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**tiny TOOLS<sup>™</sup>** INC.  
**PROBLEM SOLVED**

## *Installation and Operation Manual*



### **GPIO-32+2**

## ***32 input USB General Purpose Interface with two SPDT relays***

Manual update: 05/07/2013

Firmware Version 1.01 and above

If you need a firmware upgrade, contact Broadcast Tools<sup>®</sup>

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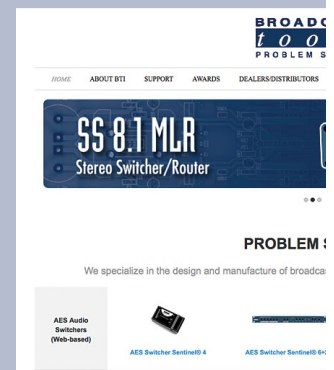
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## INTRODUCTION

Thank you for your purchase of a BROADCAST TOOLS® GPIO-32+2, thirty-two input USB General Purpose Interface with two SPDT relays (referred to as the GPIO-32+2 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® GPIO-32+2.

## SAFETY INFORMATION

Only qualified technical personnel should install the GPIO-32+2. 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 GPIO-32+2 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 GPIO-32+2. Broadcast Tools, Inc., is unable to support NON-Broadcast Tools software, hardware or NON-Broadcast Tools computer/hardware/software problems. If you experience these problems, please research your hardware/software instruction manuals or contact the manufacturers technical support department.

## 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  
Voice: 360.854.9559  
Fax: 866.783.1742

Internet Home Page: [www.broadcasttools.com](http://www.broadcasttools.com)  
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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.

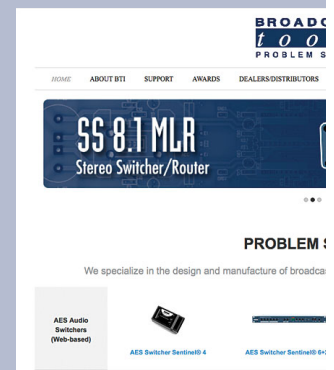


### **NOTE:**

This manual should be read thoroughly before installation and operation.

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## INTRODUCTION

### Product Overview

The GPIO-32+2 interfaces 32 general purpose logic inputs and the control of two independent SPDT relays to the user's PC USB port. The GPIO-32+2 conforms to the PIP serial format which is used on most of our audio switchers and supported by most of the radio automation software suppliers. Additional features include; Plug-in euroblock screw terminals; 36 LED indicators for power, PIP activity, relays K1, K2 and each of the 32 GPI inputs. By utilizing the 32 GPI inputs and the two relays, up to 96 GPI's may be monitored. The GPIO-32+2 is supplied with a USB type A/B cable and 9.0 VDC universal domestic wall power supply. The unit is internally surge protected. Up to four GPIO-32+2's may be rack mounted on one RA-1, 1-RU rack shelf.

### Features/Benefits

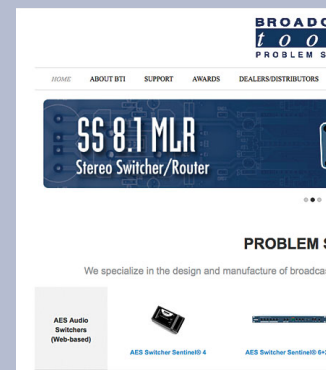
- Two user selectable unit ID's: 0, 1 (polling required.)
- Two user selectable baud rates: 9600, and 38400.
- PIP serial protocol.
- USB interface for connection to PC.
- LED indicators for all 32 inputs, K1, K2, power, PIP/GPI.
- All connections except for the USB type B connector and a coaxial DC jack are on removable euro-block screw terminal connectors to simplify wiring and service, mating plugs are supplied.
- Fully RFI proofed.
- Surge protected internal power supply, universal switching power adapter with domestic connectors supplied.
- Up to four GPIO-32+2's may be rack mounted on one RA-1, 1-RU rack shelf.

