

CIRCUITWERKES
Makers of Innovative Electronics

**Operation &
Technical Manual**

**WAM-2
Web Based Remote Audio Monitor &
Controller**

Firmware Version 1.5.4
Revised 04/23/2014

Hardware Version 1
Manual Rev 1.0

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NOTE: This technical manual & information presented within is subject to change.

Contacting CircuitWerkes

For help with setting up or operating the WAM-2, please contact us at the following:

Phone: 352-335-6555

E-mail: info@circuitwerkes.com

website: www.circuitwerkes.com

Unpacking your WAM-2

Note: CircuitWerkes is not responsible for product damage during shipment. Inspect your shipment carefully for external signs of damage. CircuitWerkes suggests that you unpack your shipment as soon as possible after receipt to inspect it for signs of damage that might not be visible from the outside. If the shipment appears to be damaged, keep the original boxes and packing material for inspection by the carrier. All damage claims should be made directly to the carrier. Do not delay. Call the carrier as soon as damage is discovered.

You should have received the following items with each WAM-2 that you have purchased:

- [] (1) CircuitWerkes 15V Power Supply
- [] (1) Standard Network cable (yellow)
- [] (1) Printed copy of the manual
- [] (2) Depluggable screw terminals (non-streaming version). (4) terminals for streaming vsn.

If you have not received all of the items shown with your shipment, please carefully check inside the box or boxes because items occasionally get lost in the packing materials and can be hard to find. If your items are not found, please call CircuitWerkes at 352-335-6555 or e-mail us at support@circuitwerkes.com.

In case your product is in need of service our shipping information is as follows:

CircuitWerkes, Inc.

Attn: RMA #

2805 NW 6th Street

Gainesville, Florida, 32609, USA

Please obtain an RMA from us and verify the address before returning any products



Safety Information

WARNING!

The WAM-2's relays are not intended to switch hazardous voltages. The exposed terminals make connecting such voltages to the WAM-2 extremely dangerous and it should never be attempted. The terminal strips are not designed to shield humans from potentially dangerous Voltages. Contact with high Voltages can cause serious injury or death. The maximum recommended Voltage for the WAM-2 is 30V. Switching of high voltages should only be done externally and in a manner that isolates the voltages from accidental contact with people.

Back panel connections

Name	Type	Description
Relay Outputs	Screw Terminals	The WAM-2 has six relays. These relays are not associated with any particular metering channel. They are completely independent and any event on either channel can be used to operate any relay. Everything is completely user defined.
Ext 1 & 2	Screw Terms	External Status inputs. Can trigger actions/alarms.
Network	RJ-45	Connects your LAN or Internet to the internal Web server.
Status LEDs	G & Y LEDs	Blinking yel = proper operation. Solid green = Net connected.
Input 1	3-terminal	Audio input to feed channel 1 analog input for audio monitoring.
Input 2	3-terminal	Audio input to feed channel 2 analog input for audio monitoring.
Ch1 thru 2 Cal	Trimmer	Adjusts the input level to the # A/D converters (range set)
Audio Present	LED	Indicates when audio is being detected to assist setup.
Stat Src	Jumper	Select internal or external voltage source for status inputs
Com Funct	Jumper 1x3	Select com=ground or com =floating for status inputs
CH1 & CH2 Output	Audio Trimmer	Adjusts the output level for streaming versions
Power In	2.1mm Barrel	Accepts 14-18 V AC or DC @ 200mA

Important Note: the DPDT relays are rated at 1Amp while the SPST relays are rated at 10va or 100mA (non inductive).

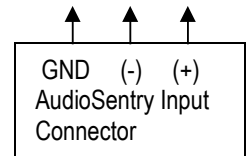
WAM-2 Front panel indicators:

Name	Type	Description
PWR	LED Indicator	Indicates that the main power supply is operating.
Link	LED Indicator	Lights up whenever the network is connected
Cust 1	LED Indicator	Lights when a user defined event triggers this LED
Cust 2	LED Indicator	Lights when a user defined event triggers this LED

Connecting your WAM-2 to other equipment

Metering/streaming Inputs

The WAM-2 has two, differential audio inputs that it monitors. The inputs are ground referenced. These are on depluggable (“Phoenix” style) connectors. Gain control potentiometers are associated with each analog input to let you calibrate your audio level to the internal metering of the WAM-2. Normally, you will apply the highest expected metering sample to the input and then set the meters for 2/3 to 3/4 of full scale using a scale factor of 1.0 (default). This sets the nominal range of the A/D converter. You can then scale the sample in firmware to read whatever you want. **For unbalanced audio sources, the typical metering configuration is to hook your audio feed between (+) and Ground.**



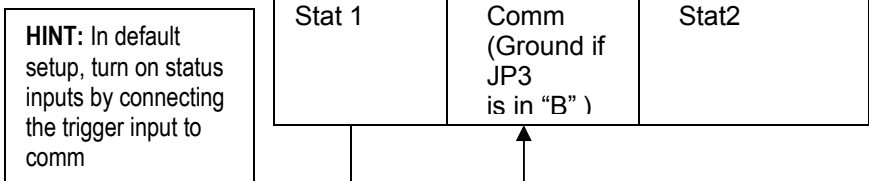
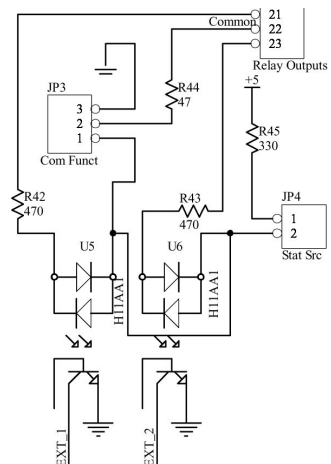
Relay Outputs:

The WAM-2 is equipped with 6 relays to provide you with control over your external equipment or to switch audio.

Relays K1 and k2 are DPDT relays which are ideal for use as a simple stereo audio switcher. All relays can also be operated in momentary mode, so they can be used as standard control outputs, as well. All six contacts of each DPDT relay are brought out on the back panel barrier strip, so any and all of their contacts may be utilized. The DPDT relays are labeled Common (ComA or ComB), Normally Open (NOA or NOB) and Normally Closed (NCA or NCB). A and B refer to which set of contacts are being used. The COM contact is connected to NC when the relay is off and the COM contact is connected to NO when the relay is energized. Electrically, it is possible to make contact closures between all of the A or all of the B but A and B sides are isolated from each other. Each of the remaining four relays are normally open SPST (form A) contacts that can be used for general control purposes. The SPST relays are rated at 10va, non-inductive. Higher loads may damage them. The DPDT relays are rated for 1A max., non-inductive. None of the relays have voltages sourced to the contacts internally. All closures are dry (no voltage is supplied on any of the contacts).

External Status Inputs

The WAM-2’s status inputs can be used to determine the status (on/off) of your equipment. The status input connectors are located immediately to the left of the network connector and are labeled Stat1 and Stat2 and common. The optocouplers are bi-directional meaning that current can flow in either direction. This means that these inputs can be triggered by supplying a voltage to them or by supplying an internal voltage and pulling them to ground. The operation of these inputs is determined by the settings of JP3 and JP4. By default, the status inputs are pulled up internally. The com terminal is jumpered to ground. These inputs accept contact closures to ground as inputs, or you can supply AC or DC voltage to them by changing jumper configurations. Max input voltage is 15V and jumper JP4 must be “off” before an external voltage is supplied. Status inputs can be used to trigger actions when closed or opened. When applying your own voltage, the polarity is not important. The optocouplers will conduct in either direction. When using the Status inputs with the internal power supply, you will need to connect your device’s ground to the WAM-2’s actual ground (JP3 in B).



