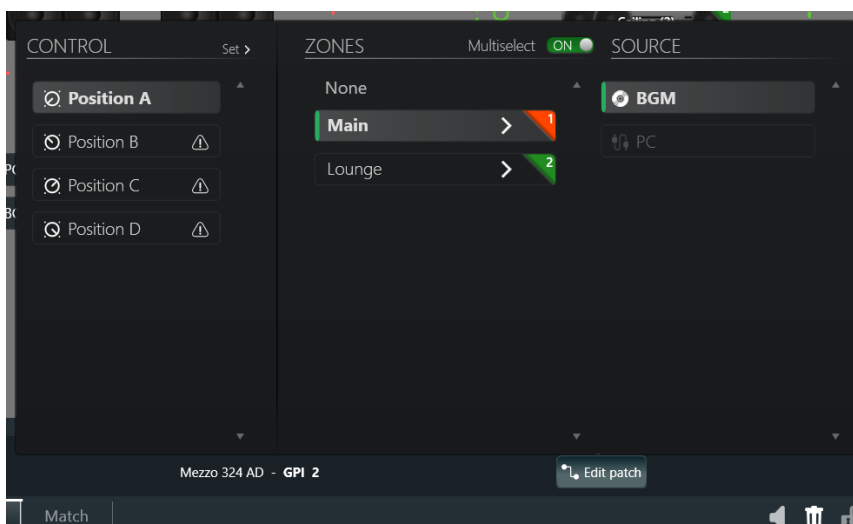


Figure 9 - Zones



• System Standby

It is now possible to configure up to one GPI to trigger system Standby for an entire DMD system. This feature allows turning off an entire system when an external contact is closed, or DC voltage is applied to the selected GPI. The system goes back to its previous status as soon as the external trigger is removed.

System Standby via GPI allows integrating DMD alongside systems for emergency and voice alarm applications, where it is required to mute the music content with a physical contact closure/ DC voltage.

Figure 10 below shows how to add and link a System Standby control to a GPI input of an amplifier.

