BROADCAST tools INC®

PROBLEM SOLVED

Installation and Operation Manual

I/O Sentinel 4 G2

Web-enabled four status/logic input, four relay output module

Manual update: 3/2/2022
For firmware versions equal to or greater than 2.05.
If you need a firmware upgrade, contact Broadcast Tools®

ALL SPECIFICATIONS AND FEATURES FOR THIS PRODUCT ARE SUBJECT TO CHANGE WITHOUT NOTICE

NOTE: We recommend the use of Chrome, Firefox or Safari as your browser.

Due to the dynamic nature of product design, the information contained in this document is subject to change without notice. Broadcast Tools, Inc., assumes no responsibility for errors and/or omissions contained in this document. Revisions of this information or new editions may be issued to incorporate such changes.

Visit **www.broadcasttools.com** for important product update information.

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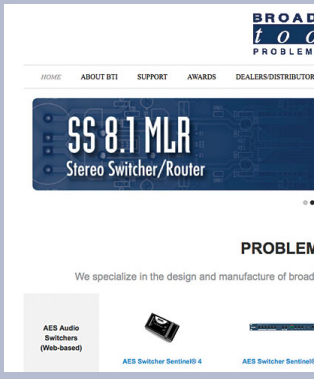

e-mail: support@broadcasttools.com **voice:** 360.854.9559 **fax:** 866.783.1742

INTRODUCTION

Thank you for your purchase of a Broadcast Tools® I/O Sentinel 4 G2 (referred to as the I/O Sentinel 4 G2 throughout this manual). We're confident that this product will give you many years of dependable service. This manual is intended to give you all the information needed to install and operate the Broadcast Tools® I/O Sentinel 4 G2.

SAFETY INFORMATION

Only qualified technical personnel should install the I/O Sentinel 4 G2. Any attempt to install this device by a person who is not technically qualified could result in a hazardous condition to the installer or other personnel or damage to the I/O Sentinel 4 G2 or other equipment. Please ensure that proper safety precautions have been taken before installing this device. If you are unfamiliar with this type of equipment, please contact a properly qualified engineer to handle the installation and setup of the I/O Sentinel 4 G2.

WHO TO CONTACT FOR HELP

If you have any questions regarding your product or you need assistance, please contact your distributor from whom you purchased this equipment. If you would like more information about BROADCAST TOOLS® products, you may reach us at:

Broadcast Tools, Inc.
131 State Street
Sedro-Woolley, WA 98284-1503 USA
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Internet Home Page: www.broadcasttools.com
E-mail:support@broadcasttools.com

THANK YOU FOR CHOOSING BROADCAST TOOLS® BRAND PRODUCTS!

Broadcast Tools is a Veteran Owned Business

Designed, Assembled and Supported in WA State, USA

CAUTION!

Broadcast Tools® Products, as with any electronic device, can fail without warning. Do not use this product in applications where a life threatening condition could result due to failure.

NOTE:

This manual should be read thoroughly before installation and operation.

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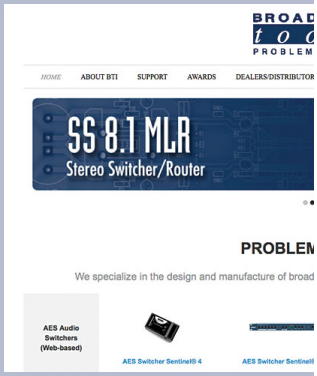

Product Overview

The I/O Sentinel® 4 G2 is a robust, full-featured Ethernet based data acquisition and remote-control device with four optically isolated status (logic) inputs and four programmable relay outputs. The I/O Sentinel® 4 G2's four optically isolated status/logic inputs may be configured for wet or dry (contact closure) status/logic monitoring. The four one-amp SPDT relay outputs may be configured for ON, OFF, pulsed or reboot operation.

The I/O Sentinel® 4 G2 can be controlled and monitored locally and/or remotely over any IP network, including private networks, IP-based industrial control networks, and the Internet. Users can operate the product using a web browser or web-enabled mobile device. Email notification may be configured to alert up to eight email or SMS-email addresses. Logging of system status, along with the site ID may be emailed in time spans from once an hour to once a day. SNMP traps and SET/GET to allow multiple units to be monitored and controlled with SNMP management software.

The I/O Sentinel® 4 G2 may be paired with a second I/O Sentinel® 4 G2 to form an IP-based "4 Channel Bi-directional Status/Relay Extension Cord".

Features/Benefits

- Four optically isolated inputs configurable for dry signals or wet signals (5-24 VDC, or 25-48 VDC via an external resistor.)
- Four SPDT relay outputs.
- Plug-in euro-block screw terminals for status and relay connections.
- Built-in web server provides simple, web-based (HTML5) notification, monitoring, configuration, and control.
- Email and SMS-email alarm notification for input, outputs, and logs.
- Remote control and monitoring via SNMP GET/SET and traps.
- Logging of all user selected input status with site ID information which may be emailed from once an hour to once a day, along with hourly snap-shot functionality.
- Nine front panel I/O activity LED indicators.
- Rear panel RJ-45, 10/100base-T LAN/Ethernet interface.
- Fully RFI proofed.
- Surge protected internal power supply, universal switching power supply with domestic connector supplied. International power supply optional.
- Three units may be mounted on one RA-1 one-RU 19" rack shelf.

Applications

- Web-enabled back-up transmitter ON/OFF control system.
- One end of a full-duplex four channel web-enabled I/O extension cord.
- Relay control and status monitoring via a web browser, SNMP, and/or user defined PC application.

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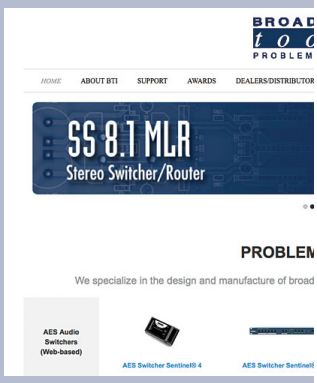

Inspection

Please examine your I/O Sentinel 4 G2 carefully for any damage that may have been sustained during shipping. If any damage is noted, please notify the shipper immediately and retain the packaging for inspection by the shipper. The package should contain the I/O Sentinel 4 G2, a BLUE straight-through CAT 5 cable, a GRAY crossover CAT 5 cable and a 9-12 VDC power supply. Manuals may be downloaded from our web site.

Installation

Surge Protection

The I/O Sentinel 4 G2 has built-in resistance to voltage changes; we recommend that you use a power surge protector or line conditioner on the incoming AC line. Lightning strikes and/or other high voltage surges may damage your I/O Sentinel 4 G2 and connected equipment if it is not properly protected. For lightning protection devices, check out www.polyphaser.com and www.itwlinx.com.

UPS Standby Power System

We recommend that you power your I/O Sentinel 4 G2 from an uninterruptable power supply (UPS) system. A UPS, like the BE600M1 from APC, helps minimize the risk to the I/O Sentinel 4 G2 and provides power during a power outage.

Power

Connect the 2.1mm barrel type center positive power connector into the unit and the 9 to 12 VDC power supply with domestic connector into a 120 Vac 50-60 Hz power source.

CAUTION!

Installation of the I/O Sentinel 4 G2 in high RF environments should be performed with care. The station ground should be connected to the "Chs Gnd" chassis ground screw.

NOTE:

Never use any type of power supply other than the specified/supplied power supply.

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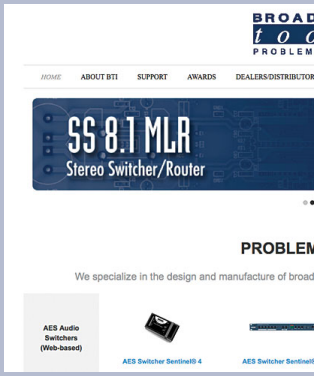

LED Indicators
"Pwr/HB" LED: Illuminates when power is applied and flashes to indicate microprocessor operation. (Green)
"INPUT" LEDs 1-4: Lit when the corresponding status input is on. (Green)
"OUTPUT" LEDs 1-4: Lit when the corresponding relay output is on. (Red)

LAN / NET Jack
RJ45 Ethernet jack for 10/100baseT LAN/WAN connection.

Chassis Ground (Chs Gnd)
This #4-40 sized chassis ground screw should be tied to the station (house) or system ground.

Cable Prep
The I/O Sentinel 4 G2 interfaces to external equipment through removable euro-block screw terminals. The terminals accommodate wire sizes from 16 - 28 AWG solid or stranded wire. Before installing a wire, remove the euro-block screw terminal plug and turn each capture screw fully counterclockwise. Strip each conductor to a length of 0.25" and insert the conductor fully into the terminal. Turn the capture screw fully clockwise to secure the conductor.

Relay Outputs
The I/O Sentinel 4 G2's relay outputs are SPDT normally open/dry. Make your connections to the desired relays, K1 thru K4. Front panel LEDs indicate when a relay is active.

(Top row, TB2)

K3			K4		
3CM	3CM	3NO	4NC	4CM	4NO
1NC	1CM	1NO	2CM	2NC	2NO
K1			K2		

(Bottom row, TB2)

CM = Common Relay Contact (wiper)
NO = Normally Open Relay Contact
NC = Normally Closed Relay Contact

CAUTION!

Installation of the I/O Sentinel 4 G2 in high RF environments should be performed with care. The station ground should be connected to the designated "Chs Gnd" ground terminal.