Note: The status “common” is a ground when JP3 is set to the “B” position (default). If JP3 is set to “A”, then comm is floating and can be used to source a voltage to the optoisolators. If sourcing a voltage, JP4 (the internal pull-up) should also be removed.

Using the Internal Web Server

Networking basics:

Before reading any further, we would like to mention that the following section is not intended to be a comprehensive guide to networks, nor does it necessarily describe your network. Indeed, we have found that networks vary quite a lot and yours will probably be different than is described here. We assume that you, or a network administrator, is familiar with your network and knows how to set it up to accommodate Web servers that exist within your network. The brief discussion provided below is only intended to be used as a very non-specific description of how a network might function.

In Internet land, devices on your network get unique IP addresses because each piece of hardware has a serial number embedded into it. Every device with a serial number, called a MAC address, has to get an IP address assigned to it in order to function using the networking protocol called TCP/IP, which is what is used for the Internet. The router in your network uses those IP addresses that it assigns to keep track of what data requests have been made and how to route responses to the devices that need data. In a way, the IP address is sort of like a nickname that computers use to talk to each other. A computer will only respond if it has been called by name. So, the IP addresses are what one computer uses to address or talk to another computer. The router also uses those IP addresses to manage the flow of communications between each computer so that they are not all talking at once like an old fashioned party-line.

IP addresses are usually doled out within a fixed range, so it's also easier for humans to remember a device's location via its IP address than to try to remember every item's MAC number. For instance an internal network might use the IP range of 192.168.1.### where ### can be 001 through 254. Once the network administrator has set up the address range, he or she only has to keep track of what's assigned to the last three digits of the address range.

Generally, simple networks are divided into two sets of addresses. There are the addresses that exist inside the network (called the private or LAN side) and then there are addresses that exist on the Internet (public or WAN) side of the network. We've already described the private side above, but getting stuff on the private side to talk to the public side can be tricky.

When you have one device that is connecting your internal network to the Internet, like a cable modem or DSL modem, it also has a unique serial number, so it gets assigned an IP address from your ISP. But the ISP only sees the modem, not other equipment on the inside of your network, so they cannot assign multiple IP addresses (actually they can, but that's another story). Although you probably only have one IP address, you will have a whole range of port numbers that you can use for each IP address that exists on the private side of your network. Usually, different types of communications use standardized ports to talk to devices. For instance http (Web browsing) is mostly done on port 80. FTP is usually port 21. E-mail might use port 25. Often, we want to set our network connection up to pass port 80 to some device on our network, like the WAM-2, that serves up web pages. We do that by telling the router/firewall to pass port 80 requests to the IP address that we know we have previously assigned to the WAM-2. To do that, we have to tell our firewall that it's okay to send port 80 requests to the WAM-2, otherwise it'll just block those requests if they come from the public side of the firewall. As described earlier, each device on the private side needs a static IP address that is set by the network administrator. So, each item on the inside of a network that will be communicating with the outside world has to have an IP address within the local network **AND** it must also have the appropriate port opened on the firewall. On the Internet side of the firewall, there is usually only the main IP address and the port number.

When you put it all together it might look like this:

Public IP address 67.234.98.135, port 630 could be mapped to internal IP address 192.168.1.250, port 80. So a browser request made to 67.234.98.135:630 would serve up a web page because you would really be talking to 192.168.1.250:80. Once you have that properly configured, your WAM-2 can serve up Web pages from inside of your network to the Internet.

Connecting to the WAM-2 for the first time:

Most networks use a router as their central hardware. When a device is plugged into a router, the device normally obtains an IP address from the router using a process called DHCP. By default, the WAM-2 obtains a DHCP address from your network's DHCP server. In order to connect to the WAM-2, you can use one of two methods: First, the device has a default netbios name of "WAM-2". You can type WAM-2 (no www) into your browser's address bar (& hit enter) and it should take you to the login screen. On some browsers, you must enter the entire `http://WAM-2/` including the starting "http" and the backslash after the 2. Some browsers will work either way. Note that netbios names are not supported in some operating systems such as Android. The second method requires you to know what its network IP address is. An IP address inside a network will usually look like XXX.XXX.X.XXX, for example 192.168.1.100. Your router knows this information and you can usually find out what the address is by logging into the setup page of your router. Most routers have a page that shows the attached devices. This can be shown as part of the router's DHCP page, or it may be shown in a separate LAN discovery page. Once you know the IP address of your device, you will be able to connect to it by entering the address into your browser's address bar. You can use the CircuitWerkes Netscanner utility, found on our Website or on the CD that came with your WAM-2 to locate the device on your network. Netscanner will identify the WAM-2 by name and will show you the IP addresses of all objects on your network that respond to pings.

If you do not use a router in your network or if you want to configure your WAM-2 via a direct connection, the default IP address for this device is 192.168.1.250. If making a direct connection, you must set your computer's network settings to match the WAM-2's settings. Your PC's TCP/IP properties must be set to 192.168.1.xxx with a netmask of 255.255.255.0. Once you have connected to the WAM-2, you can set its IP address to whatever you wish from the configuration page.

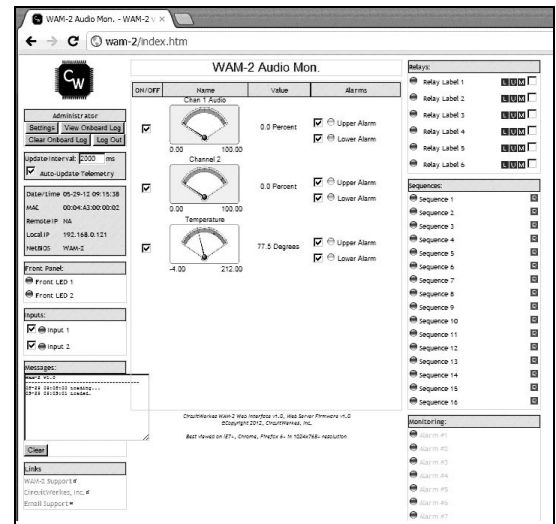
The Web server uses port 80, but this can be changed after login. Often, audios have multiple devices that want to use port 80, including some routers. You have two choices: first, you can change ports on the WAM-2's Webserver. Second, your router can simply redirect a different outside (WAN) port to the individual Web servers' inside IP addresses. For instance, the WAM-2 and an audio IP device each have Web servers using port 80. The WAM-2 has an internal IP address of 192.168.1.250 and suppose that the audio device has an IP of 192.168.1.200. If you are on the inside (LAN) of the network everything looks great. You can browse to either device and everything works. To access the audio from the outside, you must open a "pinhole" that allow data to pass from browsers to your WAM-2. You can encounter a problem if you try to route WAN port 80 to LAN port 80 for both Web servers. Only one will be assigned. You will not gain access to the second one. Instead, redirect LAN port 80 for each device to a different outside port, such as 800 and 801. In practice, you would access your audio by entering its IP address followed by a colon and the port number (xxx.xxx.xxx.xxx:800), or by its URL name followed by the port (www.myaudio.com:800).

Differentiating multiple devices on a common network:

The WAM-2 has a fixed, unique MAC address but allows you to change the IP address and Netbios name of the device. These can be important when multiple CircuitWerkes Webserver based products are used at a common location. In that case, you will want to assign a unique Netbios name to each device so that each device can be found by a unique name. If using static IP addresses, you will need to set a unique one for each device.