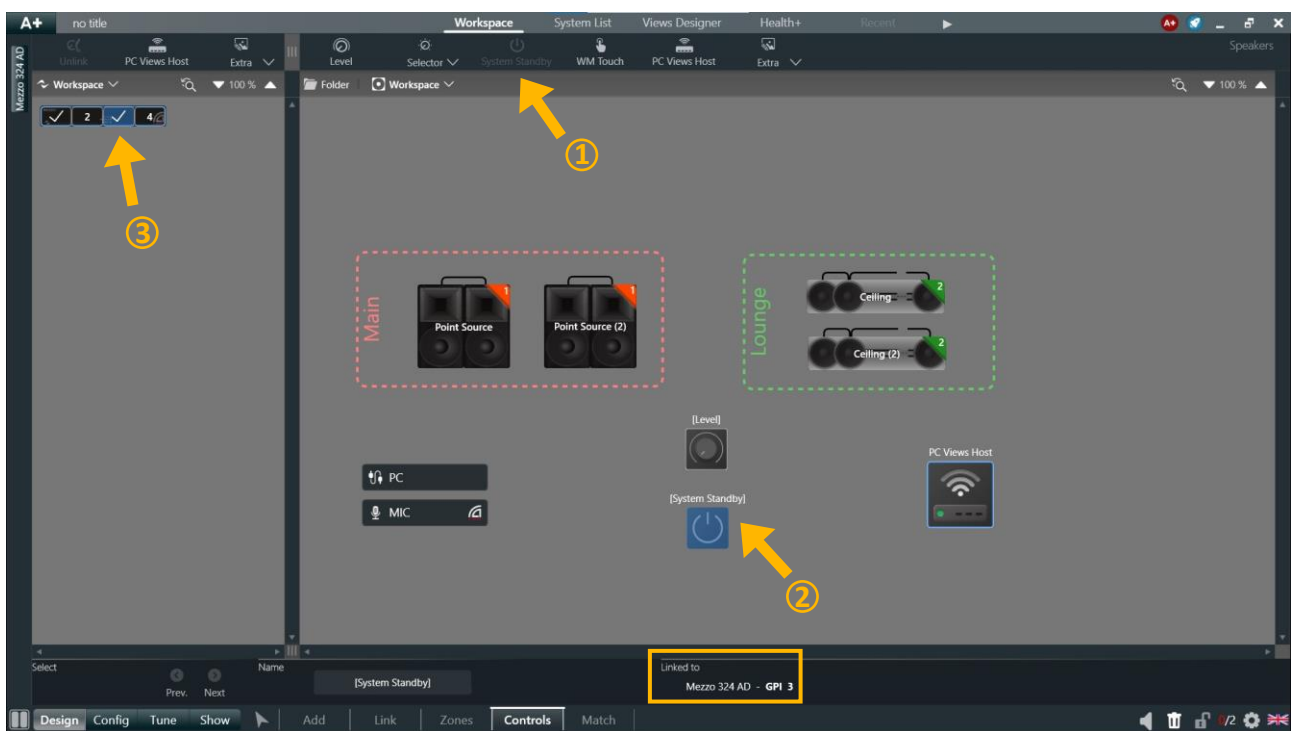


Figure 10 - Adding system Standby via GPI to a Project

1. Click on 'System Standby' icon to add a System Standby control
2. Click on added 'System Standby' control to link to a GPI input
3. Click on the desired GPI input to complete the link

Please note that Standby buttons on WM Touch, SYS Control App and Web Views are inhibited (set to read only) for as long as an external trigger is applied to the GPI.

When system standby via GPI is activated, the standby button on the Sys Control app is set to read-only, thus preventing users from overriding this state, as shown in Figure 11 below.



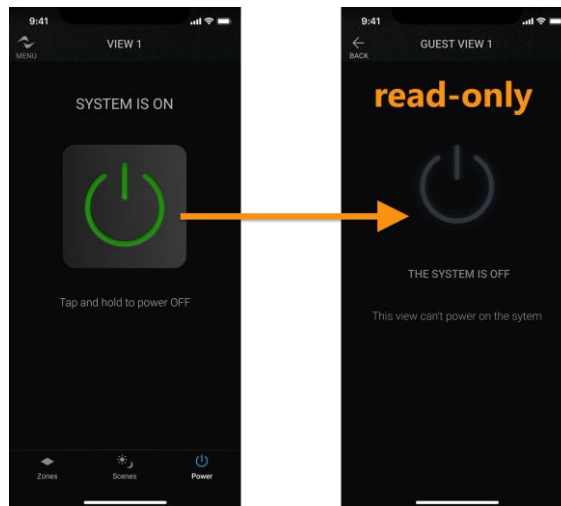


Figure 11 - Standby button on Sys Control app is read-only when Standby via GPI is enabled

• Priority Input

With ArmoniaPlus 2.5 release it is possible to add the Priority Input functionality for a DMD System.

This feature allows the user to select an input to be priority on some selected zones when an assigned GPI of an amplifier is externally triggered by a switch button.

For Mezzo Series it is possible to connect the external switch button to one of the GPI pins, I1, I2, I3, I4. The 5V pin can be used as power supply or the user can decide to provide external 5V supply.

For Canali Series the switch button needs to be connected to one of the “LEVEL” GPI pins, and an external 12V power supply is needed to trigger the GPI.

The system goes back to its previous status as soon as the external trigger is removed.

Note that the Priority Input cannot be a Source of the DMD System, and it is affected by the settings of the Zones (i.e. if a Zone is muted, the Priority In will not be played there).

Note also that the physical input connection and the GPI connection can be done on different amplifiers on the same network.

It is also possible to set Gain and EQ for the Priority Input if needed.

This feature is configurable via ArmoniaPlus under Workspace>Design>Controls as shown in Figure 12 below.



