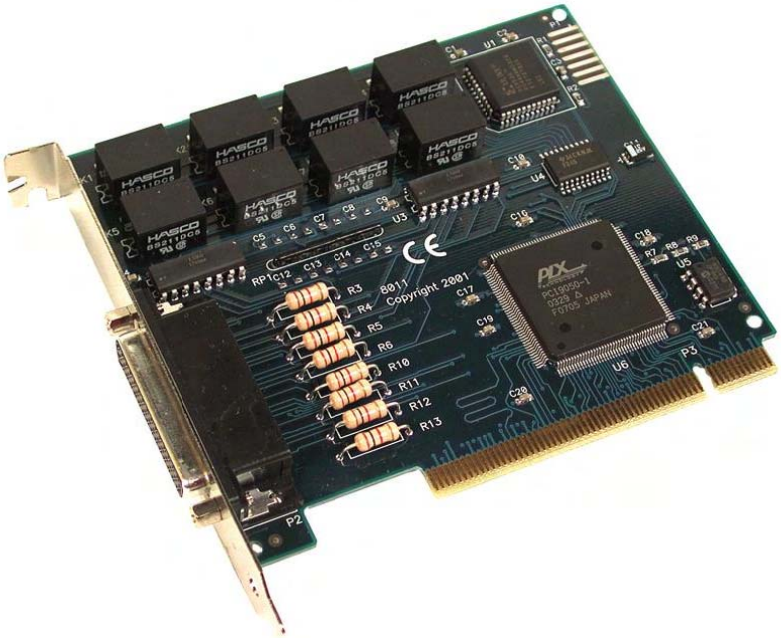
Digital Alert Systems

Application Note

Expansion GPIO Specifications and Configuration



SEALEVEL SYSTEMS INCORPORATED

Digital Alert Systems
A division of **Monroe Electronics**
585-765-1155 | fax 585-765-9330
100 Housel Ave. | Lyndonville | NY | 14098
www.digitalalertsystems.com

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Expansion GPIO Specifications

Input Port

Port A is an eight bit input port connected to optically isolated input sensors. Each sensor can be used to interface a voltage input and then sense whether the voltage is on or off. Each sensor is isolated (with respect to a common ground) from every other sensor, and also isolated with respect to the host PC ground. This means that signals such as low-level AC line voltage, motor servo voltage, and control relay signals can be 'sensed', or read by the PC, without the risk of damage due to ground loops or ground faults.

Each sensor input pair has a current limiting resistor that is used to limit the input current to the opto-isolator. The opto-isolator has two 'back-to-back' diodes internally. This allows AC or DC signals to be sensed, regardless of polarity. When the applied voltage is high enough to cause the led in the opto -isolator to turn-on, the output of the opto- isolator goes low (0 volts) and the signal is read as a low logic level (binary 0) by the PC. When the input signal is too low to turn on the opto-isolator, the output goes high and the port bit is read by the PC as a high logic level (binary 1).

The input impedance of each isolated input is approximately 1K ohms (factory default) . The opto-isolator requires approximately 3mA to turn on. The maximum input current is 50mA. There are two things to consider when selecting the input resistor. The first is turn on voltage for the circuit to sense, and second is the maximum input voltage. Maximum input voltage must not provide too much power to the input resistor, and must also not overdrive the opto-isolator input current specification. The following formulas apply:

Turn on Voltage = diode drop + (turn on current) x (resistance) [Ex: 1.1 + (.003) x R]

Input Current = ((input voltage)-1.1V) / (resistor value)

Maximum voltage = 1.1 + square root of (.25(resistor value))

The following table shows the ranges associated with the resistor.

Input Resistor	Turn-On	Input Range	Max Input	Max Current
1KΩ	3.0V	5.0 – 24.0V	30V	29mA

Note: The turn-off voltage for all resistors is less than 1V.

Because through hole resistors are utilized, they cannot be easily replaced. If modification is necessary, Sealevel can do this for an additional charge.

Important: The input circuits are not intended for monitoring 120-volt AC circuits.In addition to being too high a voltage for the circuits, it is dangerous to have that high a voltage on the card.

Input Port Pin Assignments (HD44 Female)

The inputs are not polarized and can be wired in either direction.

Port A Bit	P1
D0	9,10
D1	11,12
D2	13,14
D3	23,24
D4	25,26
D5	27,28
D6	29,30
D7	40,41

Output Ports (Form C Relays)

The PLC-16.PCI provides 8 Form C (SPDT) Electro- mechanical relays. These relays have three connections: Normally Open (NO), Normally Closed (NC) and a Common. The relays are all de-energized at power-on. Data to the relays is latched by a write to the base+2 address. On/off status of the relays can be read back by a read at the base+2 address.