Using the WAM-2's Web server:

Your WAM-2 contains an onboard Web server which is the heart of its monitoring capability. This Web server has proved to be very stable & supports multiple browsers. Although the interface looks simple, the real power of the Web server lies “under the hood”, in its speed. Readings are continually updated, at a user defined speed, which is much faster than many competing products. Your actual speed depends upon the network and upon your PC's horsepower. Your PC reads the raw data from the WAM-2 and “draws” the meter movements. Your computer's ability to draw quickly has a direct effect upon how frequently the meters move. The default update speed is 500ms which updates the meter position 2x each second. Speeds of 50ms can be achieved on fast networks, however, if you request data too fast, your network or your PC may not be able to handle it and you can get a periodic message saying that the WAM-2 is not responding. If that happens frequently, slow the updating down by using a bigger number in the “Update Interval” box.



Logging In:



By browsing to whatever IP address your WAM-2 has, you will be presented with a login screen. **The default administrator's login is 12345678**, unless you have previously set this differently from the configuration menu. There are three access levels to the WAM-2, reader, controller and administrator. Only administrators can configure the WAM-2. Controllers can operate relays while reader level has no control. The default administrator's password is simply 12345678. Passwords are a maximum of 8 characters.

If you are using Internet Explorer and you incorrectly enter the password one time, you may have to close your browser and reload it because IE cache's the passwords and will try to use them even if they don't work and you have tried to enter a different password. To avoid that problem change your IE settings for temporary files so that Explorer checks for new versions of stored pages on every visit. Other browsers such as Firefox, Opera and Chrome do not, generally, have this problem, however, we still recommend IE be used for changing configuration of the WAM-2. Any browser can be used for monitoring.

Once you have entered the correct password, it will take a few seconds to load the WAM-2's page. Once done, you will have access to the metering and controls of the WAM-2. If you are an administrator, you will also be able to manage the WAM-2's settings. If the page does not properly load the first time, use the F5 key to refresh the page.

Monitoring and control using the Web server:

The screenshot shows the WAM-2 Web server interface. It includes a navigation menu on the left with options like 'Settings', 'View Onboard Log', and 'Log Out'. The main area displays three meters: 'Chan 1 Audio' (0.0 Percent), 'Channel 2' (0.0 Percent), and 'Temperature' (77.5 Degrees). There are also sections for 'Relays' (Relay Label 1-6), 'Sequences' (Sequence 1-16), and 'Monitoring' (Alarm #1-7). Callout boxes provide detailed explanations for these features.

Displays Current Access Level

Settings button opens the configuration menu in a new window.

Update interval defines how often your meters move. Event Indicators: Cust 1 & 2 light when user-defined events occur. Ext 1 & 2 show when either of the two external status inputs are closed.

Upper and lower trigger selector boxes. Unchecking these boxes will keep the unselected state from triggering an action.

Sequence Status & Control: This box shows you all of the available sequences. The indicators at left of the labels change color to show active sequences. Controllers or administrators can manually run any sequence by pushing the "R" button. This is a very powerful control since it can perform multiple programmed steps.

Events List - shows what actions have been triggered by alarms.

Metering. Green background indicates normal operation. Red indicates an out-of-tolerance condition. Grey means that channel is not being monitored.

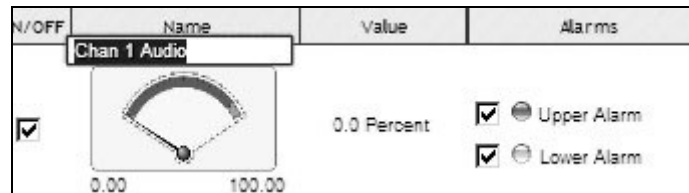
Relay controls: U is unlatch, L = Latch and the "M" button is momentary for duration of mouse-down. The "check box" has been added next to each relay function. When checked, this box disables changes to that relay, be it automated or by Web control. If a relay is latched and an automated script would have unlatched it, the relay will remain on. Uncheck the box for normal function. The indicators at the left of the labels show the relay's state. The indicators are polled at the hardware level to show you when a relay has closed, however, if the update interval is slower than the relay on time, the state may not be displayed. In other words, if the update interval is set for 2 seconds and you operate the relay for 1/2 second in the middle of the two second interval, you might not see the response from the relay that it had closed.

The WAM-2's Web server display gives you the ability to monitor a stereo audio channel, a temperature sensor and to control six relays. Four of the relays are SPST while two are DPDT, suitable for either controlling external equipment or for switching audio. Relays can be latched or momentary.

The WAM-2 also has two status inputs. Their state is shown in the upper left side of the screen as "Ext 1" and "Ext 2". When their inputs are connected to ground, the associated indicator turns from gray to green. External status inputs can also be used as events to initiate alarm actions. Administrators can disable monitoring by unchecking the boxes next to the indicators.

WAM-2 Configuration:

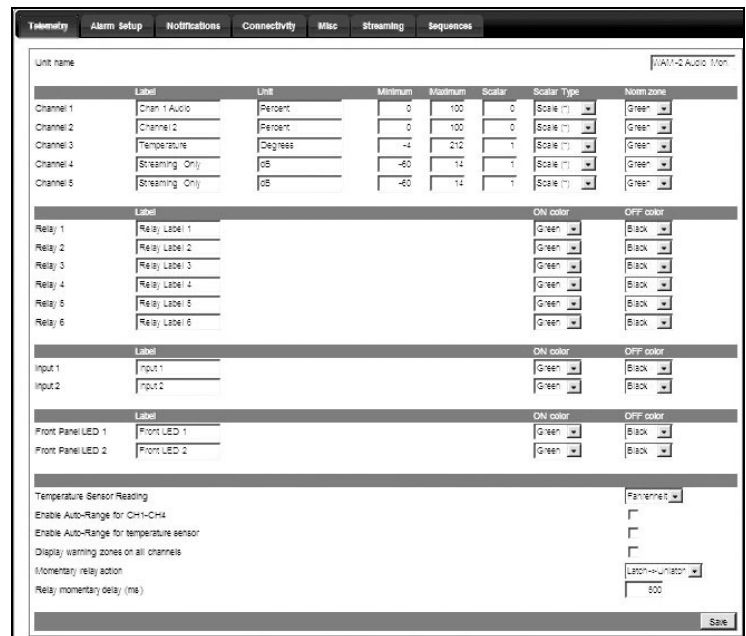
Administrators and controllers can operate relays and view the meters. Readers can login to see the meters, but cannot control anything. Administrators can read meters, operate relays and perform configuration setup tasks, including editing labels by just clicking on them from the main page. Calibrating (scaling) readings, setting the meter scales and changing labels can be done without ever opening the configuration page.



Above: Quick-changing a Label (Admin Only)
Below: The main settings Form

In addition to quick changing the labels and calibrations, administrators can click on the “settings” button to open up the main configuration form in a new window.

The configuration form has 8 tabs. Each tab lets you configure a different aspect of the Audio Sentry. Tasks available include setting a static IP address, setup passwords for the various access levels, changing label names, defining under-voltage or overload levels for each channel and specifying the delay before an event is registered as an alarm and starts an action sequence.



Changes are highlighted in green or red until saved. Changes highlighted in red are illegal operations (for example, setting an upper alarm limit lower than the lower alarm limit for a channel) and won't be saved.

The action sequences are user-defined functions that the WAM-2 will perform whenever an event is triggered. These events are often called alarms, but they can also be simple responses to any particular input as defined by you.