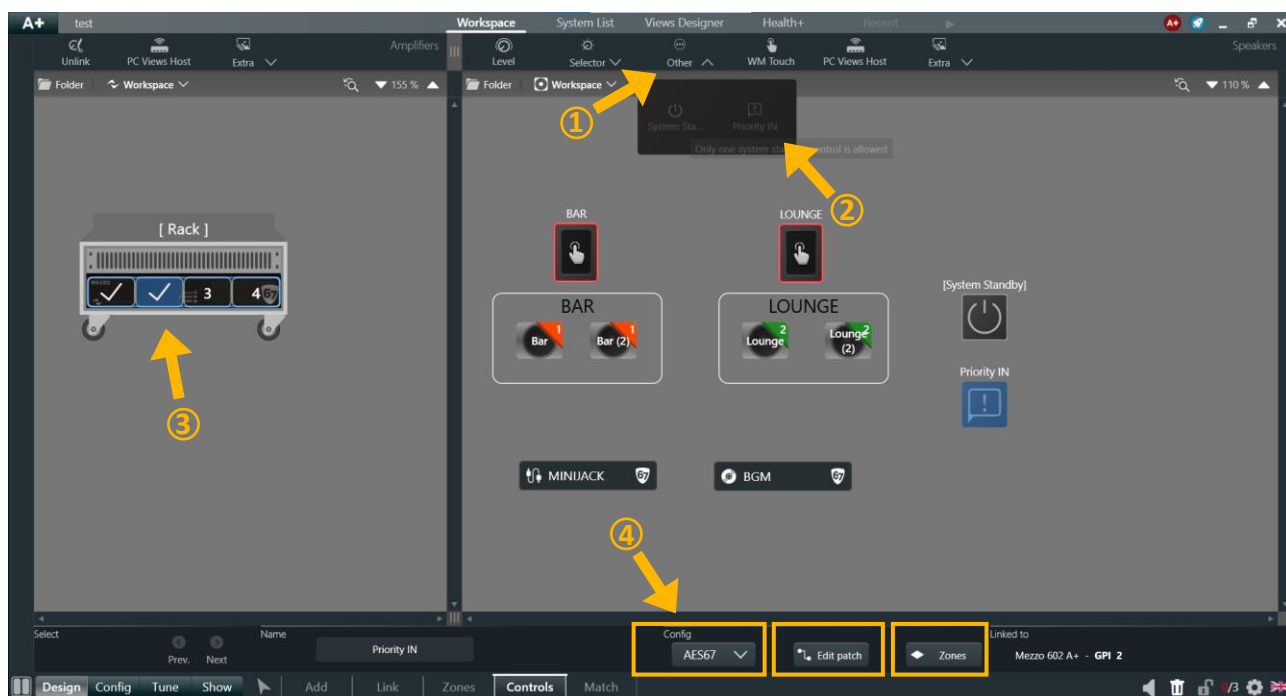


Figure 12 - Adding Priority Input to a Dynamic Music Distribution system project

1. Go under Workspace>Design>Controls and select Other in the upper part of the window.
2. Click on Priority IN to add the object to the workspace.
3. Click on the object in the Workspace and then on the desired amplifier GPI to configure which will be the GPI to be triggered for activating the Priority Input.
4. Go in the Config section and select the desired setting. Below you can see how this part is organized in the three highlighted sections.

4.1 Type of Priority Input source: analog or digital (Figure 13)

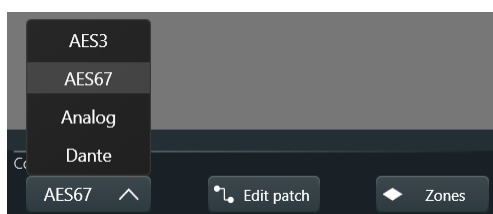


Figure 13 - Priority IN type



4.2 Priority Input selection (Figure 14)

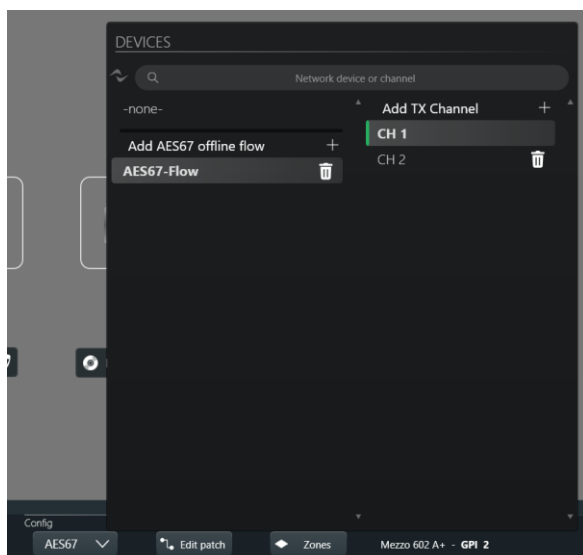


Figure 14 - Priority IN source

4.3 Zones affected by the Priority Input (Figure 15)

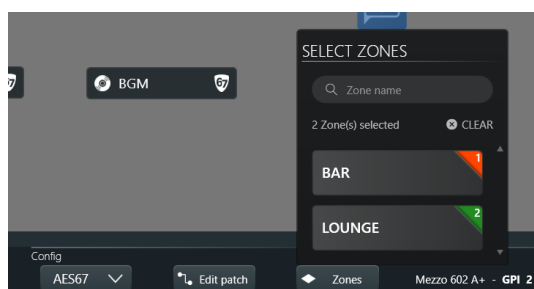


Figure 15 - Zones with Priority IN

N.B. Priority Input feature is not a Paging feature and a DMD System cannot be a Paging System.