Output Port Pin Assignments (HD44 Female)

Port C Bit	Normally Closed	Common	Normally Open
D0 (K1)	1	16	31
D1 (K2)	2	17	32
D2 (K3)	3	18	33
D3 (K4)	4	34	35
D4 (K5)	5	19	36
D5 (K6)	6	20	37
D6 (K7)	7	21	38
D7 (K8)	8	22	39

Terminal Block Kit (Item# KT108)

Another option for termination of the PLC-16.PCI is the Terminal Block Kit (Item# KT108). This kit includes an HD44 Male to HD44 Female six-foot cable (Item# CA185) and a 28- Pin Terminal Block (Item# TB08-KT). The silk screen with diagram is shown on the following page.

The CA185 cable is wired straight through, one-to-one.

The terminal block groups the common connections of the PLC-16.PCI into groups of four as shown:

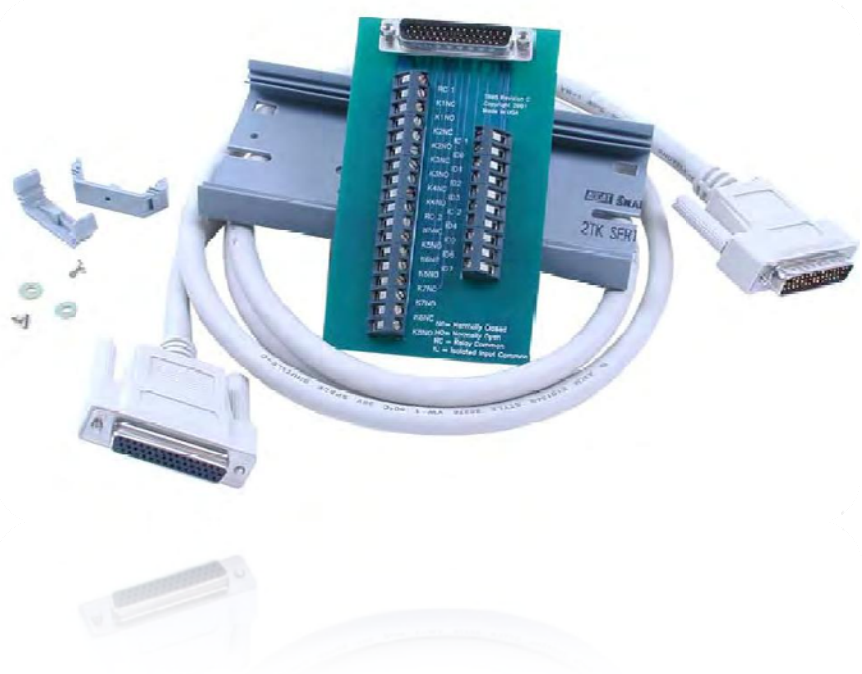
RC1 (Relay Common 1) ties together the ground pins for physical relays K1 – K4 (logical D0 – D3) e.g.: HD44 pins 16,17,18 and 34 are connected to simplify field wiring

RC2 (Relay Common 2) ties together the ground pins for physical relays K5 – K8 (logical D4 – D8) e.g.: HD44 pins 19,20,21 and 22 are connected to simplify field wiring

The other eight screw terminals in each group (16 total) are used to wire to the NO (Normally Open) or NC (Normally Closed) side of the relays. These are labeled K1 – K4 and K5 – K8