### Inspection

Please examine your GPIO-32+2 carefully for any damage that may have been sustained during shipping. If any damage is present, please notify the shipper immediately and retain the packaging for inspection by the shipper. The package should contain the GPIO-32+2, a USB type A/B cable and 9.0 VDC universal wall power supply with domestic connector. Manuals may be downloaded from our web site.

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## Installation

### Surge Protection

The GPIO-32+2 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 GPIO-32+2 and connected equipment if it is not properly protected. For lightning protection devices, check out [www.polyphaser.com](http://www.polyphaser.com) and [www.itwlinx.com](http://www.itwlinx.com).

### UPS Standby Power System

We recommend that you connect your GPIO-32+2 to a UPS system. A UPS helps minimize the risk to the GPIO-32+2 and provides power during a power outage.

### Power

2.1mm coaxial DC power jack, 7.5 - 12 VDC, center positive.

### USB Port

This type B USB port is used to connect the GPIO-32+2 to a computer

### LED indicators

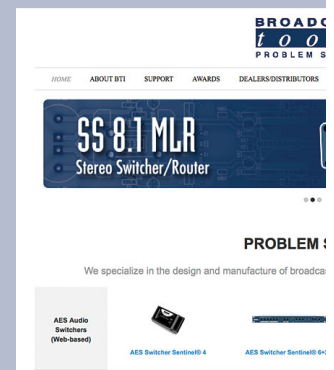
- “PWR” LED: Pulses to indicate normal operation.
- “PIP” LED: Flashes to indicate PIP activity.
- “GPI” LEDs: Indicates individual GPI input activity, 1-32.
- “K1” “K2” LEDs: Indicates K1 and K2 relay state.

### Relays

The K1 and K2 SPDT relay connections are via two 3-positions plug-in euroblock screw terminals. The K1 GD/CM terminal is also a GPI input ground terminal, the K2 CM terminal can be switched between ground and floating via DIP-switch and is set to ground from the factory.

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### **GPI Inputs**

The 32 general purpose inputs may be activated by either pulling the input to ground or releasing the input to a high state. A valid input must be 15ms in duration or greater. External sources can be contact closures, open collectors or 5 to 24 volt logic level sources. The impedance of each input is 22K ohms.

Input connections are via two 16-position plug-in euroblock screw terminals labeled “GPI Inputs” 1 thru 32. The K1 GD/CM terminal is the a GPI input ground terminal, the K2 CM terminal can also be switched between ground and floating via DIP-switch and is set to ground from the factory. See the “Configuration DIP-switch Setup” section of this manual for more information.

To install, remove the plug from the header, strip 1/8” of insulation from the wire. Insert the wire in to the desired terminal and tighten the set screw. When finished, reinsert the plug into the header.

Up to 96 GPIs may be monitored by using the GPIO-32+2’s to SPDT relays control the GPI ground connection to the devices being monitored. See the appendix for an Application Example diagram.

**NOTE: All connections and indicators are noted on the top cover label.**

### **Configuration DIP-switch Setup**

The configuration DIP-switch package (SW1) is located on GPIO-32+2’s printed circuit board.

SW1-1	Unit ID
OFF =	0                      NON-Polling (default)
ON =	1                      Polling is required
SW1-2	Baud rate
OFF =	9600 (default)
ON =	38400
SW1-3	Invert status send and poll bits
OFF =	Commands *uSPii & *uSPA data is displayed as normal (default)
ON =	Commands *uSPii & *uSPA data sense is inverted in all cases
SW1-4	Unused
SW1-5	K2 common floating/ground
OFF =	K2, common (wiper) floating
ON =	K2, common (wiper) grounded (default)
SW1-6	Unused