VCA Level Control without Dynamic Music Distribution System

GPI for level control can take multiple configurations in Powersoft Quattro and Duecanali Series amplifiers. In each instance a 10kΩ linear taper potentiometer will be used for the volume control (Figure 16). Powersoft has a great option for a 10kΩ wall mount potentiometer in the [WMP-Level](#) control. A 10kΩ linear taper potentiometer has (3) components:

- Terminals: 1 (Negative), 2 (Wiper), 3 (Positive)
- Resistive Track
- Wiper



The positive (+) pin of the potentiometer's 10k Ω Resistive Track is connected to the positive terminal and the negative (-) pin is connected to the ground terminal. The Wiper should be connected to the resistive variable pin as is indicated in the diagrams below.

VCA Level Control in Canali Series

In the Canali Series amplifiers, the three pins of the 10k Ω linear taper potentiometer should be connected to the (3) LEVEL terminals associated with the channel you wish to control (Figure 17).

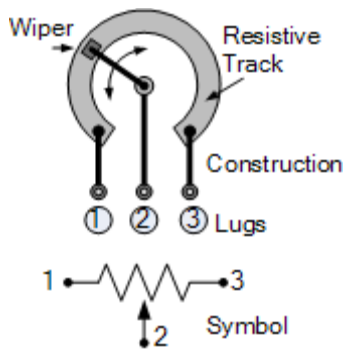


Figure 16 – Diagram of Typical Linear Potentiometer.

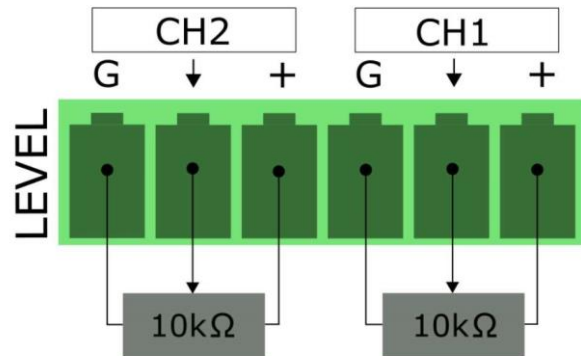


Figure 17 – Diagram of LEVEL Terminals on Amplifier.

To provide simultaneous control over all amplifier channels using a single connection, the “CH1 MSTR” DIP Switch is available in the DIP group labelled “CONFIG” (Figure 18). The “CH1 MSTR” DIP switch is in the first position far left. When engaged the CH1 connection will be treated as the master for each of the amplifier's channels.

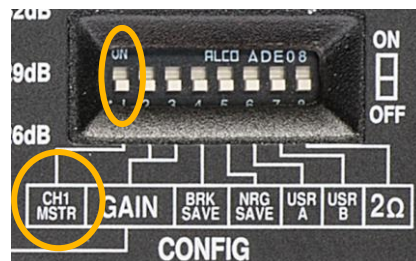


Figure 18 – CONFIG DIP Switches, CH1 MSTR.

Alternatively, by connecting the 10k Ω linear taper potentiometer's resistive variable pin in parallel mode across multiple channels, the user can simultaneously control each channel of the amp to which the connection is made (Figure 19).



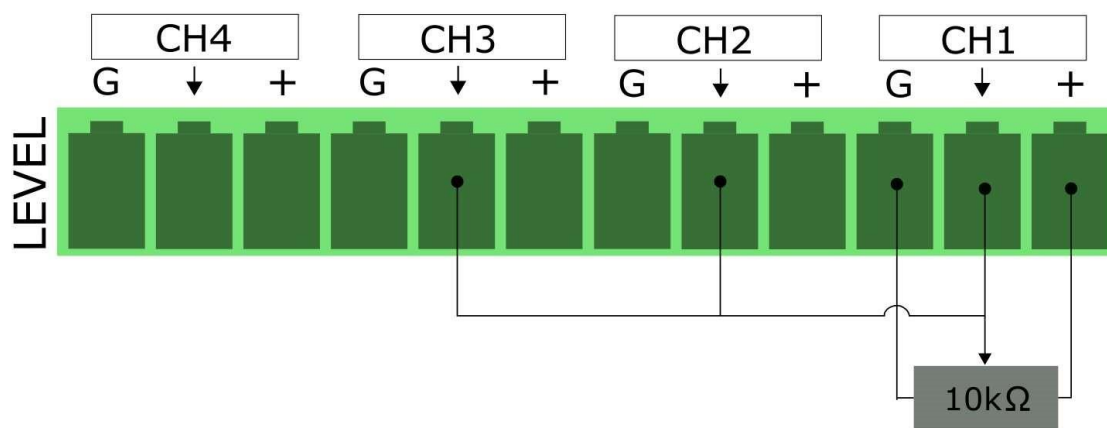


Figure 19 – 10kΩ Linear Taper Potentiometer Connected Across Multiple GPI Controlling Channels 1~3.