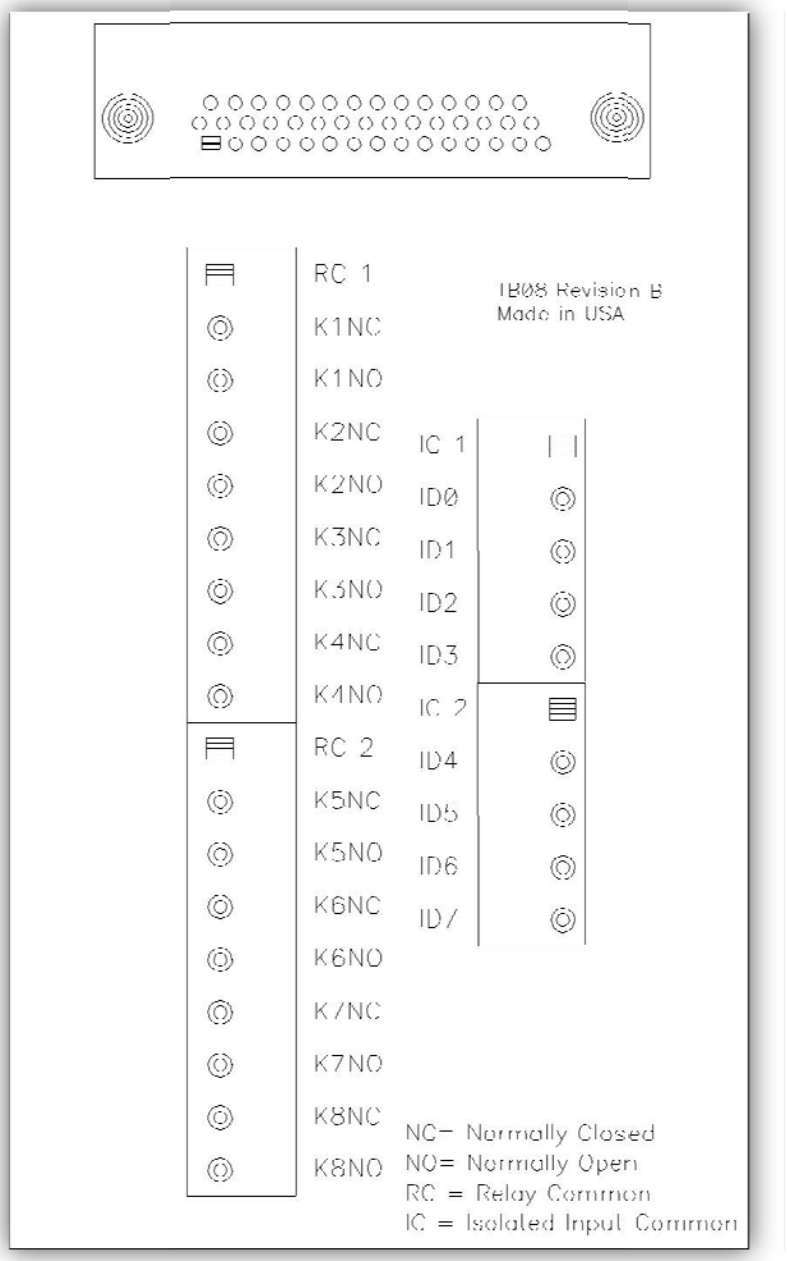
IC1 (Input Common 1) ties together one side of the input pins for D0-D3 and IC2 (Input Common 2) ties together one side of inputs D4-D7 to simplify field wiring

The other four pins in each group (8 total) are used to wire to the inputs. These are labeled ID0 – ID3 and ID4 – ID8



Silk Screen – TB08 Terminal Block

The silk screen for the TB08 terminal block shows how the connections are labeled for ease in wiring and troubleshooting.