**\*uORrF** - Unlatch output relay “r”

**Command Example:** \*0OR1F No carriage return or line feed required.  
Commands are NOT case sensitive.

**\*uORrP** - Pulse output relay “r”

**Command Example:** \*0OR1P No carriage return or line feed required.  
Commands are NOT case sensitive.

**\*uU** - Send Unit Information :<product name(GPIO-32+2)><version n.nn><cr><lf>

**Command example:** \*0U No carriage return or line feed required. Commands are NOT case sensitive.

**Response Example:** GPIO-32+2\_1.01<cr><lf>

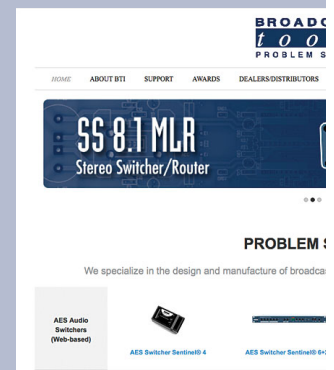


## SPECIFICATIONS

GPI Inputs:	The 32 general purpose inputs may be activated either by pulling the input to ground or releasing the input to a high state. A valid input must be greater than 15ms in duration. External sources can be contact closures, open collectors or 5 to 24 volt logic level sources. Input impedance is 22K ohms (contact current per input 0.250 ma at 5 volts DC).
Input Interfacing	Two 16-position plug-in euroblock screw terminals. Plugs supplied.
Relays:	Two SPDT relays with two three-position plug-in screw terminals. K1 common grounded, K2 common switchable between floating and ground.
GPI Indicators:	32 LED's indicating when an input is on or off. When the LED is illuminated, the input is grounded.
USB Serial Port	USB Type B jack. FTDI Virtual Com Port chipset, 9600, or 38400 baud, 8 data bits, no parity, 1 stop bit. Handshaking disabled.
Logic	Flash Microprocessor w/non-volatile memory
Power	7.5-12 VDC, 2.1mm coaxial power jack, universal switching power adapter with domestic connectors supplied. International connectors optional.
Power Indicator	Green LED, indicator will blink indicating proper operation.
Mechanical	6.10" x 3.75" x 1.60" (DWH)
Weight	2 pounds
Options	RA-1, 1-RU rack shelf. Up to four units may be accommodated.

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The term “Buyer” as used in this document refers to and includes both (but only) (a) any person or entity who acquires such an item for the purpose of resale to others (i.e., a dealer or distributor of an item), and (b) the first person or entity who acquires such an item for such person’s or entity’s own use.

Broadcast Tools warrants to each Buyer of any item manufactured by Broadcast Tools that the item will be free from defects in materials and workmanship at the time it is shipped by Broadcast Tools if the item is properly installed, used and maintained.

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If Broadcast Tools is notified, in writing, of a failure of any item manufactured by Broadcast Tools to conform to the foregoing Limited Warranty within one (1) year following the date of the Buyer’s acquisition of the item, and if the item is returned to Broadcast Tools in accordance with Broadcast Tools’ instructions for confirmation by inspection of the defect (which at Broadcast Tools’ election may include, without limitation, a requirement that the Buyer first obtain a Return Authorization number from Broadcast Tools, that the Buyer furnish proof of purchase in the form of an invoice and/or receipt, and that the Buyer prepay all freight charges associated with any return of the item to Broadcast Tools using such freight service as Broadcast Tools reasonably may specify), Broadcast Tools will repair or replace the defective item, or will refund the purchase price paid by the Buyer for the item. Broadcast Tools shall have the exclusive right to choose between these alternative remedies.