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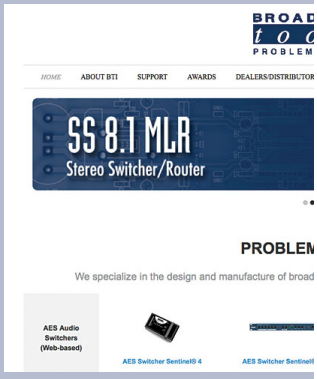

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Status Input

(Top row, TB1)

Input 1		Input 2		
3A	3B	4A	4B	GND
1A	1B	2A	2B	GND
Input 3		Input 4		

(Bottom row, TB1)

Each optically isolated input has a terminal labelled "xA" and a terminal labelled "xB". Inputs can be configured for either wet or dry operation via internal jumpers. The factory default configuration is dry, where the "A" side of the input is ground (GND) and the "B" side of the input is the cathode (-) of the opto-isolator. In this configuration 5V is applied internally to the anode (+) of the opto-isolator. This configuration is best for interfacing with external dry contact relay outputs, switches, and open collector outputs.

In the "wet" configuration an external voltage must be applied to the input to activate the opto-isolator. When configured for wet operation the "A" side of the input is the anode (+) and the "B" side of the input is the cathode (-). This configuration is best where full isolation is preferred or when interfacing with external voltage/logic level outputs.

Each optically isolated input is connected through an internal 2.2k ohm series current-limiting resistor directly to an opto-coupler circuit so no external resistor is necessary if the input voltage is between 5 and 24 VDC. Higher DC voltages, from 25 to 48 VDC, can be used but must be reduced with an additional external resistor of the appropriate value and power rating to limit the input current.

Here is how to calculate the value and power rating of an external current limiting resistor for DC voltages up to 48 VDC: Each opto-isolated input has an internal 2.2K ohm series resistor. The opto-isolator works well with an input current of 9 mA and has a voltage drop of around 1.2V. With this information we can determine the correct external series current limiting resistor value needed for other voltages using the equation:

$$R = ((Vin-1.2)/0.009)-2200$$

Where:

R = External resistor value required
Vin = Desired input voltage
1.2 V = Forward voltage drop of the LED in the opto-isolator
0.009 A = Nominal LED current
2200 ohms = Internal resistor

For example:
To connect a 48 VDC signal voltage to an input on the I/O Sentinel 4 G2 in "wet" configuration the completed equation for the external resistor value would be:

$$R = ((48-1.2)/0.009)-2200 = 3000 \text{ ohms}$$

To calculate the power dissipated by the external resistor, the equation would be:

P = I x I x R, so the resistor must be at least .009 x .009 x 2200 = 0.243 Watts, use a 1/2 Watt rated resistor.

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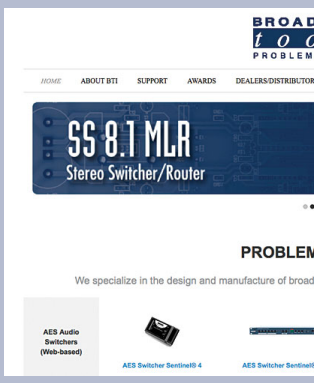

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Input Jumper Configuration

Each input is equipped with an internal four-position header and two jumpers. The headers are labeled JPR1-4, JPR1 = IN1, JPR2 = IN2, etc. The factory default configuration is for a DRY input (relay contact, switch, open collector) with a jumper over pins 1 & 2 and another jumper over pins 3 & 4. To change the input to WET (user supplied external voltage between 5 and 24 VDC, or 25-48 VDC with an added resistor), remove both jumpers and place ONE jumper over pins 2 & 3.

Operation

The I/O Sentinel 4 G2 can be controlled from over the network from its HTML-based web-browser interface, via SNMP, or via TCP commands. The slow blinking front panel "PWR/Heartbeat" LED indicates valid power and proper operation. The front panel Input and Output LEDs indicate channel status.

Reset to Defaults

Factory defaults may be restored by depressing the recessed front panel "Defaults" push button for five seconds after waiting for the unit to power up. The PWR/HB led will rapidly blink two to three times when loaded.

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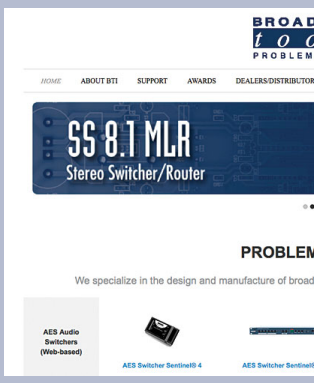

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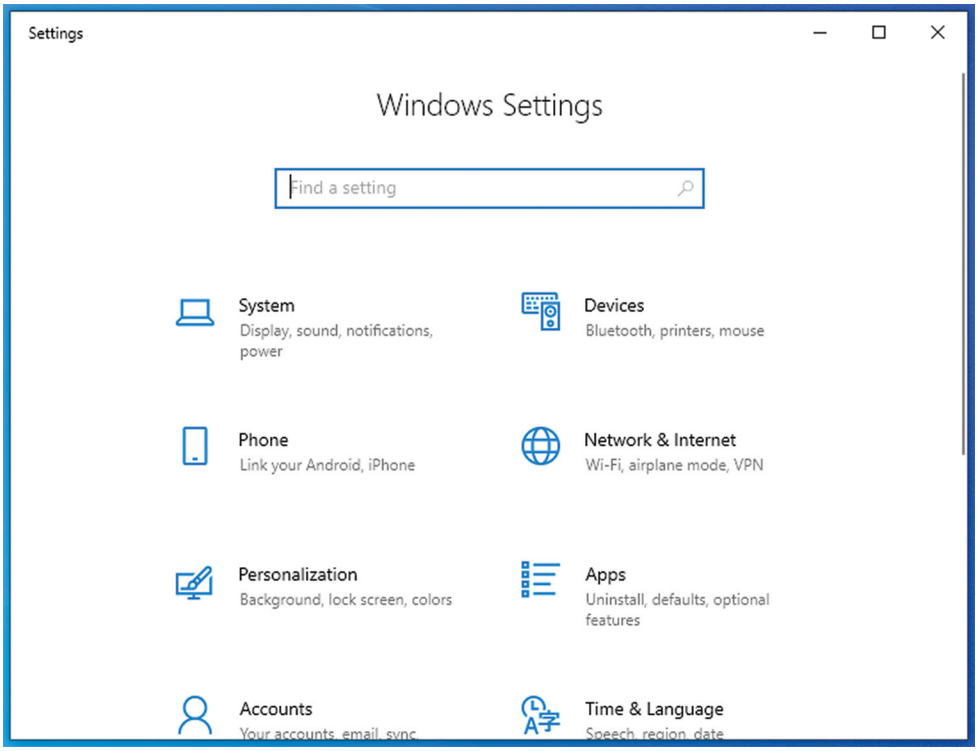
Ethernet "Quick Start" Guide

CAUTION! If you are not familiar with Ethernet enabled equipment, it may be useful to contact your IT department, network administrator or network consultant for assistance. Assigning an IP address already in use by another device may cause problems with your network!

Instructions for changing the IP address of the computer that will be used for the configuration of this product are given here. Note that these instructions are specifically for computers with the Windows 10 operating system but will also work with Windows 7. For setup using other operating systems, refer to the appropriate OS user's manual.

Step 1: Open the control panel by clicking on the Start Menu, click on Settings, then click on Network & Internet. Click on View network status and tasks under Network and Internet.



CAUTION!

NEVER DOWNLOAD FIRMWARE UPDATES OR CHANGES TO THE XPORT WEB-SERVER UNLESS INSTRUCTED TO DO SO BY BROADCAST TOOLS®. DOING SO DELETES ALL SOFTWARE AND VOIDS ALL WARRANTIES FROM BROADCAST TOOLS, INC.

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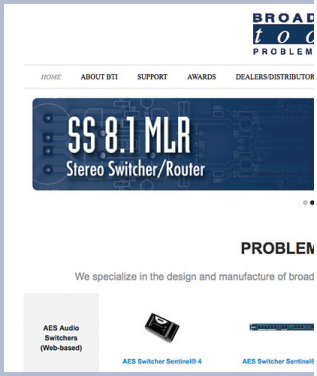
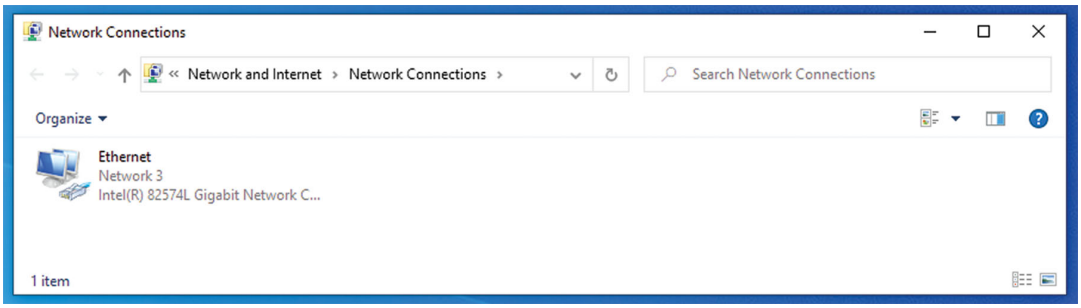
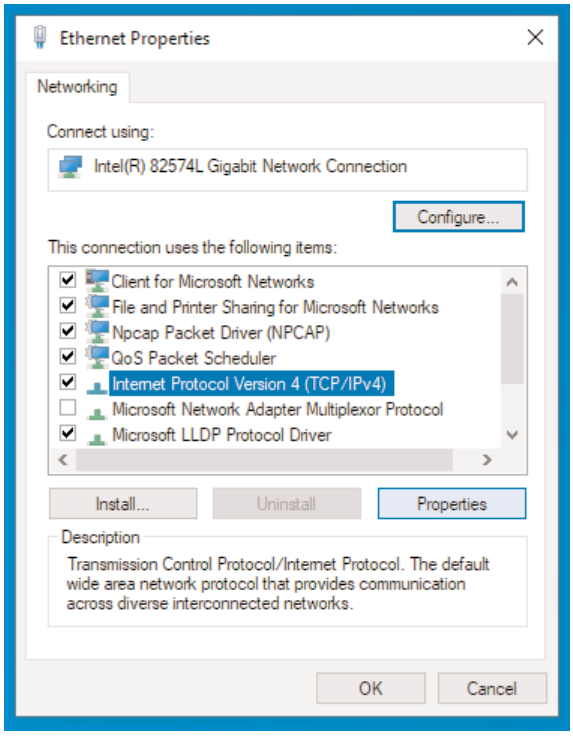


Step 2: Click on the sidebar labelled Change adapter settings. The Network Connections windows will pop up, as shown below.