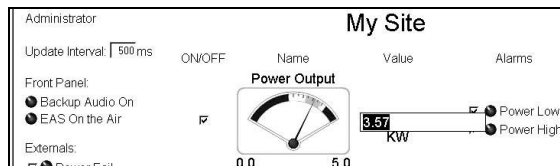
The “alarms” are defined by two sets of parameters:

1. The triggering event
2. The step, or steps that you want to take when an event occurs.

Calibrating Meters:

Only administrators can calibrate the meters. This is best done when the output of your equipment is at its nominal operating voltage. Each input (except for onboard temperature) has a calibration control that is physically associated with the channel. The meter scale can be manually set or can be self-adjusting based upon where the pointer is and what value you assign to that metering input. Meters can be calibrated in just a few simple steps:

1. Log into the Web server for the WAM-2.
2. Apply a voltage sample to be monitored to the WAM-2's input.
3. Use that channel's calibration control to set the pointer to approximately the right spot on the dial. For most users this will be around $\frac{3}{4}$ of the way to the right side of the metering display
4. Set the meter's maximum scale so that the value you will be using will be within the meter's operational display range. For example, if you are currently reading -15, but will want the meter to read +1, click on the upper scale value and enter a number bigger than +1, like +6. The meter will rescale itself and your present value of -15 will be near the bottom of the meter.
5. Click on the value currently displayed. This will allow you to directly enter the value that you want to record. When through, hit the enter key to set the value. The meter pointer will now move to the proper location on the meter face. The digital readout will also now reflect the correct reading. You can also adjust the scaling factor on the telemetry configuration page.



Yup, it's not a picture of a WAM-2, but the principle is the same for all of our products. The WAM-2 meter minimum is expressed as a negative number like -25. Max is usually expressed as a positive number like 6.

6. Note that if you set the meter pointer to extend beyond the upper scale, the meter will read overload, even if there is still range in the A/D. If autorange was previously selected in the telemetry setup, the full scale value will self-adjust.

Note that calibrations are in dBm. With a scaler of 1, the minimum is -60dB (-20 is more useful, typically) and the max is +9dBm.

I/O Functions Quick Reference:

Meters 1-2 are the AC inputs. (differential, ground referenced).
Meter 3 is the onboard temperature sensor

Status inputs 1 & 2 are factory configured to turn on when the individual inputs are tied to "comm" or ground. These can be reconfigured for other types of drive circuits.

Relays 1 and 2 are DPDT.
Relays 3 through 6 are SPST.

Setup Detail:

The Telemetry setup Tab of the WAM-2

The screenshot shows the 'Telemetry' configuration page with several sections:

- User Defined Channel Names:** Points to the 'Unit name' field.
- User-set Unit Labels:** Points to the 'Unit' column in the channel table.
- Relay Labels:** Points to the 'Label' column in the relay table.
- Status input & front panel LED labels:** Points to the 'Label' column in the input and LED tables.
- Color Selections:** Points to the 'ON color' and 'OFF color' dropdowns for relays and LEDs.
- Meter min & max scale values:** Points to the 'Min' and 'Max' columns in the channel table.
- Meter scalar and scalar type:** Points to the 'Scale' and 'Scalar Type' columns in the channel table.

Channel	Unit	Min	Max	Scale	Scalar Type	Warn zone
Channel 1	Chan 1 Audio	Percent	0	100	Scale (%)	Green
Channel 2	Chan 2	Percent	0	100	Scale (%)	Green
Channel 3	Temperature	Degrees	-4	212	Scale (°)	Green
Channel 4	Streaming Only	dB	-60	14	Scale (dB)	Green
Channel 5	Streaming Only	dB	-60	14	Scale (dB)	Green

Meter min & max scale values. Sets the visible range of the meters. Normally min is zero and max is set to about 120% of the highest expected reading.

Meter scalar and scalar type. The scale lets you manually multiply the input sample by whatever you want in order to achieve the reading desired. If you calibrated the meters by typing a value, these fields will have multipliers already in them. When set to "Offset" the scalar type lets you offset the current reading by xx. This is usually only used for temperature readings that are typically scaled right but that may be off by a few degrees. Most other types of readings use scale values, not offsets.

The bottom fields are misc telemetry options:

You can change the temperature reading from F to C.

You can select auto-scale for the meters. When enabled, the meter max value will set itself as a function of where the meter pointer is (as a percentage of full scale) and what the value of the readings is.

Warning zones puts a splash of yellow on the meter face to indicate when the reading is close to a trigger point, but warning zones have no effect on the actual function of the device.

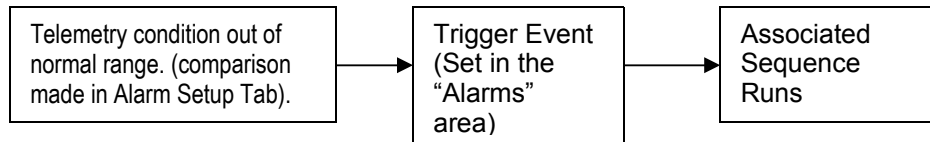
The momentary action selects how the relay will respond if it is in latch mode. If set to toggle, a latched relay will unlatch momentarily, then re-latch. If set to Latch-> Unlatch, the relay will unlatch, then momentarily latch on for the duration specified in the delay box. The delay box specifies the maximum closure for any momentary action.

Setting static IP addresses and resetting the WAM-2:

When you set a static IP address, your software and Web browser should automatically connect to the new IP address. You have 60 seconds to log in or else the unit will revert back to its previous IP address. To force the change, unplug the power during the 60 second window. The new address will be kept at power-up. If you force-set a static IP address that is not on your normal network mask, you could lose contact with the WAM-2. The same is true if you change your network address range when using a static IP for your product. For example, if your network is configured to work in the range of 192.168.1.xxx and you inadvertently set your unit's static IP address to 192.168.0.xxx, then, on most networks, you will not be able to log into your WAM-2. If you set the netmask of your PC to uncover the range used by the WAM-2, you will be able to connect on some networks. Previously, there were only two solutions. One was to make a crossover cable and setup a computer to connect directly to the WAM-2 using the new network settings, but this only works if you didn't make a typo and therefore know the IP address of the unit. It's also a lot of work. The second solution was to reset your WAM-2 to factory defaults. This is easily done by shorting the internal pins marked "Reset" and toggling the power while maintaining the short. When the unit re-powers, it's back to defaults including obtaining a dynamic IP. We have added a step to this. Now when you reset your WAM-2, it will require two reset attempts if you have a static IP set. The first reset clears only the static IP flag and allows the unit to pick up a dynamic address. The second reset clears everything else.

Setting Alarm Points:

The WAM-2 uses a simple but flexible system for handling alarms. It can perform actions when conditions exceed upper or lower limits and it can perform actions when conditions return to normal, so it is possible to program a simple corrective action for one event and then to program another action to reverse the process when things return to normal. It has sixteen (16) event triggers (alarms) that can be programmed. Each trigger can respond to one of 16 possible conditions (upper alarms, lower alarms or status input changes). In order to activate a trigger, it is necessary to program the conditions that will cause the WAM-2 to trigger an event. Typically, these are lower or upper metering alarms, or status inputs. Lower and upper alarms are directly entered as a value (as opposed to a percentage of full meter scale as in earlier versions of the Sentry products). For instance, if you select an upper (overload) alarm of +9, the alarm will trigger whenever the scaled reading rises above +9, but the trigger value must be on the meter's visible range. If the meter is from -20 to 5, the meter won't trigger the +9 upper alarm. This does not apply to the lower limit because the A/D is hardware set for -60 minimum, so any value above -60 is fair game. If a lower alarm is set to -20, and the min scale is set to -25 the trigger will occur at about 10% on the meter. At the point that the meter's value is reduced below the alarm threshold, the meter background will change to red or whatever color you have defined as the alarm color.