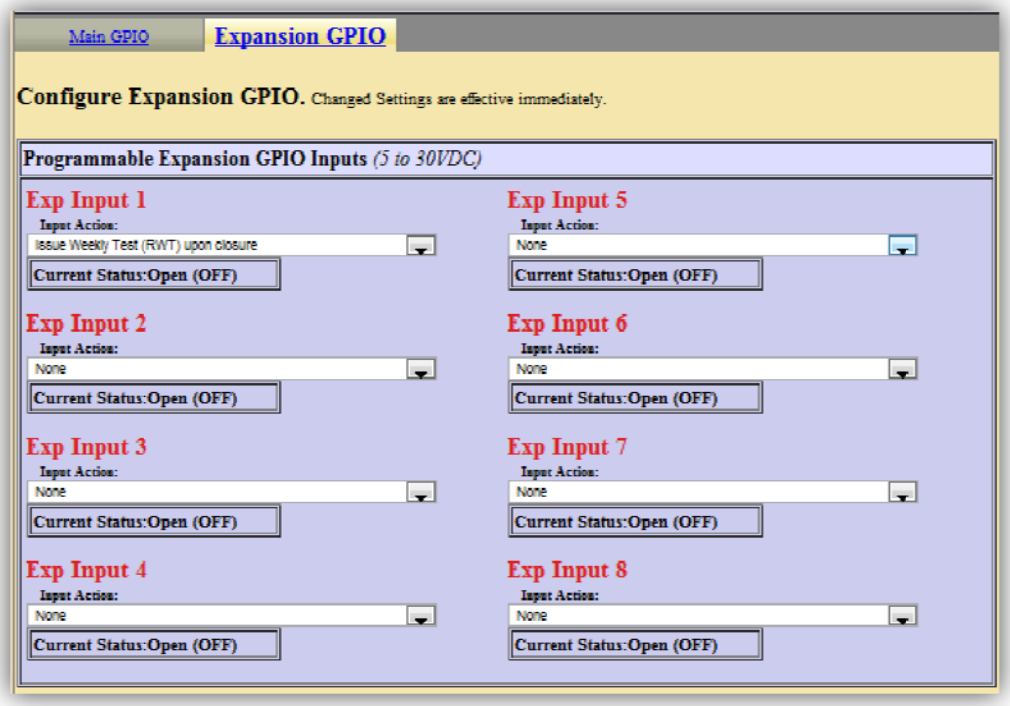


Expansion GPIO Configuration

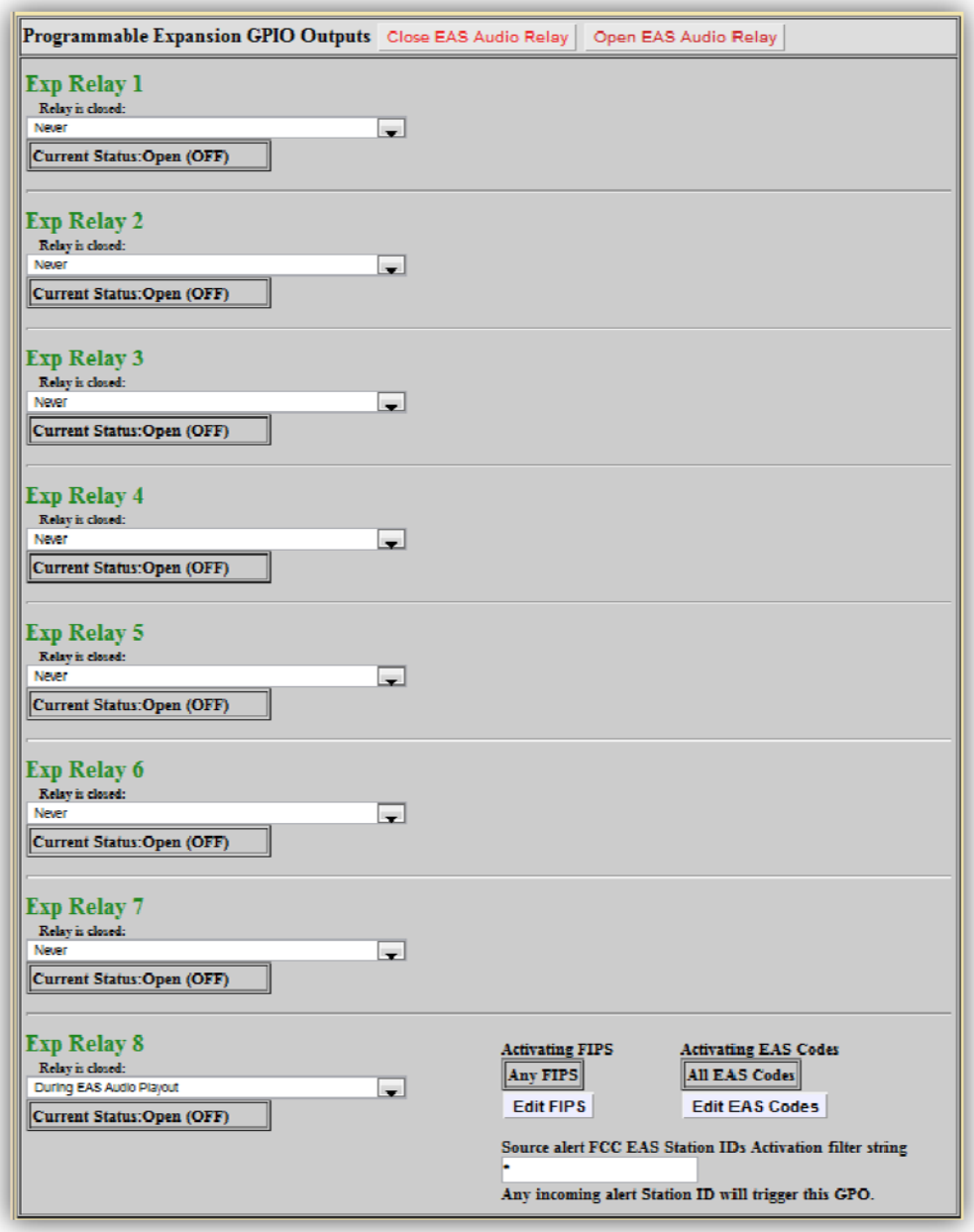
The Expansion GPIO Tab

If Expansion GPIO has been enabled on your DASDEC, you can now configure the settings for how it operates. To do this, go to **Setup > GPIO> Expansion GPIO** in the DASDEC browser interface.