Step 3: Right click on the icon labeled Local Area Connection or Ethernet. A menu will appear. Select the option at the bottom of the menu labeled Properties. The Ethernet Properties window will appear.



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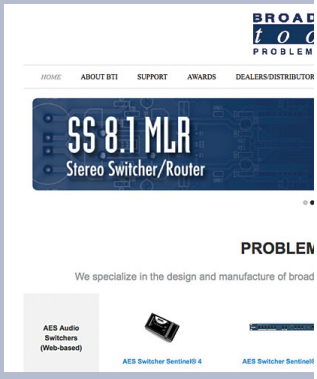
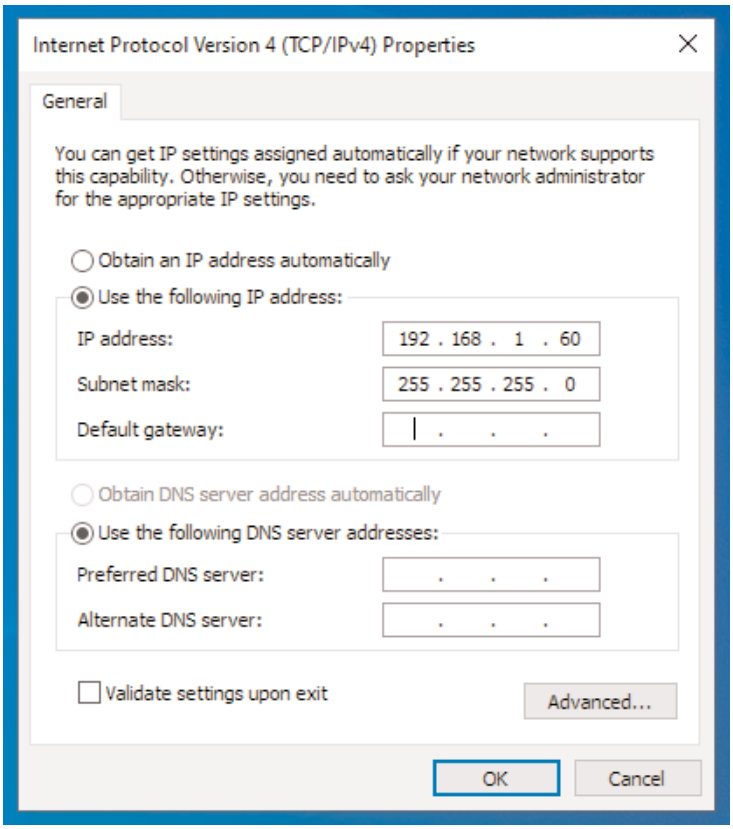


Step 4: On the Local Area Connection Properties page, double click on Internet Protocol (TCP/IPv4) to display properties.



Step 5: Before making any changes to the network settings, write down the current settings (or screen capture the page and print) so that they can be restored once the unit is configured. Next, select the radio button labeled "Use the following IP address" and type in the IP address 192.168.1.60. Type in the subnet mask of 255.255.255.0. Leave the default gateway field blank. Click OK to apply the new settings.

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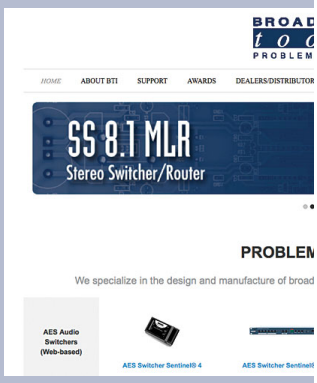

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Ethernet (NETWORK) port LED indicator functions

Link LED Left Side	
Color	Meaning
Off	No Link
Amber	10 Mbps
Green	100 Mbps

Activity LED Right Side	
Color	Meaning
Off	No Activity
Amber	Half Duplex
Green	Full Duplex

NOTE: We recommend the use of Chrome, Firefox, or Safari for as your browser.

Opening the LOGIN Web Page

1. Connect the supplied GRAY colored XOVER cable between the PC's Ethernet port and the products "NET" network RJ45's jack.

2. Connect the supplied power supply. Verify that the green PWR/Heartbeat LED is blinking and the left "LINK" LED above the "NET" Network RJ-45 is illuminated

3. Open the product's login page by typing the following URL into the browser: http://192.168.1.55 The username and password is required to change any parameter and the fields are case sensitive.

Factory "login" defaults: username: admin (lower case)
password: 1234

NOTE: You may view the password by checking the "Show Password" box.

4. Press the "Submit" button to login in. Once you are logged in, follow this manual for setup and/or operational information.

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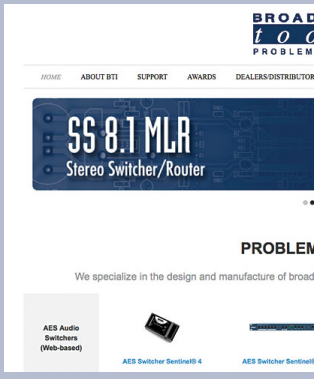
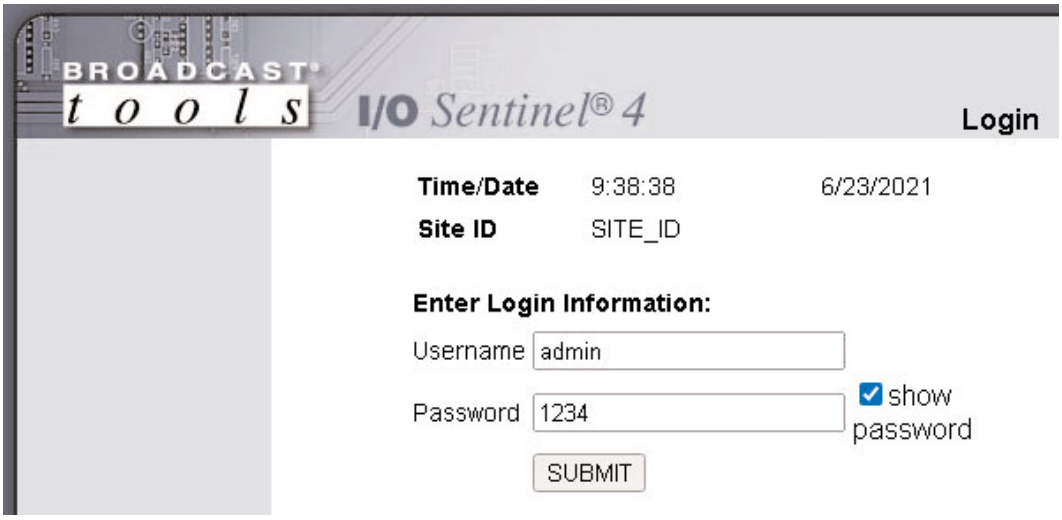


Web Setup and Operation

"Login" Web Page

The Login screen displays the Username and Password entry points.



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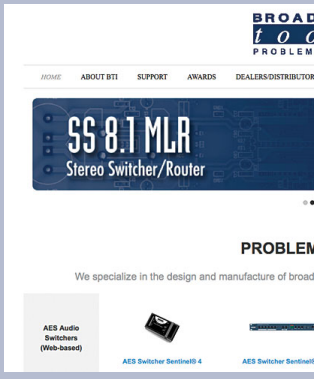
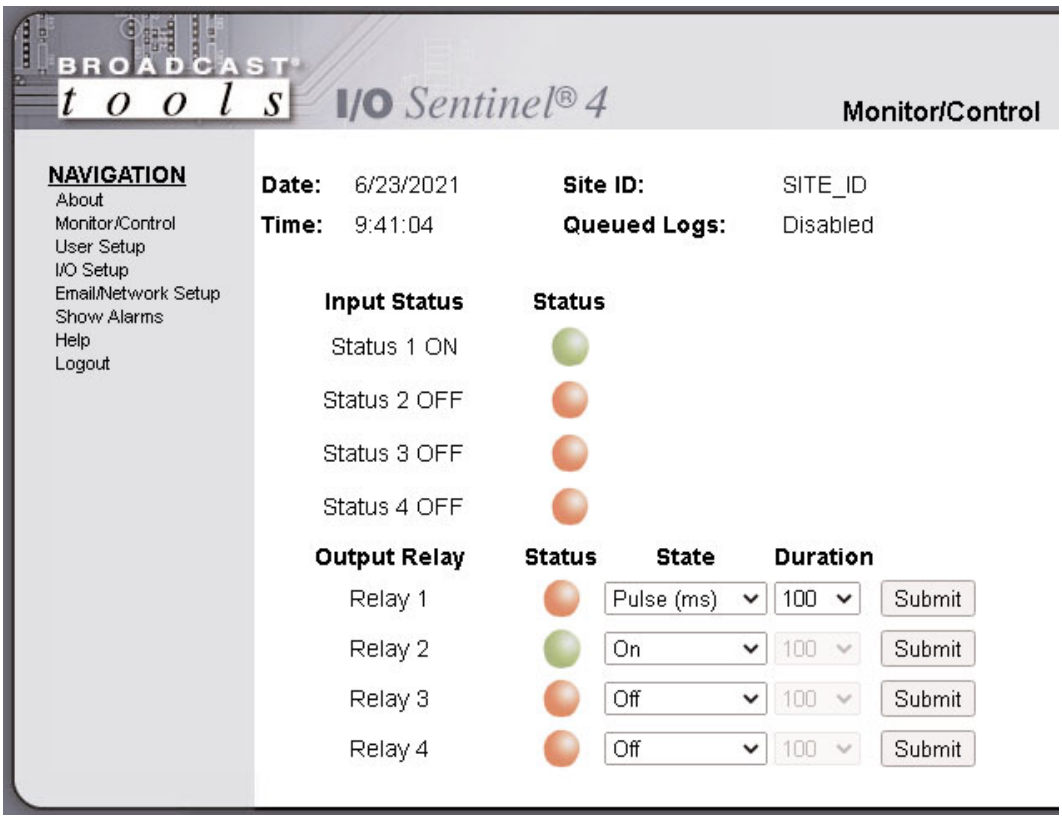


After you have successfully logged in, the Monitor/Control page will be displayed. Depending on your access level, you may or may not be able to control or modify the product's configuration.