VCA Level Control in Mezzo Series

Within the Mezzo Series, the GPI connections offer a different terminal configuration and thus the connection scheme is different (Figures 3 & 4).

The terminal on the far right of the connector with the contact closure symbol is used as a General Purpose Output (GPO) triggered by alarms that can be configured in the *Ways EQ* section of Armonía Plus.

The 5v terminal should be connected to the positive (+) pin of the 10kΩ linear taper potentiometers that are to be used. The ground connection should be connected to the negative (-) pin of the 10kΩ linear taper potentiometers that are to be used.

The GPI terminal for each channel you wish to control should be connected to the resistive wiper pin of the 10kΩ linear taper potentiometer(s). The GPI terminal for each channel are labelled; i1, i2, i3, i4, for the respective channel the terminal controls.

In order to control a single channel on the Mezzo connect the 10kΩ linear taper potentiometer across 5v, Ground and the GPI pin of the amplifier channel you wish to control. The connection scheme depicted below is controlling Output Channel #1 (Figure 20).

An option for controlling multiple channels on the Mezzo is to connect multiple 10kΩ linear taper potentiometers across 5v, Ground and the GPI pins of the amplifier channels you wish to control. In the connection scheme depicted below we are controlling Output Channels 1~4 with (4) distinct potentiometers (Figure 21).

Alternatively to control multiple channels on the Mezzo the user can connect a single 10kΩ linear taper potentiometers across 5v, Ground and the GPI pins of each amplifier channel you wish to control. In the connections scheme depicted below we are controlling Output Channels 1~4 with a single master potentiometer (Figure 22).