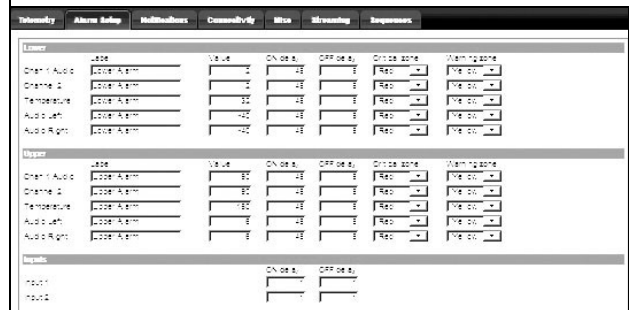


The Alarm setup box can be considered two forms in one.

The top half of the form is where you set the parameters that can trigger an event. It's also where you define the colors that will show up on your meter faces.

If you don't want alarms to show, just make them the same color as the meter's normal range. To disable an alarm, don't set a corresponding action. If you don't want to even see the tick marks for the alarm on the meter, just make the value of the alarm higher than the upper scale or lower than the lowest visible scale.

When setting lower alarm values, it's best to use some number other than zero because minor fluctuations of input signals can cause the meters to read greater than zero, especially if a large multiplier has been used in the telemetry scalar setting.



Hysteresis: This is an optional setting designed to control triggering on events where the cause is fluctuating near the trigger point. When hysteresis is enabled, the triggering value must return to the "good" range by a certain (user set) value before the existing alarm considered ended. In other words, the alarm trigger point stays the same, but the return to normal is adjusted by some amount so that a value that would be typically considered normal is still considered to be within the alarm range. Triggering of alarms from the non-alarmed state is not affected by hysteresis.

Label	Event	Sequence
Alarm 1	Alarm #1	Disabled
Alarm 2	Alarm #2	Upper Alarm OFF (CH2)
Alarm 3	Alarm #3	Upper Alarm OFF (CH3)
Alarm 4	Alarm #4	Upper Alarm OFF (CH4)
Alarm 5	Alarm #5	Upper Alarm OFF (CH5)
Alarm 6	Alarm #6	Upper Alarm OFF (CH6)
Alarm 7	Alarm #7	Upper Alarm OFF (CH7)
Alarm 8	Alarm #8	Upper Alarm OFF AND Upper Alarm ON (CH1 AND CH2)
Alarm 9	Alarm #9	Upper Alarm OFF AND Upper Alarm ON (CH1 AND CH3)
Alarm 10	Alarm #10	Upper Alarm OFF AND Upper Alarm ON (CH1 AND CH4)
Alarm 11	Alarm #11	Upper Alarm OFF AND Upper Alarm ON (CH1 AND CH5)
Alarm 12	Alarm #12	Upper Alarm OFF AND Upper Alarm ON (CH1 AND CH6)
Alarm 13	Alarm #13	Upper Alarm OFF AND Upper Alarm ON (CH1 AND CH7)
Alarm 14	Alarm #14	Upper Alarm OFF AND Upper Alarm ON (CH2 AND CH1)
Alarm 15	Alarm #15	Upper Alarm OFF AND Upper Alarm ON (CH2 AND CH2)
Alarm 16	Alarm #16	Upper Alarm OFF AND Upper Alarm ON (CH2 AND CH3)

The bottom half of the form is where you set the event that will trigger a user-defined sequence. The triggering events can control one of 16 available sequences. The actual sequences are defined on the Sequences tab.

Event Triggers:

There are 36 (non-streaming) events that can trigger actions.

The first 14 are permutations of low-meter conditions. You can react to low conditions on one or two channels, or you can react to the return of normal readings on those same channels.

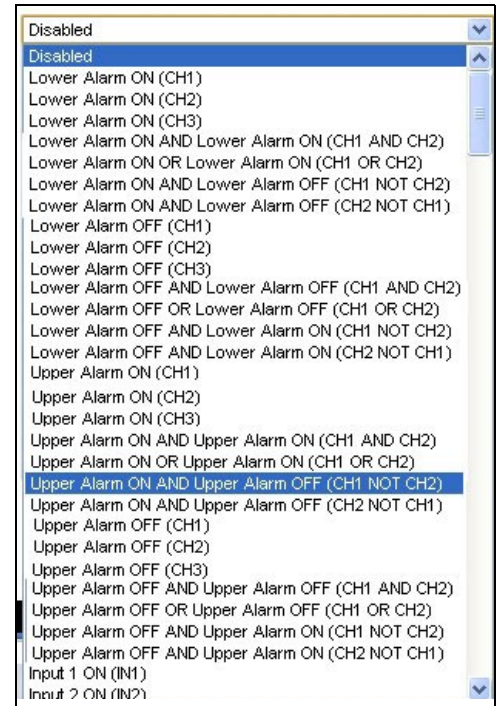
Similar to low meter detection, overload detection indicates when too much voltage is present on a channel.

The four External “ON” events occur whenever one or both of the external status inputs are triggered, while the four External “OFF” events happen whenever the external status inputs are untriggered. Combinations include EITHER, BOTH or OR.

Each of these trigger events can be used to perform a different action. For instance, one alarm event (and action) might be if a low meter detection on channel 1 causes relay #1 to latch “ON”. A second event might then be used to unlatch relay #1 when low meter “OFF” (back to normal) condition is detected on channel one. By using two alarm events, you can create an automatic switchover system that will operate whenever a situation occurs and will automatically reverse itself whenever condition returns to normal.

Each channel’s upper and lower triggers are governed by their own set of timers, so you can choose how quickly the WAM-2 will respond to a particular condition. For instance, the Audio Silence detection might be set to occur after 30 seconds of silence on both channels (assuming you’re working with a stereo system), but you might want to know that the audio has returned after only 5 seconds, so that you can restore main programming. In that case, you would probably set an action sequence to occur on Silence OFF on either channel 1 or 2 and set both off delays to 5 seconds. Setting a timer to zero is an instant response.

Each “alarm” trigger can operate any one of the 16 available action Sequences as described on the following page.



Sequences:

Telemetry Alarm Setup Notifications Connectivity Misc Streaming Sequences							
	Sequence Label	Action #1	Pause	Action #2	Pause	Action #3	Pause
Sequence 1	Backup Aud ON	Latch: Relay Relay 1	0	Turn ON FP LED Front Panel LED 2	0	Dispatch Email Receiver(s) Index 2	0
Sequence 2	Backup Aud OFF	Unlatch: Relay Relay 1	0	Turn OFF FP LED Front Panel LED 2	0	Dispatch Email Receiver(s) Index 2	0
Sequence 3	Sequence 3	No Action	0	No Action	0	No Action	0
Sequence 4	Sequence 4	No Action	0	No Action	0	No Action	0
Sequence 5	Sequence 5	No Action	0	No Action	0	No Action	0
Sequence 6	Sequence 6	No Action	0	No Action	0	No Action	0
Sequence 7	Sequence 7	No Action	0	No Action	0	No Action	0
Sequence 8	Sequence 8	No Action	0	No Action	0	No Action	0
Sequence 9	Sequence 9	No Action	0	No Action	0	No Action	0
Sequence 10	Sequence 10	No Action	0	No Action	0	No Action	0
Sequence 11	Sequence 11	No Action	0	No Action	0	No Action	0
Sequence 12	Sequence 12	No Action	0	No Action	0	No Action	0
Sequence 13	Sequence 13	No Action	0	No Action	0	No Action	0
Sequence 14	Sequence 14	No Action	0	No Action	0	No Action	0
Sequence 15	Sequence 15	No Action	0	No Action	0	No Action	0
Sequence 16	Sequence 16	No Action	0	No Action	0	No Action	0

Any trigger event can perform any of the 16 action sequences on the “sequences” list. There are thirteen basic actions available and a sequence can run up to seven actions. Available actions include operating relays, either momentarily or latching, sending e-mails, turning on LEDs on the box, and muting or unmuting alarms (triggers).