"Monitor/Control" Web Page



The Monitor/Control page allows the monitoring and or control of the I/O Sentinel 4 G2. The following is an explanation of each item on this page:

The Site ID, Time and Date are always displayed.

Queued Logs: Displays the number of log events in the email queue.

Status: Displays the condition of the four status/logic inputs.

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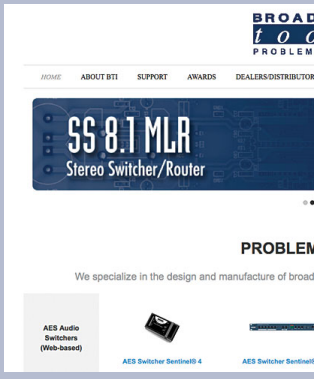

Relays: Allows the user with admin or monitor/control access to control each relay for its displayed function.

Action/State: Determines how each relay will function. The relays may be configured for one of three states.

1 - ON and OFF operation.
2 - Pulse with user configured pulse length from 100 ms to 2000 ms in 100 ms steps.
3 - Reboot, with user configured pulse length from 0 to 30 minutes in 1 minute steps.

To select other pages (if authorized), make your selection under the left hand Navigation column.

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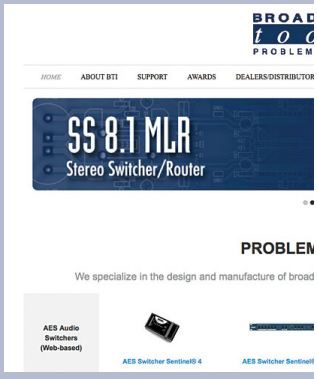
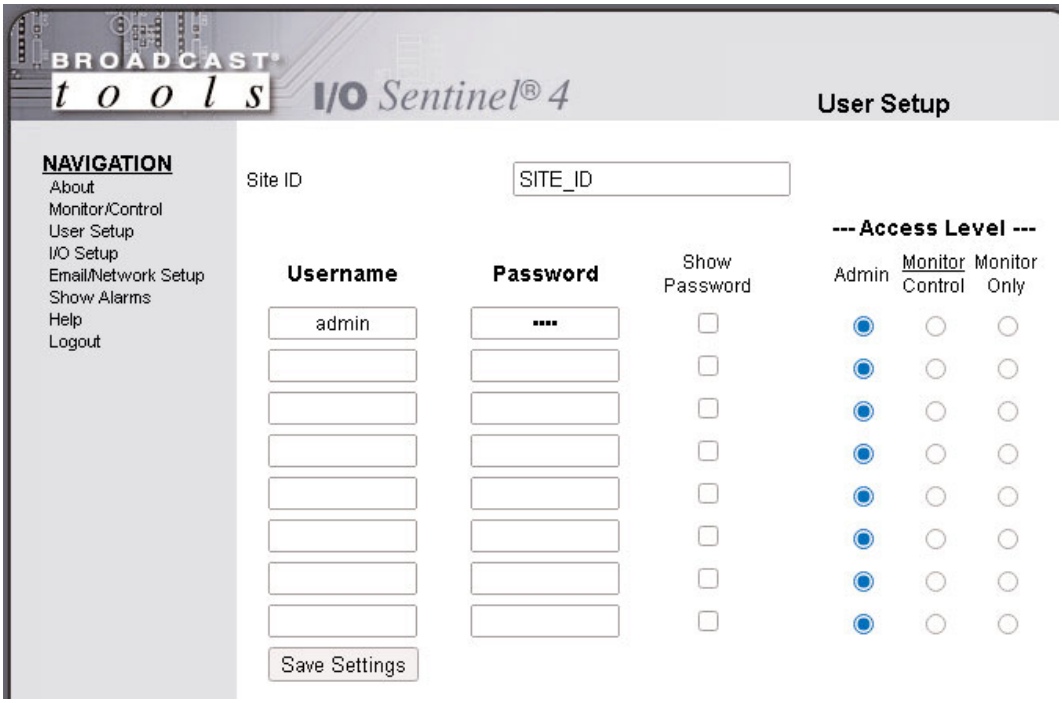


"User Setup" Web Page



NOTE: You may view a password by checking the "Show Password" box.

Eight Usernames and Passwords may be configured for one of three access levels:

1. "Admin" allows complete configuration access and control.

2. "Monitor/Control" allows the following access:
   About, Monitor/Control, Show log, Help, and Logout.

3. "Monitor Only" allows the following access:
   About, Monitor only, Help, and Logout.

Only users with "admin" access can make changes to this page.
The site ID is displayed and can be changed on the Email/Network Setup page.

NOTE: After any item has been changed, you MUST press the "Save Settings" button for your changes to be saved.

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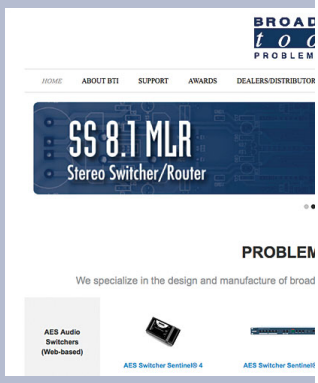
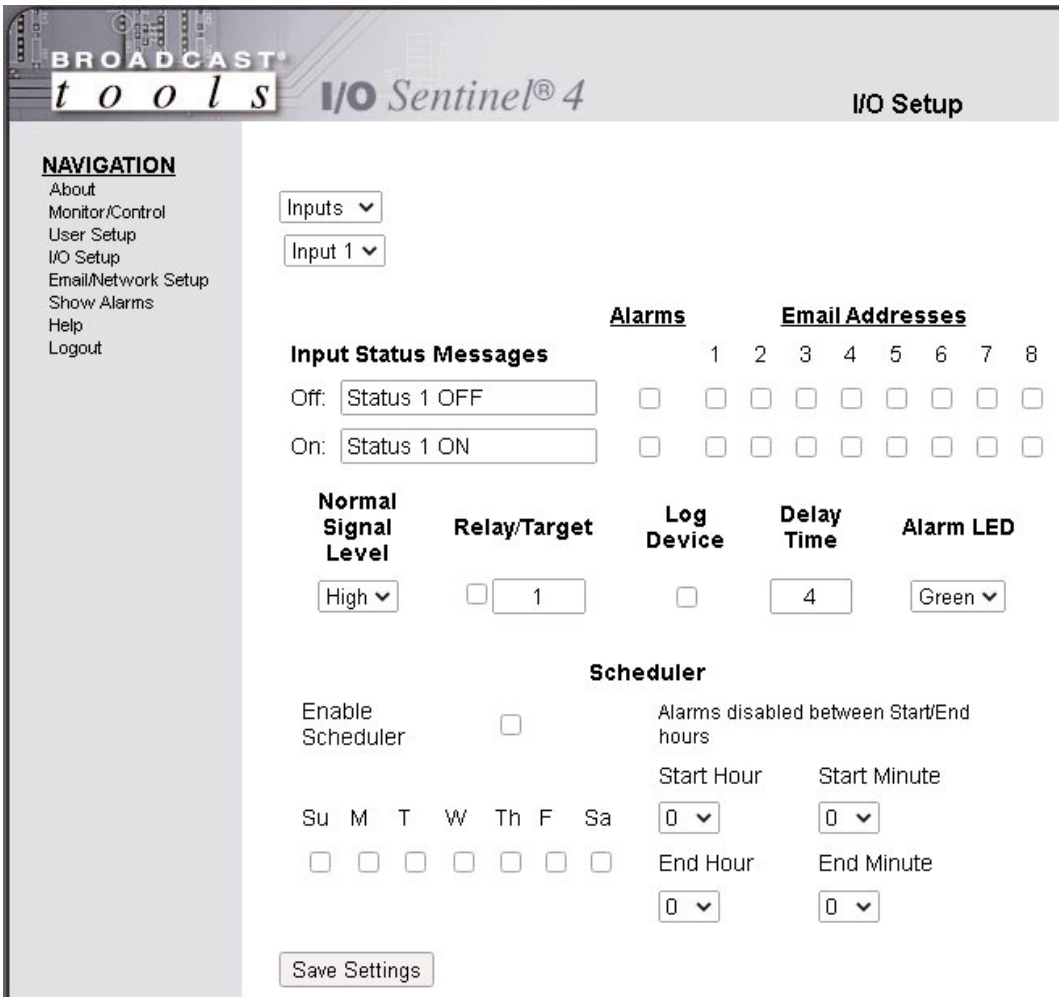


"I/O Setup" "Inputs" Web Page

The I/O setup page allows you to label and configure the status inputs and relay outputs. Use the drop-down menu to select "Inputs" or "Outputs" and the "Input x" and "Output x" drop-down menus to configure each input and output.