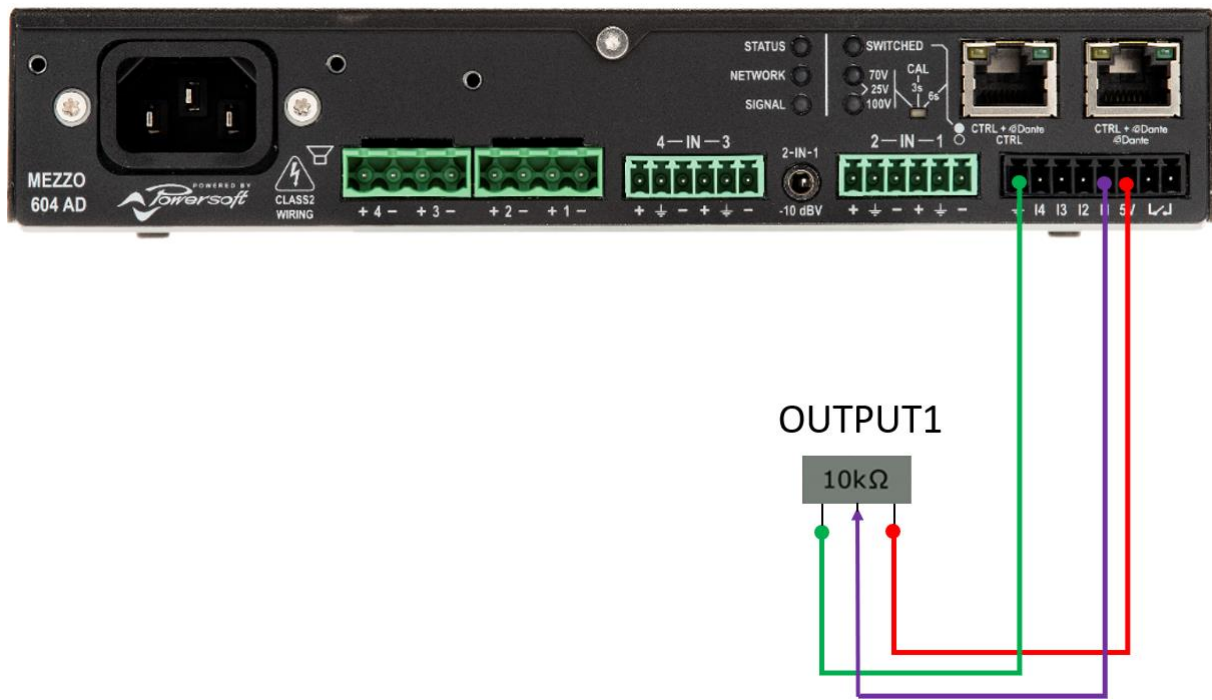


Figure 20 – Single 10kΩ Linear Taper Potentiometer Connected Across a Single Channel's GPI on Mezzo

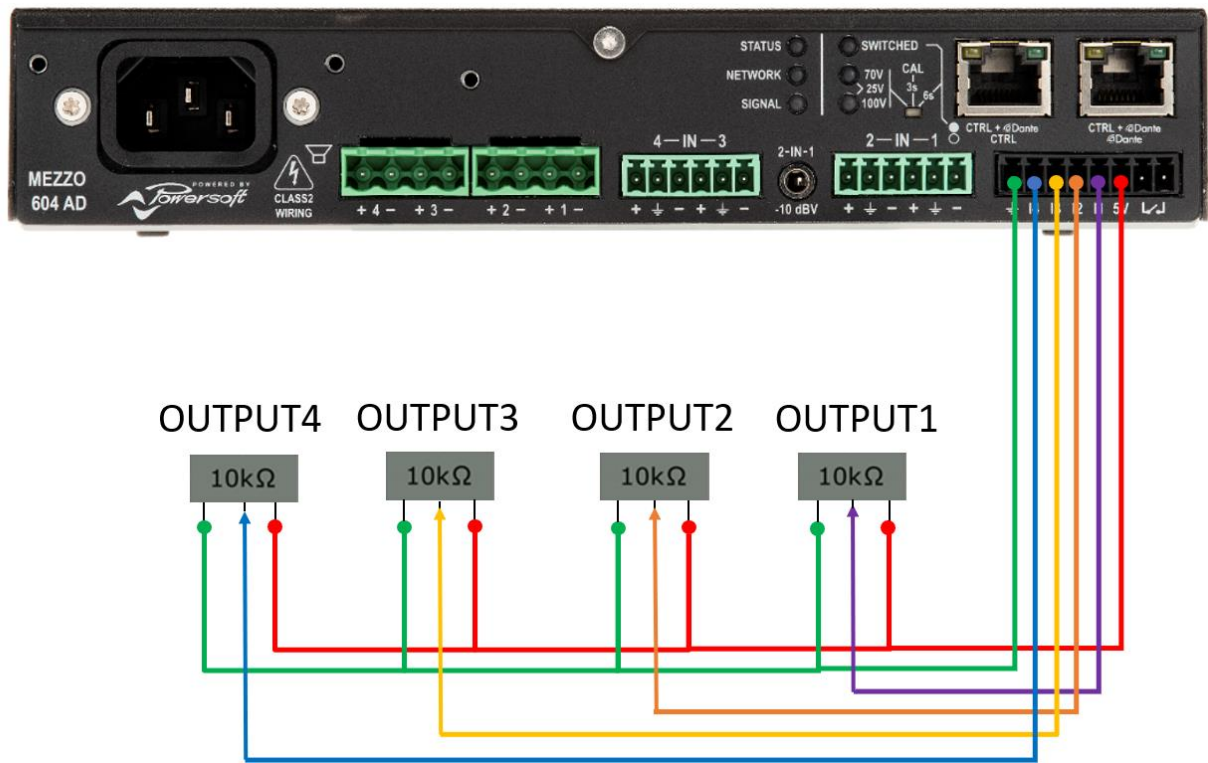


Figure 21 – Multiple Discrete 10kΩ Linear Taper Potentiometers Connected Across Multiple Channel's GPI on Mezzo