Each sequence will run only once. As long as the triggering event maintains its state, the alarm will not repeat. In the case of a threshold situation where a channel is cycling between good and bad values, it might be useful to employ automatic or manual muting of alarms for that/those channels to avoid repeated notifications or actions. For manual muting, create an action sequence that is not called from an alarm. Then you will run that sequence manually, as needed. Be sure to create a sequence to turn reporting back on, too.

When a latching action is performed, often a matching “unlatch” or “release” event is used to undo the action when the triggering event is over. For example, if audio is lost (silence ON), you might latch relays 1 and 2 “on” to act as a stereo, balanced audio switcher. When audio is restored (Silence OFF), you might unlatch relays 1 and 2 to switch back to regular programming.

In addition to operating relays, the custom LEDs can be operated. The Custom LEDs are represented graphically on the Web server as gray (off) or green (on) lights. There are also two real LEDs on the front panel of the WAM-2 that can be operated by the same actions.

Each sequence can have up to seven steps. There are programmable pauses available between steps as well. Using these, it is possible, for example, to have one event, close a relay, turn on one of the LEDs and then pause for a few seconds, then close, or open, another relay or send an e-mail.

Whenever actions are occurring, the WAM-2 will not respond to outside commands or to other events until the action has completed. If a pause is set to 60 seconds, then the WAM-2 will not be responsive to outside control, nor will it update its meters, until that time, plus whatever amount of time to run the action steps has passed.

E-mail notifications Setup

Telemetry	Alarm Setup	Notifications	Connectivity	Misc	Streaming	Sequences
SMTP Server settings:						
Server:	<input type="text" value="SMTP my-isp.net"/>					
Port:	<input type="text" value="25"/>					
Username:	<input type="text" value="my user name"/>					
Password:	<input type="password" value="*****"/>					
From:	<input type="text" value="Type a valid reply address here"/>					
Subject:	<input type="text" value="Mail from My Transmitter"/>					
						<input type="button" value="Save SMTP Settings"/>
Last server response code: 32768						
Recipient list (max 80 characters per index location):						
Recipient(s) IDX 1:	<input type="text" value="Put as many addresses as desired in each index, separated by commas"/>				<input type="button" value="Test Email"/>	
Recipient(s) IDX 2:	<input type="text"/>				<input type="button" value="Test Email"/>	
Recipient(s) IDX 3:	<input type="text"/>				<input type="button" value="Test Email"/>	
Recipient(s) IDX 4:	<input type="text"/>				<input type="button" value="Test Email"/>	
Recipient(s) IDX 5:	<input type="text"/>				<input type="button" value="Test Email"/>	
						<input type="button" value="Save Recipient List"/>

E-mail notifications can be sent to you for alarm purposes as part of your sequences. In order to send mail, you must use a mail server that does not require SSH secure access. Most unsecured mail servers will use port 25. If your server requires port 995 or 465, it's probably not going to work.

For mail servers that require a user name and password, there are fields provided to enter the required information.

The "From" field should normally contain a valid reply to address. Some mail servers will not deliver mail unless there is a valid reply to address.

The "Subject" field is the title that will be prepended to each e-mail's subject line.

The bottom half of the form has five fields for entering e-mail addresses. **Each field can contain more than one address, separated by a comma for each.**

SMS texts are actually just e-mails sent to the target mobile number at the carrier's SMS domain name. For example, `987-654-3210@txt.att.net` (no dashes would be entered in the phone number, of course).

Messages sent in response to alarms will contain a notification of the alarm in the subject line and will have a dynamically created message showing the channel that caused the alarm. You can also choose to attach a log to the message, if desired.

Connectivity (Network settings):

The WAM-2 allows you to change almost everything about the network configuration.

Telemetry	Alarm Setup	Notifications	Connectivity	Misc	Streaming	Sequences	Weather Advisory
Current Remote IP				74.179.113.182			
Current Local IP				192.168.0.154			
HTTP Port		<input type="text" value="80"/>		<input type="button" value="Submit"/>			
MAC Address		<input type="text" value="00:04:A3:00:00:01"/>		<input type="button" value="Submit"/>			
NETBIOS Hostname		<input type="text" value="SITESENTRY4"/>		<input type="button" value="Submit"/>			
Static IP (0.0.0.0 = not used/DHCP enabled)		<input type="text" value="0.0.0.0"/>		<input type="button" value="Submit"/>			
Subnet Mask		<input type="text" value="255.255.254.0"/>		<input type="button" value="Submit"/>			
Default gateway		<input type="text" value="192.168.0.1"/>		<input type="button" value="Submit"/>			
Primary DNS server		<input type="text" value="192.168.0.1"/>		<input type="button" value="Submit"/>			
Secondary DNS server		<input type="text" value="0.0.0.0"/>		<input type="button" value="Submit"/>			

The HTTP port is typically 80, but you can change it to anything that you want.

The MAC address is not user-changeable, however, CircuitWerkes' tech support can remotely change the last four digits of your MAC address. A pass-through network connection is required for this.

The Netbios Name is optional and allows you to find computers or devices by name instead of knowing their IP address. When you call a Netbios name, a request is sent across the network for a response from any device with the matching name. If that device has a Webserver, it can be loaded into your browser directly without calling the IP address, much like a domain name works over the Internet.

The WAM-2 is normally configured for DHCP by setting the four address octets to 0.0.0.0. If you want to enter a static IP address, you can direct enter it in the Static IP field as **###.###.###.###**.

When set to DHCP, the WAM-2 will detect the default gateway and enter its address in the "Default Gateway" field and also in the "Primary DNS Server" field. When a static IP is set, you can alter the gateway and DNS fields manually.

Differentiating multiple devices on a common network:

The WAM-2 allows you to change the IP address and Netbios name of the device. These can be important when multiple CircuitWerkes Webserver based products are used at a common location. In that case, you will want to assign a unique Netbios name so that each device can be found by a unique name. If using static IP addresses, you will need to set a unique one for each device.

Dynamic DNS (beta):

A dynamic DNS service (DDNS) allows you to operate devices requiring a static address on networks that have only dynamic IP addresses. You make up a name for your location and register it with a DDNS service. Whenever your IP address changes, the device detects the change and notifies the host DNS service. The host service then modifies the address that the name points to. So when you try to login using the name, it always points to the right address. Currently the SiteSentry supports dyndns.org, no-ip.com and dnsomatic.com. All of these services offer free and paid services. Other services also may work with your particular dynamic update service, but you will have to try yours and see if it works. Type the network name of your service (service_name.com) into the blank box and fill in the rest of the form. After setting up an account, enter your credentials into the fields of the DNS settings page and save them. DDNS has been tested, but is considered a beta feature.

DDNS settings:	
DDNS Service:	<input type="text" value="members.dyndns.org"/>
Username:	<input type="text" value="members.dyndns.org"/>
Password:	<input type="text" value="dynupdate.no-ip.com"/>
Host:	<input type="text" value="updates.dnsomatic.com"/>
Status: undefined	<input type="button" value="Save DDNS Settings"/>

The Misc Tab - Passwords and system utilities:

In the MISC tab you can change access codes for the three classes of users. Administrators can configure & control the WAM-2. Controllers cannot configure the device, but can operate its controls. Readers can only see the main page and cannot operate any relays.