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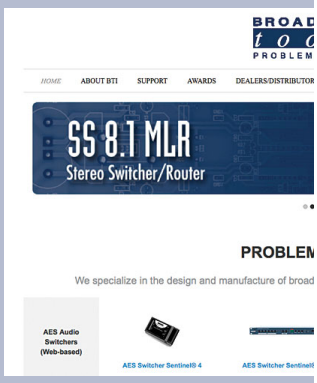


"I/O Setup" "Inputs" Web Page (cont.)

Input selection drop-down: Allows for the selection of each status/logic input.

Input Status Message: Used to identify each status/logic input.

OFF Alarms: This box must be checked to enable alarms when the input is OFF. The boxes labeled 1 thru 8 allow the user to enable up to eight different email addresses.

ON Alarms: This box must be checked to enable alarms when the input is ON. The boxes labeled 1 thru 8 allow the user to enable up to eight different email addresses.

Normal Signal Level: This drop-down allows the selection of current logic level. This normally set for "high", but may be set to "low" to invert the input.

NOTE: When the "Normal signal level" is set to High = When NO voltage is applied to the input, it is considered OFF, when voltage IS applied to the input, it considered ON.
NOTE: When the "Normal signal level" is set to Low = When voltage IS applied to the input, it is considered OFF. When NO voltage is applied to the input it considered ON.
NOTE: By enabling the ON and/or OFF monitoring and NOT enabling an email box, the device will log the events, but not send an email. If the device is exiting a OFF alarm condition, then the email addresses used will be those notified when the OFF alarm condition was entered.

Enable Extension: This box must be checked when paired with a second I/O Sentinel® 4 G2 to form a "4 Channel Bi-directional Status/Relay Extension Cord." Normally disabled.

Log Device: This enables the email snapshot logging of the status input.

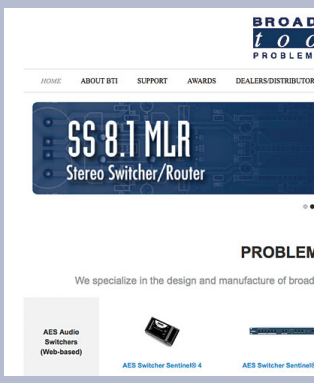
Delay Time: The delay is in seconds. This option specifies the wait time from when a status/logic input changes state before an alarm is activated.
NOTE: Set to zero when paired with another I/O Sentinel® 4 G2.

Alarm LED Status: Allows the user to configure the color of the web LED when in an alarm condition.

Scheduler: When enabled, the user may set each input alarm to be disabled or enabled by configuring the required day(s) of week and the start and end hours and minutes.

NOTE: Press the "Save Settings" button to save your changes.

WEBSITE:
Visit our web site for product updates and additional information.



"I/O Setup" "Relays" Web Page

BROADCAST tools I/O Sentinel® 4 — I/O Setup

NAVIGATION
- About
- Monitor/Control
- User Setup
- I/O Setup
- Email/Network Setup
- Show Alarms
- Help
- Logout

Relays
Relay 1

Relay Label
Relay 1

Enable Extension

Alarms
On
Off
Log Device

Email Addresses
1 2 3 4 5 6 7 8

Scheduler

Enable Scheduler

Su M T W Th F Sa

Alarms disabled between Start/End hours

Start Hour 0 — Start Minute 0
End Hour 0 — End Minute 0

Save Settings

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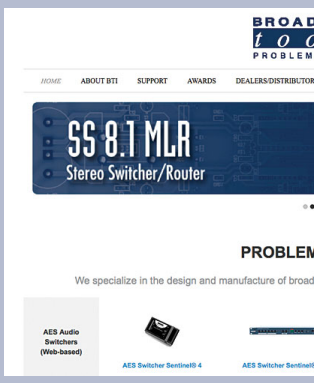

"I/O Setup" "Relays" Web Page (cont.)

Selection drop-down: Allows the user to select the I/O setup configuration pages.

Relay label: Used to identify the device.

Alarms OFF: This option enables email alarms with an "OFF" relay.

Email Addresses: The "OFF" boxes labeled 1 thru 8 allow the user to enable up to eight different email addresses for off alarms.

Alarms ON: This option enables email alarms with an "ON" relay.

Email Addresses: The "ON" boxes labeled 1 thru 8 allow the user to enable up to eight different email addresses for on alarms.

Log Device: This enables the email snapshot logging of the relay status.

Scheduler: When enabled, the user may set each relay alarm to be disabled or enabled by configuring the required day(s) of week and the start and end hours and minutes.

Enable Extension: This box must be checked when paired with a second I/O Sentinel® 4 G2 to form a "4 Channel Bi-directional Status/Relay Extension Cord." Normally disabled.

NOTE: Press the "Save Settings" button to save your changes.

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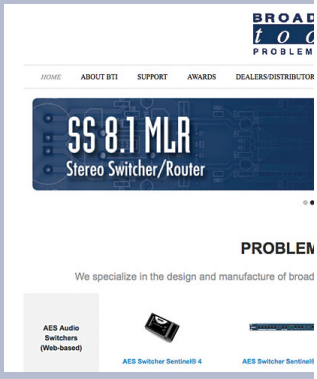

"Email/Network Setup" Web Page

BROADCAST tools I/O Sentinel® 4 — Email / Network Setup

NAVIGATION
- About
- Monitor/Control
- User Setup
- I/O Setup
- Email/Network Setup
- Show Alarms
- Help
- Logout

Device Address	192 . 168 . 111 . 55
Device Netmask	255 . 255 . 255 . 0
Gateway Address	192 . 168 . 111 . 1
DNS Server Address	192 . 168 . 1 . 1
HTTP Port	80
SMTP Server Address	
SMTP Port	25
SMTP Return Address	
SMTP Host ID	
SMTP Authentication	☐
SMTP Username	
SMTP Password	☐ show password
Logging Email Address	
Logging Email Snapshot Interval (Hours)	0
Logging Email Update Interval (Hours)	0
Email Alarms	☑ Immediatly ☐ Daily
Daily Alarm Email Time (Hour)	0
Recipient Addresses	1 2 3 4 5 6 7 8
SNMP Manager IP Address	192 . 168 . 1 . 170
SNMP Manager Trap Port	162
SNMP Read Community	public
SNMP Write Community	private
SNMP Enable Traps	☐
TCP Relay Enabled	☐
Relay Peer IP Address	0 . 0 . 0 . 0
Relay Peer Port	0
Relay Receive Port	0
NTP Server Address	pool.ntp.org
NTP Port	123
NTP Update Interval (Minutes)	30
NTP Enabled	☑
Site ID	SITE_ID
Monitor Refresh Time	1 Seconds
MTU Size	1400
Time Zone Offset from UTC	-8.0 hours
Enable Encryption with Relay	☐
Encryption Key (16 hex bytes)	0000000000000000000
Enable Event Logging	☐ Login ☐ Email ☐ Reboot ☐ Alarms Cleared

Save Settings | Reboot Device
Send Test E-mail | Reload Defaults
Clear Daily Logs | Send Daily Logs

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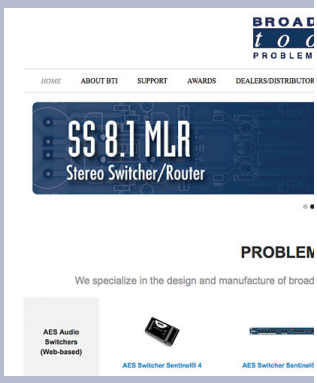

"Email/Network Setup" Web Page – Device Network Settings

Device Address:	Enter a static IP address here.	Default: 192.168.1.55
Device Netmask:	Enter the Netmask here:	Default: 255.255.255.0
Gateway Address:	Enter the Gateway IP here:	Default: 192.168.1.1
DNS Server IP Address:	Enter your DNS address here.	Default: 8.8.8.8
HTTP Port:	Normally Port 80	Default: 80

"Email/Network Setup" Web Page – SMTP Settings

SMTP Server Address:	SMTP (Simple Mail Transfer Protocol) server address. Used to send emails.	
SMTP Port:	Normally Port 25, 587 or 2525.	Default: 25
SMTP Return Address:	Enter your return email address here. Emails from the I/O Sentinel 4 G2 will indicate they are from this address. If an email cannot be delivered, a message stating why will be sent to this address.	
SMTP Host ID:	No spaces or special characters allowed.	
SMTP Authentication:	When checked, Base64 SMTP authentication used. SSL/TLS secure authentication required by Gmail/Outlook is not supported.	
SMTP Username:	Enter SMTP server username here.	
SMTP Password:	Enter SMTP server password here.	

NOTE: Required for successful email: SMTP Server Address, SMTP Port, SMTP Return Address, SMTP Host ID. If the SMTP server requires authentication: SMTP username and SMTP password must be supplied, and authentication turned on. A valid email address must be entered into Recipient Address field #1.

WEBSITE:
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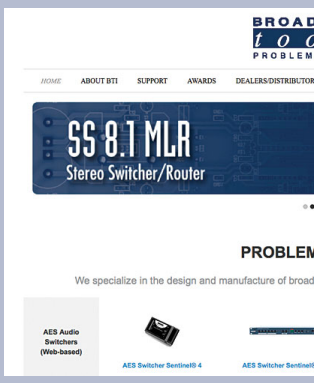


"Email/Network Setup" Web Page – Email Logging Settings

Logging Email Address: Email address for the "Logging" email recipient (may be different from the 8 "Alarm" Recipient Addresses. Logging emails and Daily emails are sent to this address only.

Logging Email Snapshot Interval: The period in hours that a snapshot is taken of the system. The logging email is not sent on this interval.

Logging Email Update Interval: The period in hours that snapshots are emailed. This email may contain multiple snapshots if the Snapshot Interval is less than the Update Interval. Each snapshot will be identified by the date and time.