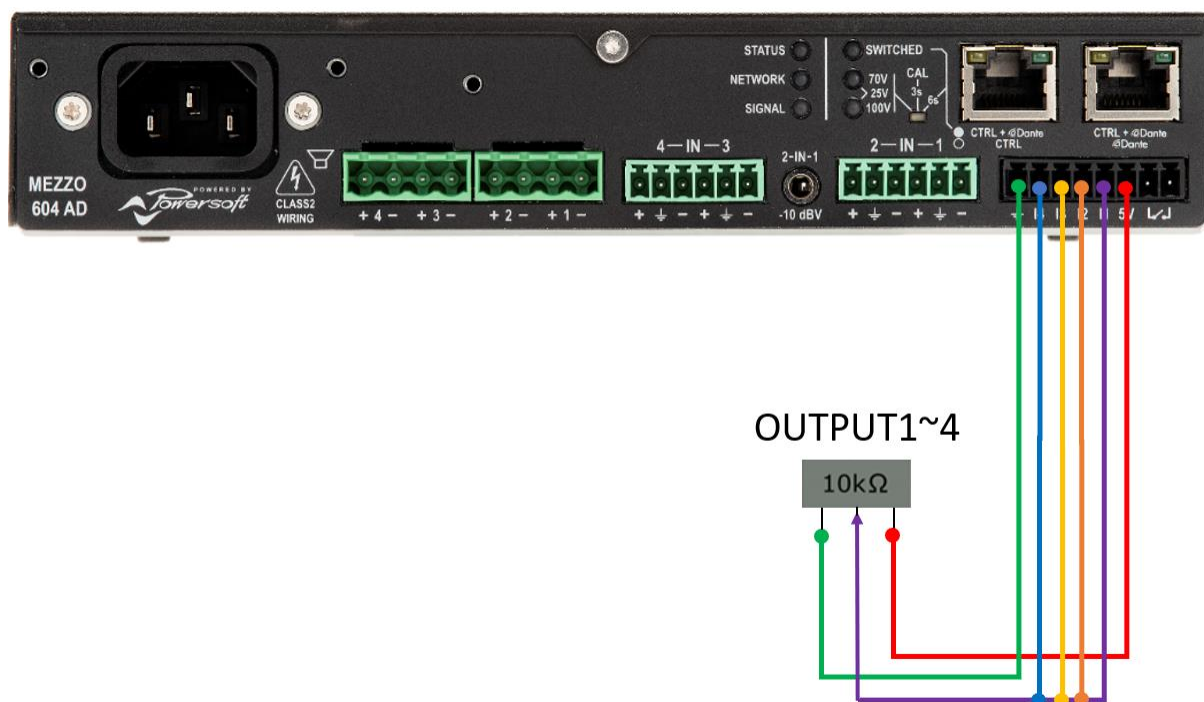


Figure 22 – Single 10kΩ Linear Taper Potentiometer Connected Across Multiple Channel's GPI on Mezzo

VCA Level Control in Gain Stage in Armonía Plus

When the GPI of the Canali Series, or Mezzo Series, is utilized for gain control it's a post-matrix output stage which is being attenuated. The gain stage can be viewed and monitored in Armonía Plus when *Synchronization* is on. The gain stage is after the *Ways EQ* and *Speaker Configuration* on the *Scheme* Tab. In the figure below only GPI #1 of a Mezzo has a potentiometer connected to it and thus Output Channel #1 has attenuation applied to it (Figure 23).