The WAM-2 polls Internet time servers, if available and can also be sync'd to your PC. When an NTP server is not available, the WAM-2 keeps time via a timing loop which only runs while the unit is powered. If the power is off for a while, you will need to re-sync the time, if you want to know when logged events actually happen.

The resets/reboot section lets you restart your WAM-2 or load default values. The connectivity button changes the MAC address, Netbios name, IP port number and IP address back to defaults, but leaves the main configuration data intact. The bottom button overwrites everything with default data. This is a requirement when upgrading the firmware.

Saving Your Unit's Configuration Data to Your PC:

The import/Export functions are VERY important. This function lets you save your configuration data to a local file. You can also load saved data into a virgin unit without having to program everything from scratch. When you click the "Export" button, you will be presented with a text box containing a lot of information. Select the entire contents of the box (CTRL-A in Windows). Copy the entire contents to the clipboard (CTRL-C). Then open up a text writer like notepad and paste everything into it (CTRL-V). Save the new file. ***DO NOT MODIFY THE CONTENTS OF THESE FILES.***

To import saved data, open the text file that you previously saved and copy everything to the clipboard (CTRL-A, then CTRL-C). Then click the "Import" button and paste the contents of the clipboard to it and click the "Import" button on this form. When done importing, click the "Save" button at the bottom of the main form, or click any of the save buttons on any of the other tabs. Note that network settings are not automatically saved because they would cause the unit to potentially change IP addresses in the middle of the process and you might not find it if you don't know what IP address and range it is using. Therefore, you have to make those changes individually.

On some computers, the import/export function may only work properly with Internet Explorer.

Logging

The WAM-2 has the ability to keep a running log of its main parameters. The log entries can be timed or triggered by an alarm.

Logs are comprised of a header and the actual entries. The header usually contains the labels that explain the entries. Headers can be printed as often or infrequently as desired. The default is to print one header every 20 entries.

Log entries can consist of any or all of the available monitoring options. To change or create entries, place your cursor at the desired location on the line and choose the entry type from the "insert" drop down menu. Generally, you should separate log entries by spaces or other divider characters.

The top three boxes control the intervals at which logs are taken, how often they are e-mailed to you and how many headers are printed on each page.

The sequence selector is one way to e-mail logs to you. To email a log every 50 entries, setup any sequence to e-mail you and then select that sequence and enter 50 in the box.

The check box selects whether the log shows the most recent readings at the top of the log or at the bottom.

The bottom half of the log form is where you setup the templates for how your log will look. Headers are printed at the interval you specified in the box at the very top of the form.

Log entries are created dynamically, based on the items that you insert on the line (or lines). The default log contains most of the typical data. You can also format the log so that particular data resides on its own line. For instance, you could have left and right audio on one line and temperature and status on another. Be careful that the header is considered when setting up the format of the entries.

An example of a modified logging setup from the SiteSentry4. The SiteSentry 2 and WAM-2 have fewer meters:

The default header looks like this:

```
| Date/Time | Channels | Inputs | Relays |
```

In order to get the output below, the following header was created:

```
| Date/Time | Channels | Inputs | Relays |
| 1 2 3 4 Temp Aud1 Aud2 | 1 2 | 123456 |
```

Zero (0) is "Off" and one (1) is "On".

The result is below....

	Date/Time	Channels							Inputs		Relays
		1	2	3	4	Temp	Aud1	Aud2	1	2	123456
T	12-09-13 14:12:57	0.000	0.000	0.000	4.940	77.000	-4.696	-7.933	00		000000
T	12-09-13 14:13:57	0.000	0.000	0.000	4.940	77.000	-10.912	-10.525	00		000000
T	12-09-13 14:14:57	0.000	0.000	0.000	4.940	77.000	-12.655	0.081	00		000000
T	12-09-13 14:15:57	0.000	0.000	0.000	4.987	77.000	-14.837	-6.396	00		000000
T	12-09-13 14:16:57	0.000	0.000	0.000	4.940	77.000	-2.491	-4.891	00		000000
T	12-09-13 14:17:57	0.000	0.000	0.000	4.940	77.000	-5.091	-3.112	00		000000
T	12-09-13 14:18:57	0.000	0.000	0.000	4.940	77.000	-9.461	-12.655	00		000000
T	12-09-13 14:19:57	0.000	0.000	0.000	4.940	77.000	-6.396	-7.933	00		000000
T	12-09-13 14:20:57	0.000	0.000	0.000	4.940	77.000	-4.135	-4.891	00		000000
T	12-09-13 14:21:57	0.000	0.000	0.000	4.940	77.000	-4.891	-2.343	00		000000
T	12-09-13 14:22:57	0.000	0.000	0.000	4.940	77.000	-12.655	-12.185	00		000000
T	12-09-13 14:23:57	0.000	0.000	0.000	4.940	77.000	-6.396	-5.295	00		000000
T	12-09-13 14:24:57	0.000	0.000	0.000	4.940	77.000	-5.295	-22.197	00		000000
T	12-09-13 14:25:57	0.000	0.000	0.000	4.940	77.000	-8.817	-10.525	00		000000
T	12-09-13 14:26:57	0.000	0.000	0.000	4.940	77.000	-6.396	-8.512	00		000000
T	12-09-13 14:27:57	0.000	0.000	0.000	4.940	77.000	-7.657	-9.801	00		000000
T	12-09-13 14:28:57	0.000	0.000	0.000	4.940	77.000	-15.481	-14.837	00		000000
T	12-09-13 14:29:57	0.000	0.000	0.000	4.940	75.755	-3.781	-12.185	00		000000
T	12-09-13 14:30:57	0.000	0.000	0.000	4.987	75.755	-8.817	-4.696	00		000000
T	12-09-13 14:31:57	0.000	0.000	0.000	4.940	75.755	-6.164	-5.719	00		000000
	Date/Time	Channels							Inputs		Relays
		1	2	3	4	Temp	Aud1	Aud2	1	2	123456
T	12-09-13 14:32:57	0.000	0.000	0.000	4.940	77.000	-19.698	-25.719	00		000000
T	12-09-13 14:33:57	0.000	0.000	0.000	4.940	75.755	-13.151	-5.719	00		000000
T	12-09-13 14:34:57	0.000	0.000	0.000	4.940	75.755	-8.817	-4.696	00		000000

The first character is either a T for time triggered or a sequence number (like S13) to indicate what caused the log reading to be taken.

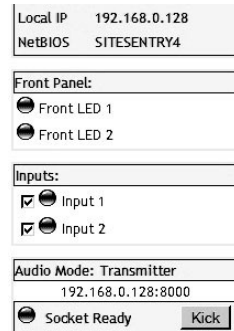
Optional Streaming

The WAM-2 series offers an optional hardware upgrade that lets you receive Shoutcast compatible mp3 or Ogg-Vorbis streams. Receiving audio can be used as a backup audio source for routing the air. The optional streaming module also lets you encode Ogg-Vorbis streams in stereo or mono at various bitrates. Encoded streams are useful as confidence audio, letting you verify that your audio is reaching the transmitter audio properly. The Ogg-Vorbis streams are of very high quality, rivaling AAC at medium to high bitrates. The encoded streams can be received on many media players including VLC, Foobar 2000, and WinAmp (with the Ogg plugin). Transmit audio, although high quality, is intended for confidence monitoring, not as a point-to-point streaming source for critical applications. Due to a small transmit buffer size only one client can be connected at a time and dropouts can occur in the encoded stream.