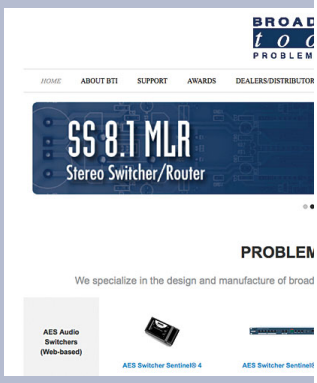
"Email/Network Setup" Web Page – Email Alarm Settings

Email Alarms: Choose Immediate and/or Daily. If Immediate is selected, then an email will be sent out as soon as an alarm is generated. If Daily is selected, then each alarm is queued and emailed as a digest every 24 hours. Both can be used at the same time. The number of queued alarms is displayed on the Monitor/Control page.

Daily Alarm Email Time: The hour of the day that queued alarms are sent. Queued alarms are sent to the Logging Email Address only.

"Alarm" Recipient Address: Email addresses for up to 8 addresses. These addresses correlate to the 8 email addresses selectable on the I/O Setup page.

WEBSITE:
Visit our web site for product updates and additional information.



"Email/Network Setup" Web Page – SNMP Manager Settings

SNMP Enable: Enables or disables SNMP functionality, enabled by default.

SNMP Enable Traps: When enabled, SNMP trap messages will be sent. When disabled, no trap messages will be sent to the manager IP.

SNMP Trap IP Address: This is the IP address of the SNMP manager. The system will send traps to UDP port 162 at this IP address.

SNMP Read Community: This is the community name used for Read-Only access.

SNMP Write Community: This is the community name used for Read-Write access.

NOTE: A cold-start trap will be sent when the unit boots up if the SNMP Enable Traps are enabled and trap messages will be sent when a device enters or exits an alarm condition, depending on whether or not alarms are enabled.

"Email/Network Setup" Web Page – TCP Relay (Relay Extension Cord)

TCP Relay Enable: Check to pair with a second I/O Sentinel® 4 G2 to form a relay "extension cord".

Relay Peer IP address: Enter the IP address of the second I/O Sentinel® 4 G2.

Relay Peer Port: Enter the port number configured as the receive port on the second I/O Sentinel® 4 G2. Example: 8002

Relay Receive Port: Enter the port number at which the unit will receive TCP relay commands. Example: 8001

Two different ports must be used, one for the Peer port and one for the Receive port. For example, if you set the Peer port to 8002 and the Receive port to 8001 on Unit #1 you must set the Peer port to 8001 and the Receive port to 8002 on Unit #2.

"Email/Network Setup" Web Page – NTP Settings

NTP Enabled: Enable for NTP network time sync. Default: Enabled
NTP (Time) Server Address: Enter the NTP address here. Default: pool.ntp.org
NTP Port: Port used to connect to NTP server. Default: 123
NTP Update Interval (Min): Interval between time updates. Default: 30

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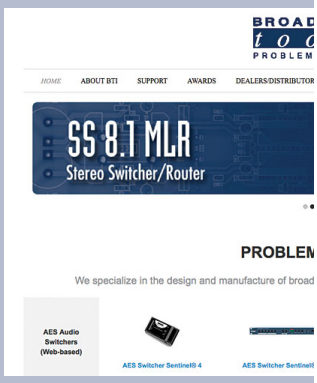

"Email/Network Setup" Web Page – Other Settings

Site ID: This is the Site Identifier that is displayed on the web and in email.

Monitor Refresh Time (Sec): Interval at which the Monitor page refreshes. Shorter times may increase network traffic. Default: 1

MTU Size: Sets the network interface's Maximum Transmittable Unit. 1400 by default. If a VPN is being used this may need to be reduced to 1296 to account for added overhead.

Time Zone Offset from UTC: Sets the time zone used for the internal clock. Default: -8

Enable Encryption with Relay: When two I/O Sentinels are setup to operate in pair mode (relay extension cord), the communication can be encrypted.
When encryption is enabled both devices must use the same 16 hex byte encryption key.

Encryption Key (16 hex bytes): 32 characters are required, inserting 0 where required (i.e. 0xA would be entered as 0A). The checkbox "Enable Encryption" must also be checked. It is important to verify that both devices are configured properly to operate as an extension before enabling encryption.

Enable Event Logging: Event logging will generate an alarm, but it will not send an email. If the system is configured for Daily Alarm emails, then that Daily Alarm email will contain the event logging alarms as well as the alarms configured on the I/O Setup page.

Login: When someone logs into the unit, the username and date/time will be logged in the alarm log.

Email: When an email is sent, the type of email and date/time will be logged in the alarm log.

Reboot: When the device boots the date/time will be logged in the alarm log.

Alarms Cleared: When the Daily Logs or Normal Alarms are cleared, the type of log cleared and date/time will be stored. When Daily Logs are sent, the Daily Logs are also cleared; this will cause an event log as well.

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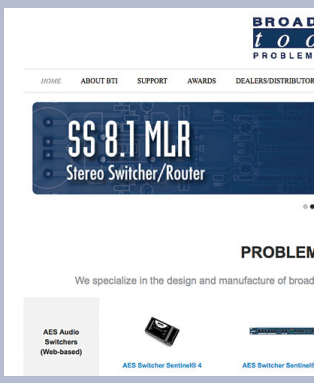

"Email/Network Setup" Web Page – Controls

Save Settings: After pressing the "Save Settings" button, the device will reboot (If you changed the IP address, you must navigate your web browser to the new IP address (if the HTTP port was changed from port 80, be sure to add the new port number after the IP: xxx.xxx.xxx.xxx:port #). If you didn't change the IP address, then you will be returned to the login screen after the device reboots.

Reboot Device: When you press the "Reboot Device" button, the internal web server restarts.

Send Test Email: Press this button to send a test email to recipient address #1.

NOTE: After you are done making changes to the Email/Network Setup page, you MUST press the "Save Settings" button to save your changes.

Reload Defaults: When you press the "Reload Defaults" button, the device resets to factory default settings.

Clear Daily Logs: When you press the "Clear Daily Logs" button, the daily logs stored in memory will be cleared. Keep in mind that if the Alarms Cleared Event is enabled, this event will post after the logs are cleared.

Send Daily Logs: When you press the "Send Daily Logs" button, the system will send the daily logs email and clear the log queue.

WEBSITE:
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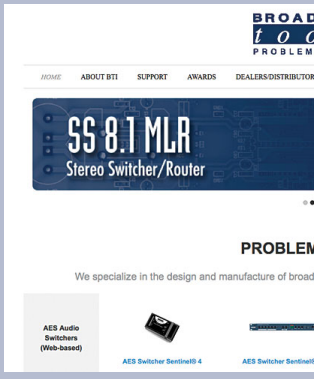
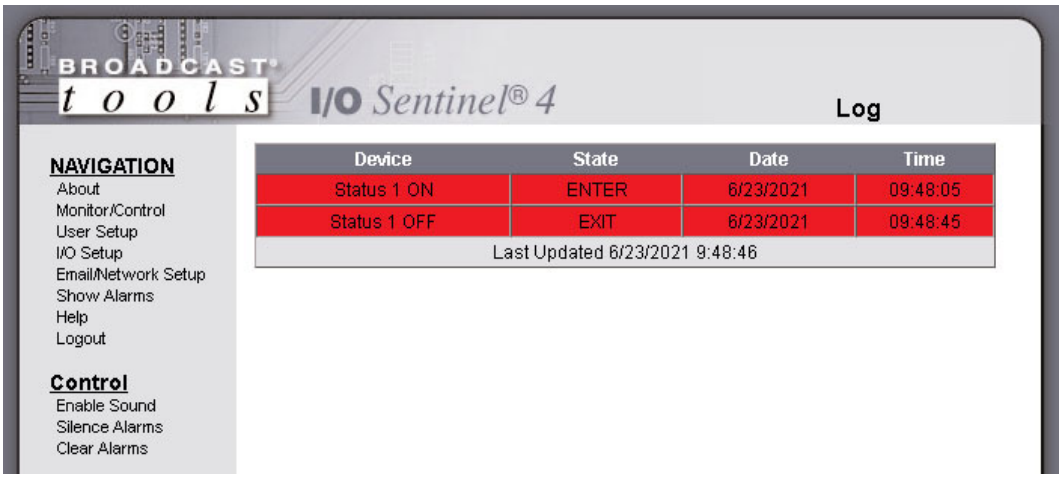


"Show Alarms" Web Page



This page displays current alarms.

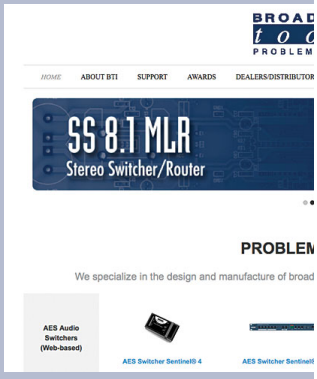
Controls

Disable Sound: Mutes the alarms sound.

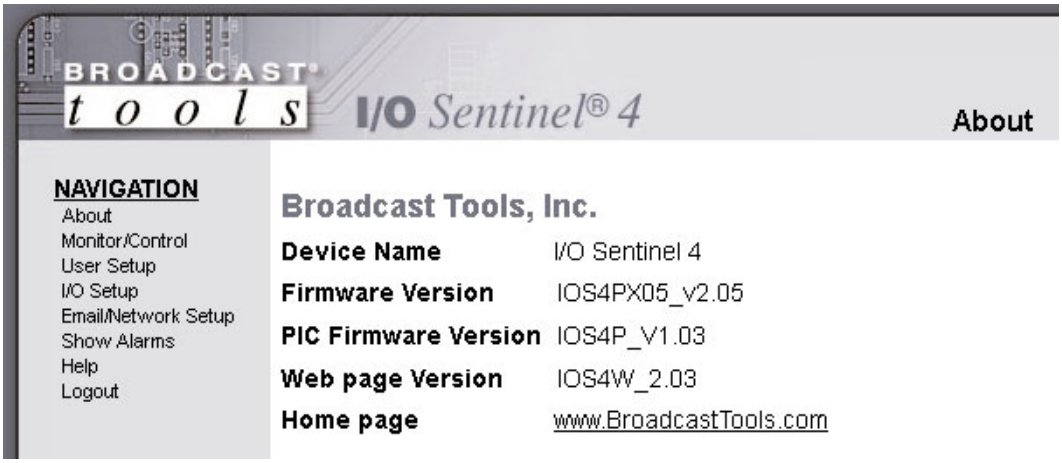
Silence Alarms: Makes active alarms as acknowledged.