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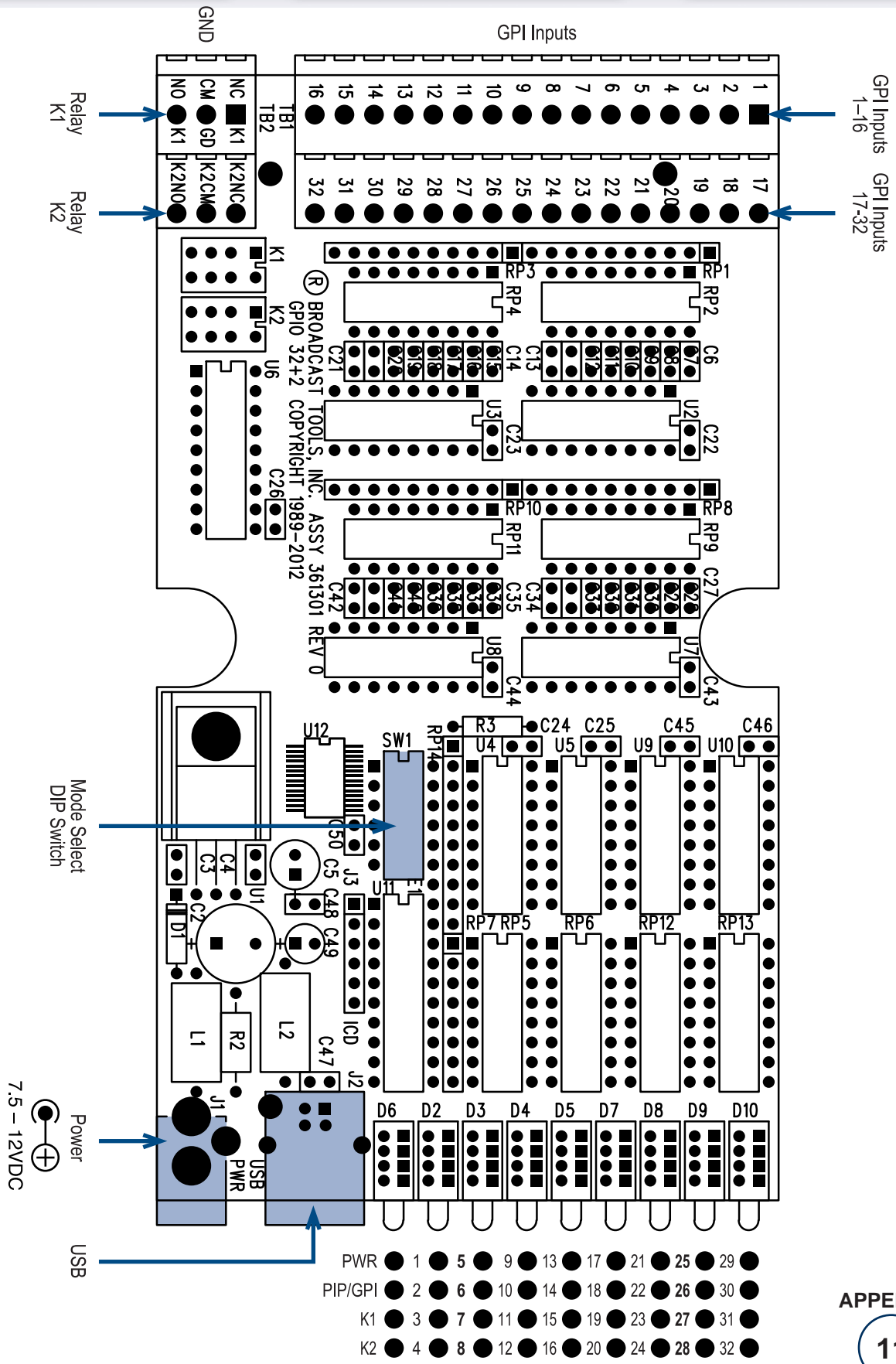
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# Broadcast Tools® GPIO-32+2