The options are very similar to that of the stock GPIO configurations. The different pull down menus allows you to choose when Inputs and Outputs close based on the situation in the DASDEC. You can configure this for each of the 8 inputs and outputs.



Setup > GPIO > Expansion GPIO: GPIO Inputs



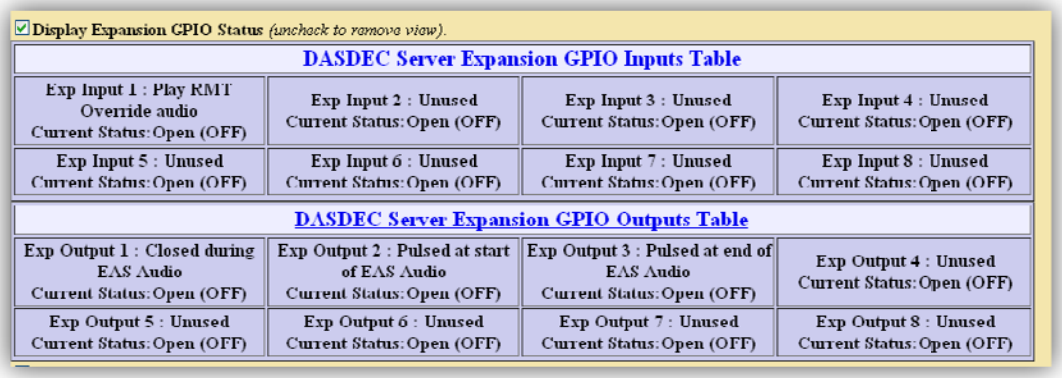
Setup > GPIO > Expansion GPIO: GPIO Outputs (Below the Inputs)

Notice that, *when* a relay is set to close in a certain scenario, the interface allows you to edit the Activating FIPS and EAS codes. You may find that this option can hurt you more that it will help you, especially if you already are controlling your FIPS and EAS codes due to manual forwarding your alerts. If you already control your FIPS and EAS codes, you don't need to reconfigure them here.

At the top of the GPIO Outputs box, you will find the two options, Close EAS Audio Relay and Open EAS Audio Relay. This button only applies to the expansion relays that have been configured to close **During EAS Audio Playout**. To reiterate; if you choose Close EAS Audio Relay, then it will close all of the GPIO Outputs that are configured to close **During EAS Audio Playout**.

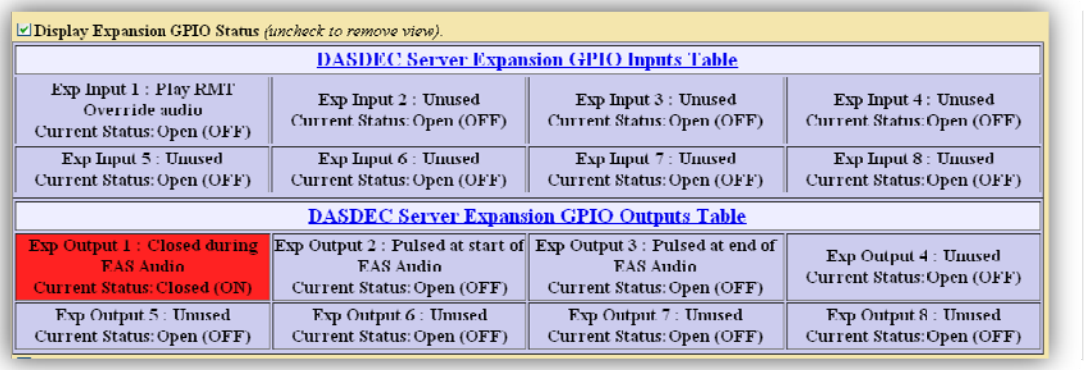
Monitoring Your Expansion GPIO Configuration

To monitor your GPIO configurations, go to the **Setup > GPIO > Main GPIO** page on the DASDEC browser interface. At the top of the page, you will see the status of the GPIOs that are already in the DASDEC. It does not show the status of the Expansion GPIOs. In order to show the status of the Expansion GPIOs, you must click the check box ☑ **Display Expansion GPIO Status** *(uncheck to remove view).* which is located below the configuration box for the internal GPIOs. It should look similar to this:



Setup > GPIO > Main GPIO: Expansion GPIO Status Display

When an expansion relay is closed, the location of that relay on the table will appear **RED**. This is shown below:



Setup > GPIO > Main GPIO: Expansion GPIO Status Display (Closed Relay)

Once you have configured the GPIO Inputs/Outputs to your desired operation, your configuration is complete. Be sure to test these settings so that you can ensure that the DASDEC will operate exactly how you want it to in an emergency.