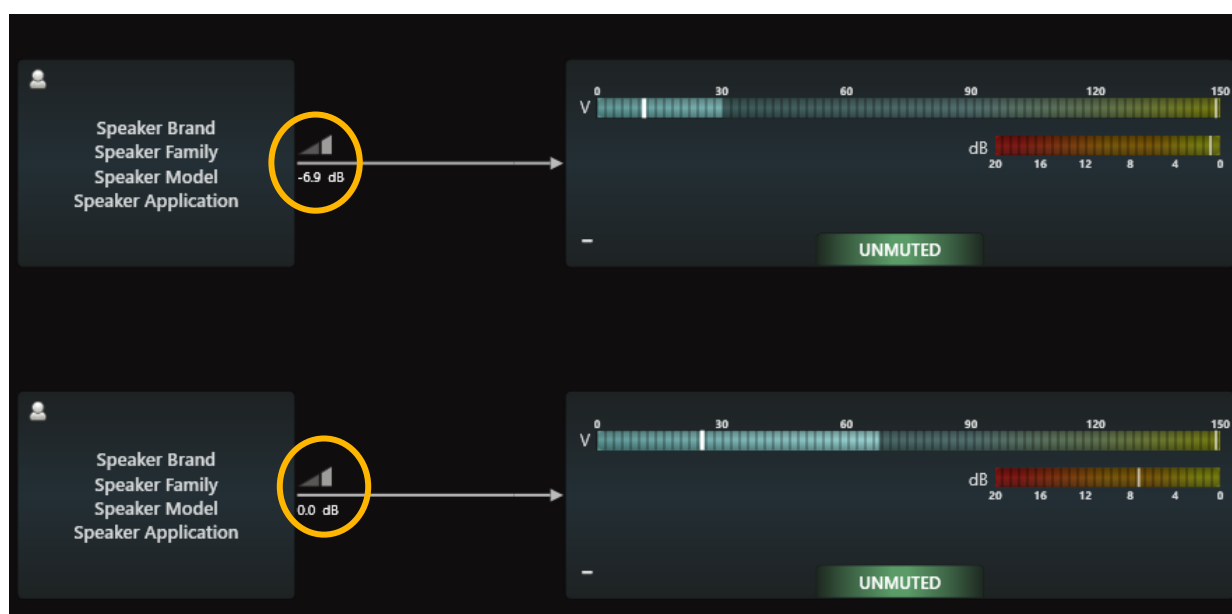


Figure 23 – VCA Gain Stage in Mezzo with Attenuation applied to Output Channel 1



Remote On/Off Triggering with a DC Power Supply (Quattro, Otto and Duecanali only)

In order to save energy and to be compliant with Life Safety Systems it may be necessary to put the amplifier(s) into Standby Mode. When a Powersoft amplifier is in Standby Mode all outputs cease sounding and the amplifier goes into a “Power Save” mode where current draw is at a minimum. Armonía Plus can still communicate with the amplifier and the 3rd Party UDP API will still function, but there will be no audio from the amplifier.

The amplifier can be put into Standby Mode and brought out of it with the application of a voltage differential at the GPI Terminals labeled “REMOTE ON” and “REMOTE OFF”. A voltage differential of between 5vDC and 24vDC is required to activate a change in state. Do not apply a voltage greater than 28vDC to the terminals as damage may occur.

The behavior of this functionality can be described with the following (3) phrases:

- If a voltage greater than or equal to 5v is applied to the REMOTE ON terminal with any voltage applied to the REMOTE OFF terminal, the amplifier will turn on.
- If a voltage of greater than or equal to 5v is applied to the REMOTE OFF terminal and if the voltage applied to the REMOTE ON terminal is less than 3vDC the amplifier will go into Standby Mode
- If the voltages applied to both REMOTE ON and REMOTE OFF are less than 3vDC there will be no change. The amplifier will stay in Standby if that is the current state.

REMOTE ON	REMOTE OFF	AMPLIFIER STATE
Vdiff \geq 5vDC	Any	Force Turn On
Vdiff < 3vDC	Vdiff \geq 5vDC	Force Standby
Vdiff < 3vDC	Vdiff < 3vDC	No Change

Figure 25 – Chart Depicting Behavior of REMOTE ON, REMOTE OFF jacks.

A common voltage on commercially available DC power supplies is 12vDC. The figure below depicts a typical connection from the REMOTE OFF terminal to a 12vDC power supply and a contact closure. Perhaps a Programmable Logic Controller (PLC) that is triggered by a Life Safety System is providing the contact closure.

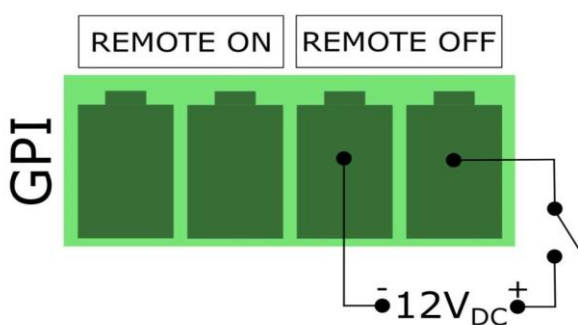


Figure 26 – Connection of a DC Power Supply to REMOTE OFF Terminal.



Final Comments

The GPI Terminals on Canali Series and Mezzo Series have different terminal configurations but share similar functionality with regard to output channel volume control using a 10 kΩ linear taper potentiometer. In addition to the VCA output level controls, both in Canali and Mezzo Series the user is provided with the ability to put the amplifier in to Standby Mode, or have it Power On based on a voltage differential applied across the GPI terminals.

The GPI Terminals in Canali Series and Mezzo perform vital functions that can help the amplifier to conform to specification requirements set out by the end user, or by the authority having jurisdiction over safety.

Document Title: VCA AND REMOTE ON/OFF OPERATION USING GPI & DYNAMIC MUSIC DISTRIBUTION SYSTEM STANDBY VIA GPI

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