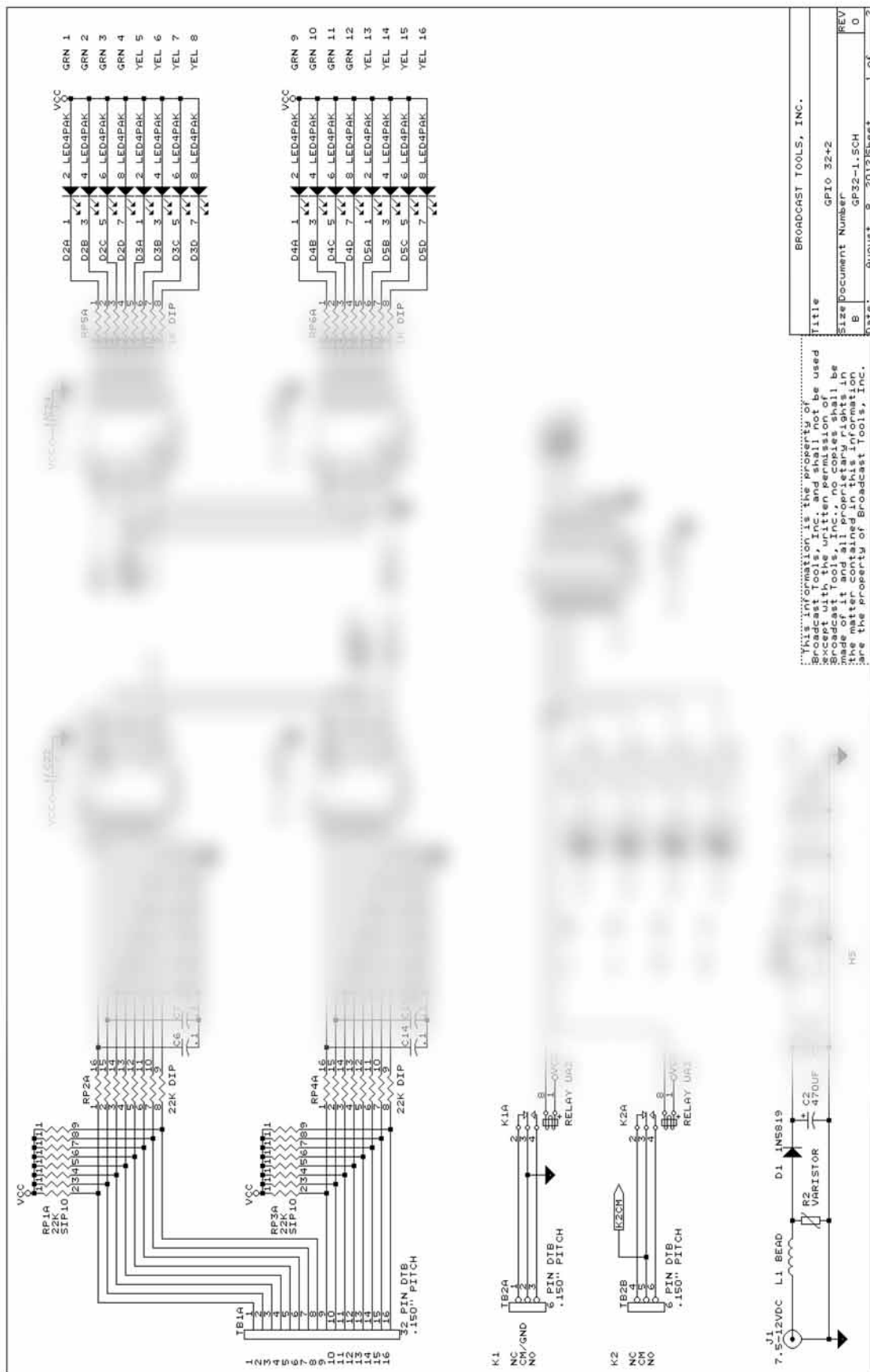
## Connector, DIP Switch and Indicator Layout