Clear Alarms: Empties the Alarm Log.

WEBSITE:
Visit our web site for product updates and additional information.



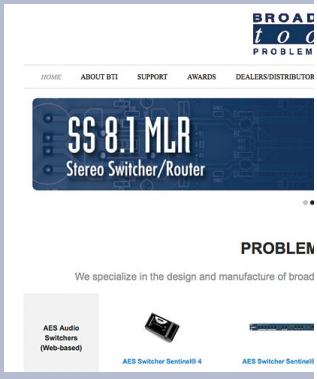
"About" Web Page



The "About" web page displays the product name, firmware version numbers, and Broadcast Tools® web site link. For firmware updates please contact Broadcast Tools® Technical Support.

http://broadcasttools.com/support/

WEBSITE:
Visit our web site for product updates and additional information.



Specifications

Ethernet Interface:	RJ-45, 10base-T or 100base-TX, auto sensing with link & activity LED indicators - Full/half duplex.
Protocols:	TCP/IP, UDP/IP, ARP, ICMP, SNMP, DHCP, HTTP, SMTP.
Status/GPI Inputs:	(4) Optically isolated (5 to 24 VDC, or 25-48 VDC via an external resistor) wet or dry inputs. Default = Dry (5 volt internally sourced). With front panel LED indicators.
Relay/GPO Outputs:	(4) SPDT relays, 30 VDC @ 1 Amp maximum rating. With front panel LED indicators.
Connectors:	(4) Removable euro-block screw terminals. Mating plugs supplied.
Required power supply:	9 to 12 VDC only, greater than 500 mA. 2.1mm ID x 5.5mm OD coaxial connector, center positive, surge protected. Universal switching power supply with domestic connector supplied. International power supply optional.
Size:	6 x 5.25 x 1.63 in (W x L x H)
Weight:	3.0 lb.
Options:	RA-1 Rack Shelf – 1 RU. Accommodates up to 3 units, filler panels supplied.

Note: Velcro is supplied to secure the product to the RA-1 shelf.

CAUTION!

For safety, never connect 120 Vac circuits to the above relays!

WEBSITE:

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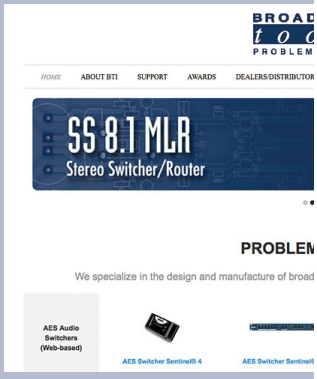

e-mail: support@broadcasttools.com **voice:** 360.854.9559 **fax:** 866.783.1742

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EXCLUSIVE REMEDIES

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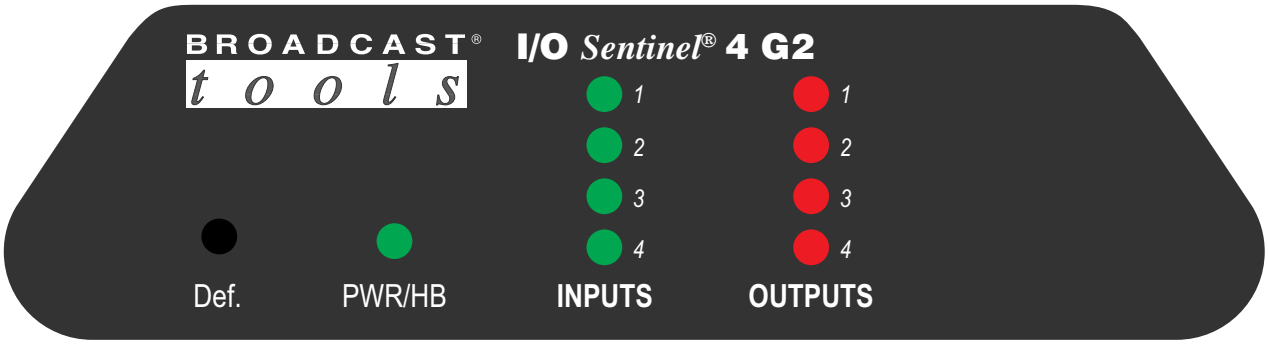
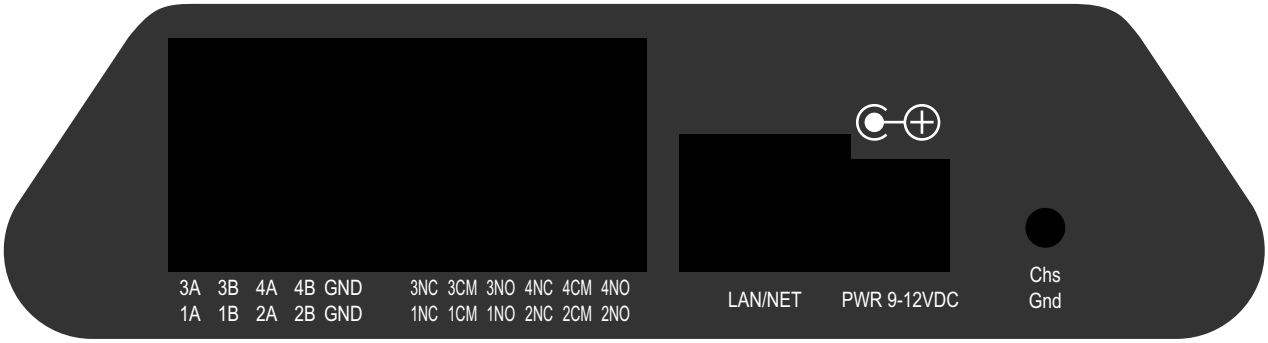
www.broadcasttools.com **website**





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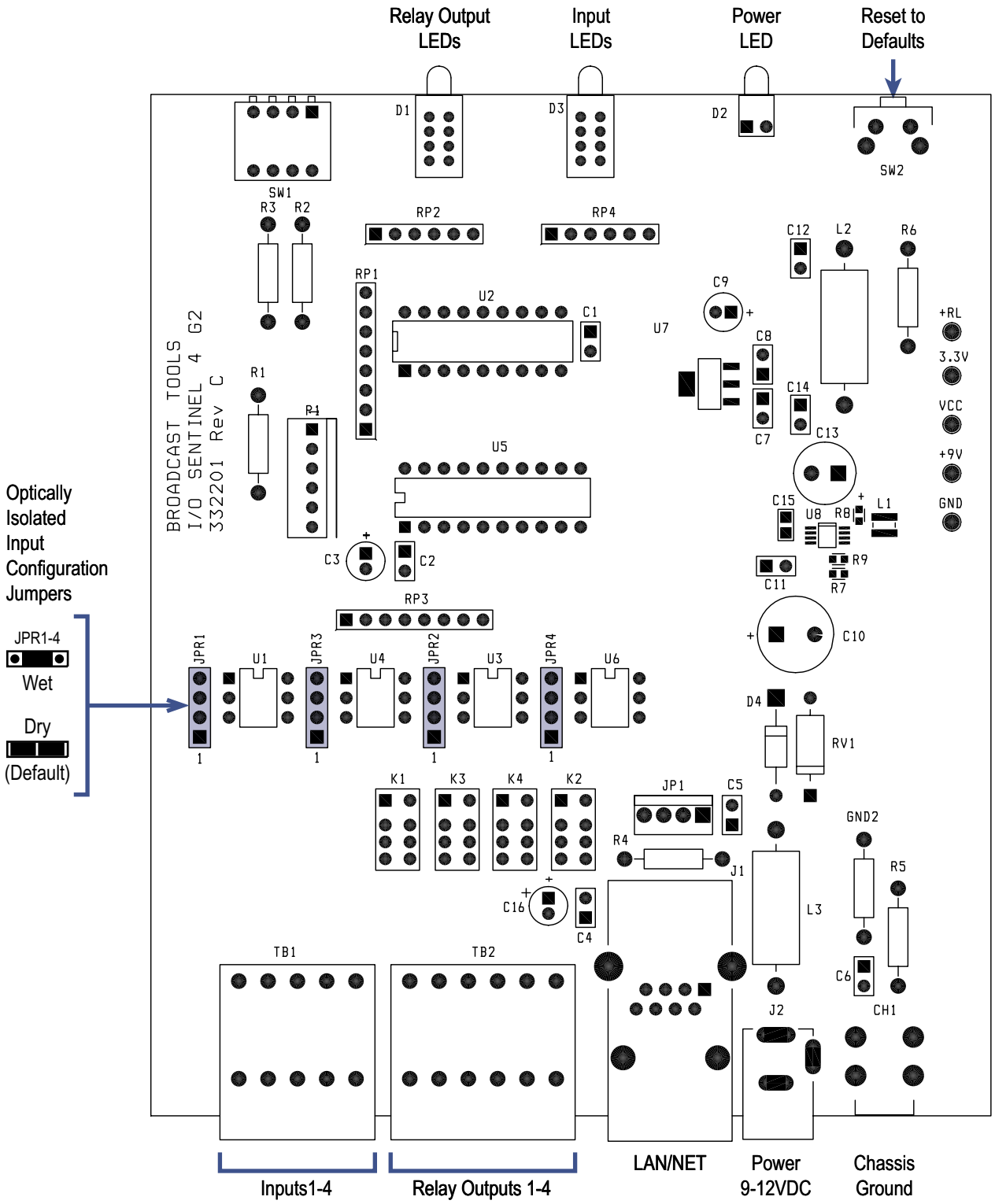
Component Layout