**Product Label**



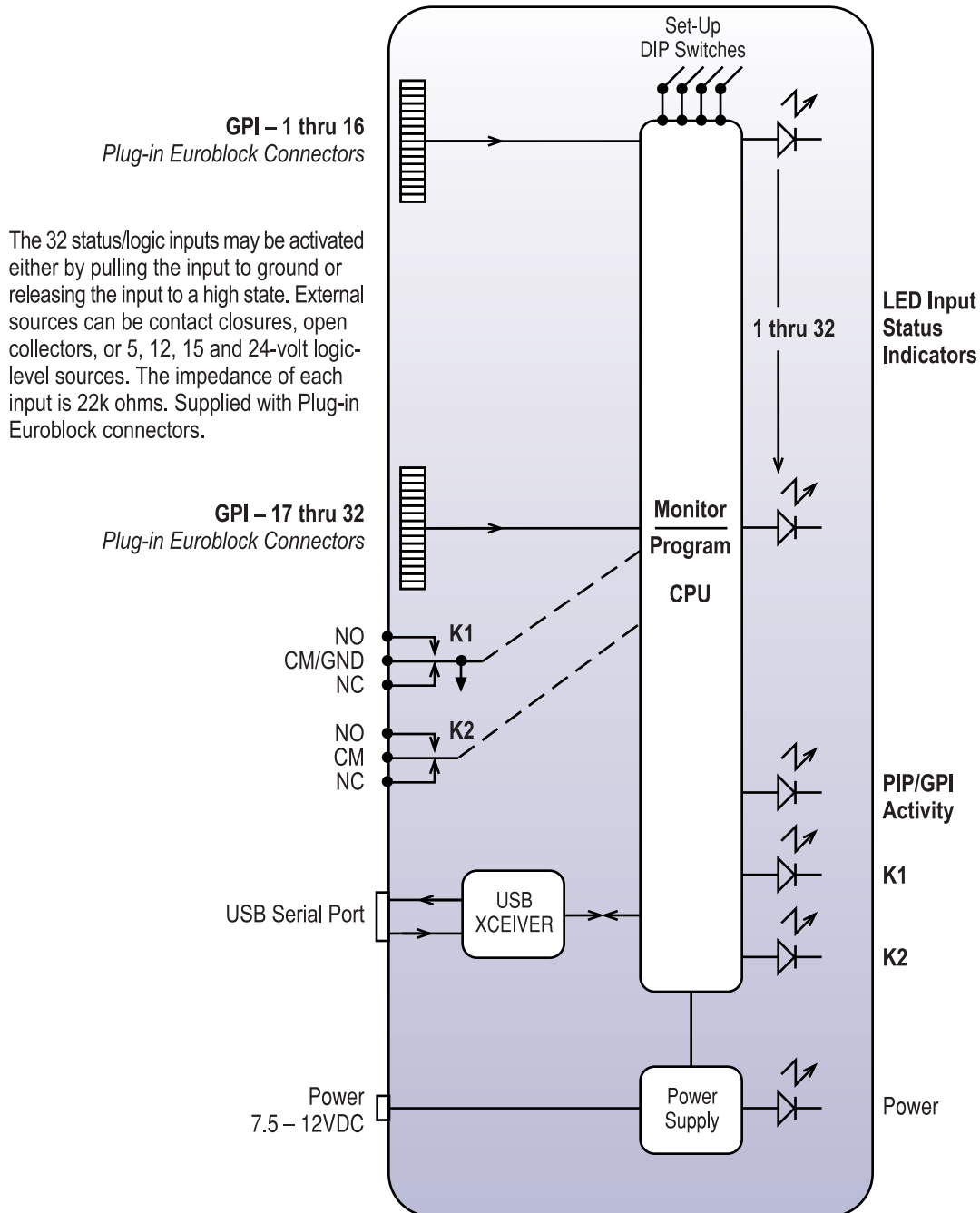
## Fractional Schematic



## Fractional Schematic



### Functional Diagram



### Monitoring 96 Satellite Receiver Relay Contact Closures with 32 GPI's