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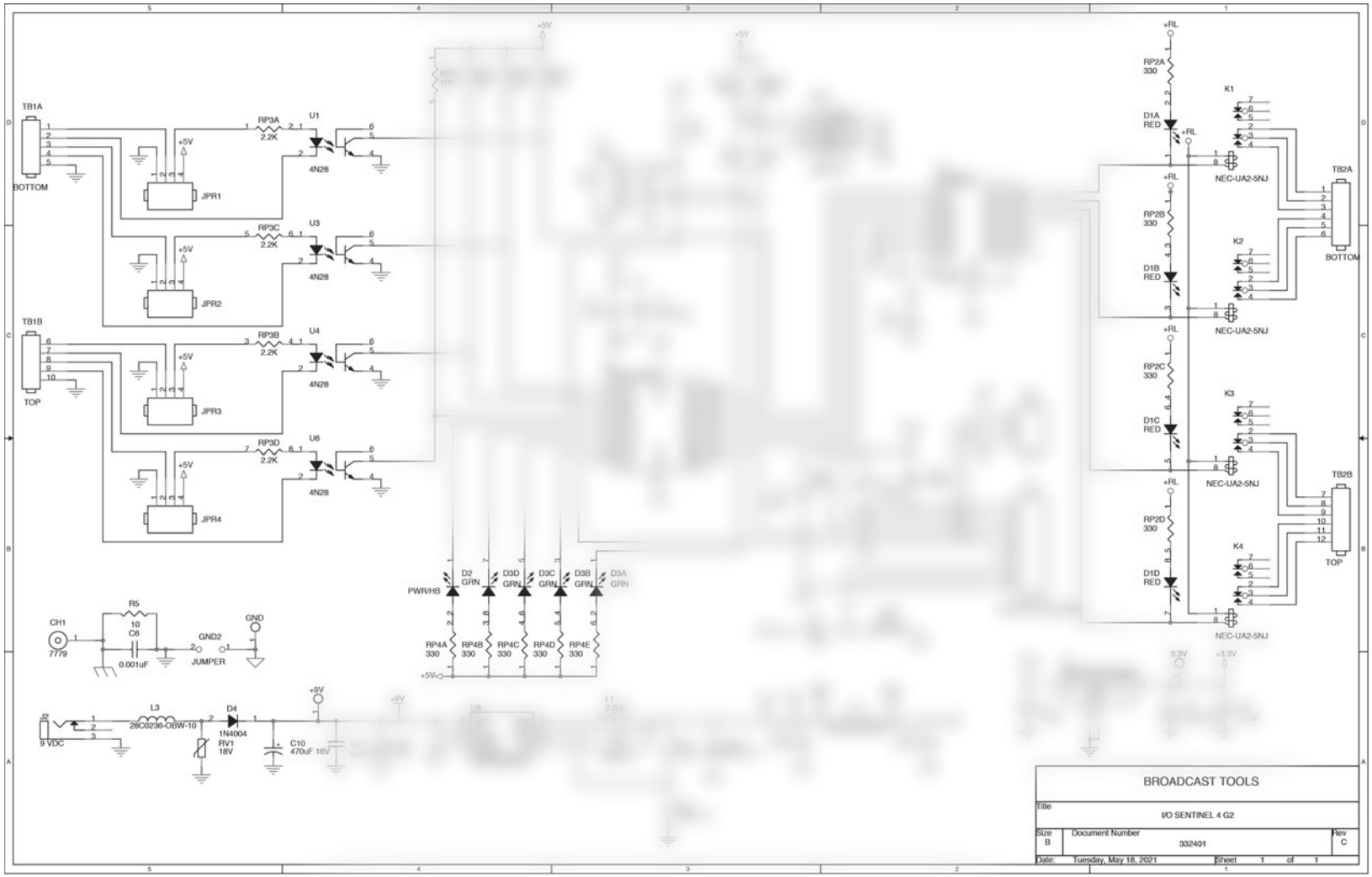
Fractional Schematic



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Broadcast Tools TCP Relay Interface

The I/O Sentinel 4 G2 supports the monitoring of status inputs and control of relay outputs via TCP byte streams. Under Email/Network Setup, the following settings must be configured:

Setting	Description
TCP Relay Enabled	Enables relay querying and control
Relay Peer IP Address	The IP address of the external control computer. The device will only respond to requests from devices at this IP address.
Relay Peer Port	The TCP Port on the external control computer to which the device should send input status changes.
Relay Receive Port	The TCP Port for which the current device will be receiving query and control commands.

Input Status:

Input status can be queried from supported Broadcast Tools input devices. To do this, open a TCP socket on the peer device's *Relay Receive Port* and send a TCP Relay Command as described in the table below. The device will respond with a query command response packet and close the TCP connection. The response packet is formatted as a TCP_CMD_SET_RELAY command (described above in the **Relay Control** section). The relay number/state fields of the response will indicate the status of the inputs on the given device.

Byte	Description	Value
0	TCP_CMD_GET_STAT – The command ID for *Get Status*	0x01

Relay Control:

Relays can be turned on or off by opening a TCP socket on the peer device's *Relay Receive Port* and sending a series of bytes outlined in the table below. The device will configure the relays and close the TCP connection.

Byte	Description	Value
0	TCP_CMD_SET_RELAY – The command ID for *Set Relays.*	0x02
1	CMD_LENGTH – The number of relay state pairs to be set	$L = n * 2$, where L is the length field's value, and n is the number of relays to be configured
2	RELAY_NUMBER – The zero-indexed number	0x00 for Relay 0,

	of the relay who's state should be set to the state specified in the byte below	0x01 for Relay 1,etc.
3	RELAY_STATE – The new state of the relay indicated above.	0x00 for ACTIVE, 0x01 for NOT ACTIVE
...		
n	*Relay n should be set...*	
n+1	*Relay n's state...*	

Command Encryption:

TCP Relay commands and query responses can be encrypted using 128-bit AES encryption. The device must be configured under the Email/Network Setup page by checking the box for *Enable Encryption with Relay* and entering a 32-character encryption key in *Encryption Key (16 hex bytes)* field.

To **send encrypted relay control commands** from an external computer, you must first encrypt the command byte, then encrypt the length byte, each individually. The remaining bytes of the command pairs are then encrypted together as a block.

Byte	Description	Encryption Group
0	TCP_CMD_SET_RELAY – The command ID for *Set Relays.*	1
1	CMD_LENGTH – The number of relay state pairs to be set	2
2	RELAY_NUMBER – The zero-indexed number of the relay who's state should be set to the state specified in the byte below	3
3	RELAY_STATE – The new state of the relay indicated above.	
...		
n	*Relay n should be set...*	
n + 1	*Relay n's state...*	

To **send encrypted input query commands** from an external computer, apply the encryption to the single byte query command before sending, and decrypt the query command response packet as describe below.

To **decrypt query command response packets** from a supported Broadcast Tools device, always decrypt the first byte to determine the information present in the packet. If after decryption the command field of the packet has a value of 0x02 (i.e. TCP_CMD_SET_RELAY), the next byte should be the length field. Decrypt this byte to determine the number of bytes in the input number/status pairs. Once the correct number of bytes for the input number/status pairs has been received, they may be decrypted as a block.

Broadcast Tools HTTP/CGI Interface

To communicate with a Broadcast Tools Sentinel Product using the HTTP protocol, the following steps must be performed:

Login and Authentication

All products require authorization before data can be sent/retrieved from the device. Authentication is performed by POSTing the following data to 'cgi-bin/postauth.cgi'

LoginUser=<username>

LoginPass=<password>

AccessVal=0

For Example: LoginUser=admin&LoginPass=1234&AccessVal=0

The reply to the authentication POST will provide you with a session cookie, this cookie must be sent in all future HTTP GET or POST requests, failure to do so will result in 401 error code.

Getting Data

Data is retrieved from the Broadcast Tools Sentinel device by use of the HTTP GET protocol, you must have already been successfully authenticated and provided a cookie, this cookie must be transmitted in the header of each GET request. All data returned from a valid GET request is in JSON format and varies between the devices depending on what features they support. The following are standard files.

cgi-bin/getexchanger.cgi -- Basic device configuration, Site ID, Network Settings, etc. This is data that does not change often, unless POST'ed by the user

cgi-bin/getexchanger_monitor.cgi -- Basic monitoring status, this contains data that reflects the inputs the device is monitoring

cgi-bin/getexchanger_user.cgi -- Contains user login credentials, must have administrative rights to retrieve this file

cgi-bin/getexchanger_logs.cgi -- contains log details

Posting Data

Data is modified on the Broadcast Tools Sentinel device by the use of the HTTP POST protocol, you must have already been successfully authenticated and provided a cookie, this cookie must be transmitted in the header of each POST request. In addition, to change typical settings you must have access of Monitor/Control or Administrative rights. To change user credentials you must have Administrative rights.

All data is sent as a normal POST (key=value&key=value) format to 'cgi-bin/postexchanger.cgi'.

The data posted varies by the device, however most data from getexchanger.cgi can be posted.

Device Specific Features

Every Broadcast Tools Sentinel device has different features that are specific to the operation of the device. Due to the number of Broadcast Tools Sentinel devices the specific features of each are not documented and are subject to change between releases.

To determine the proper KEY=VALUE paring for specific BTI Sentinel devices the use of Firefox FireBug or the built-in debugger in Chrome can be used to see how the web pages communicate with the device.
Note that all out-of-range POSTed values are silently ignored since it is expected that the web pages will perform input validation. If an out-of-range value is POSTed, no change to the value will take place and no error will be given.