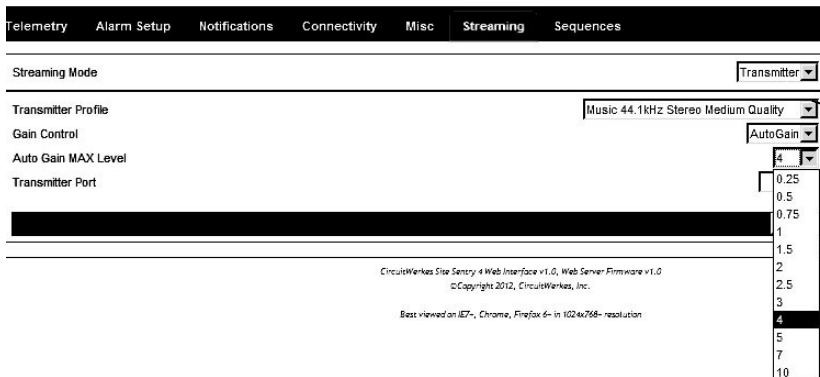
The streaming setup controls will only be enabled if the streaming hardware is present. When no streaming hardware is present, the streaming tab will only have a notice that streaming is not available on this version. The streaming module information will also not appear on the main metering page.

Transmit Audio Mode:

In the transmit mode, the main metering page shows you the mode (Transmit), the status (ready or occupied) and the IP address of the remote client, if any. There is a button labeled "kick". If there is a remote client connected to your stream that you don't want, you can use the "kick" button to disconnect them. The "Socket Ready" text tells you no one is currently connected. When a remote client is connected, their IP address is displayed and the simulated LED will be green.

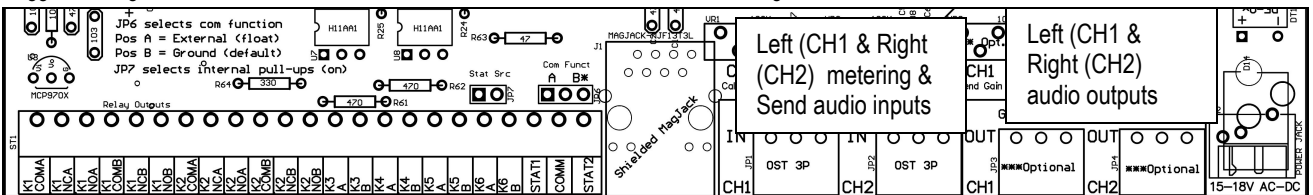


Transmit Audio Setup

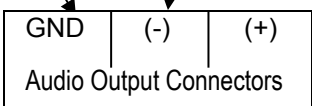


Above: Transmit Quality Settings

The transmit mode has two main settings groups that you can change. First is the quality mode. You can choose from CD quality stereo, through several low bitrate medium quality stereo or mono settings. Very low (voice only) quality settings are available for networks with extremely limited bandwidth. The second main settings group are the auto-gain settings. The encoder uses an optional DSP based AGC & peak limiter to maintain optimum encode amplitude. The AGC/limiter is optional and can be disabled by un-checking the "AutoGain" box. The AGC has a setting that limits the maximum gain to avoid pumping and noise pickup during low passages. In order to avoid pumping and sucking up of noise, we suggest setting the AGC limit to four or less and use the audio drive controls to feed a high level to the encoder.



NOTE: Leave unused audio **outputs** floating (unconnected). Do not ground them. Inputs can float or be grounded.



Receive Audio Mode:

In the receive mode, the WAM-2 can decode Ogg-Vorbis or mp3 shoutcast compatible streams. When in the receive mode, the Audio module on the main page will display the connection information along with buttons to connect or disconnect. If enabled in setup, sliders for adjusting the output gain will be present as well.

Audio Mode: Receiver
 Main Audio Feed (205.188...
 Volume control
 -12dB -12dB
 MUTE
 Connect Disconnect
 Connected
 [-] Stream Info:
 Format: MP3
 ID: ISO 11172-3 MPG 1.0
 Layer: III
 Protected: No CRC
 Bitrate: 96kbps
 Sample Rate: 44100
 Padding: Additional Slot
 Mode: Joint Stereo
 Copyright: No
 Original: Yes
 Emphasis: None
 Available Buffer Size: 32 KB
 Available Buffer Time: 2.667 sec
 (s)
 Station Name:
 Salsa - SKY.FM - Best Sa...
 Song Name:
 chuito - don chu
 Messages:

Receive Audio Setup

When set to receive mode, you can set up to five receive stations. Each of these stations consists of the IP address and port number of the streaming audio. The five streaming sources form a "hunt" group, meaning that if the stream from one fails, the decoder can be set to move down the list to the next. Each streaming source can be individually enabled. If not enabled, that stream will not be included in the hunt group. Each index of the hunt group can be named for easy recognition. Below the hunt group are the five indexes as radio buttons. Here you can select which will be active (the main stream).

Streaming Mode: Receiver

Stream	Enabled	Name	Host
Stream IDX1	<input checked="" type="checkbox"/>	Main Audio Feed	205.188.211.231:8010
Stream IDX2	<input type="checkbox"/>
Stream IDX3	<input type="checkbox"/>
Stream IDX4	<input type="checkbox"/>
Stream IDX5	<input type="checkbox"/>

 Set Active: IDX1 IDX2 IDX3 IDX4 IDX5
 Number of attempts to reconnect to each stream before trying next stream index: 3
 Seconds to wait before 'receiver went offline' alarm fires (auto-restarts on successful reconnect to any of the streams): 30
 Enable persistent decoder connect:
 Disabled volume control on main page:
 Left/Right channel volume tied together:
 Variable Playback:
 Treble enhancement level: OFF
 Bass enhancement level: OFF
 Treble enhancement frequency floor: 15Hz
 Bass enhancement frequency floor: 10Hz
 Save

Persistent decoder connect and retry attempts: When persistent decoding is enabled, the AudioSentry will try each index the user defined number of retries before moving on to the next. When the last index is reached, the loop will start over until a connection is achieved.

Treble and Bass controls: These DSP based controls are built-in to the decoder hardware. You can adjust the knee frequencies and the amount of boost for each. These controls only work at lower audio output levels (below -15dB for full effect). Because operating the decoder output at a lower level can result in increased noise (due to the low level needing to be amplified more downstream), you should decide if the advantages of using the tone controls is worth any noise penalty that you might face.

You can also set the delay before registering the loss of streaming as an alarm. The stream alarm resets whenever a stream is successfully started, even if it is not the primary.

The variable playback box is only used for some obscure Ogg-Vorbis streams and should not be used 99.99% of the time.

Receive Audio hardware:

WAM-2's with the streaming option have an active, balanced, output from the streaming engine. The audio output level is controlled digitally from the Web interface.

Date & Time:

All versions of the Sentry products, including the WAM-2, have the ability to calibrate their clocks to an NTP (Time) server. They will keep time if an NTP server is not available, but there are two caveats:

1. They will not keep time if power is interrupted. When power returns, they will attempt to sync the clock with NTP if available.
2. The clock function in the 8-bit product is a timing loop which will not be very accurate. Expect drift of 1 to 5 minutes per hour if no NTP server is available. The 32 bit streaming versions use a clock crystal to keep better time.

The 8-bit version of the product does not include a scheduler, but it can run up to three sequences on a repeating schedule, so you can do things like mute alarms at a certain hour and unmute the alarm at another hour. You can also email logs to yourself at specified intervals instead of per number of log entries. Setup for these sequences can be found in the "misc" tab as described above.

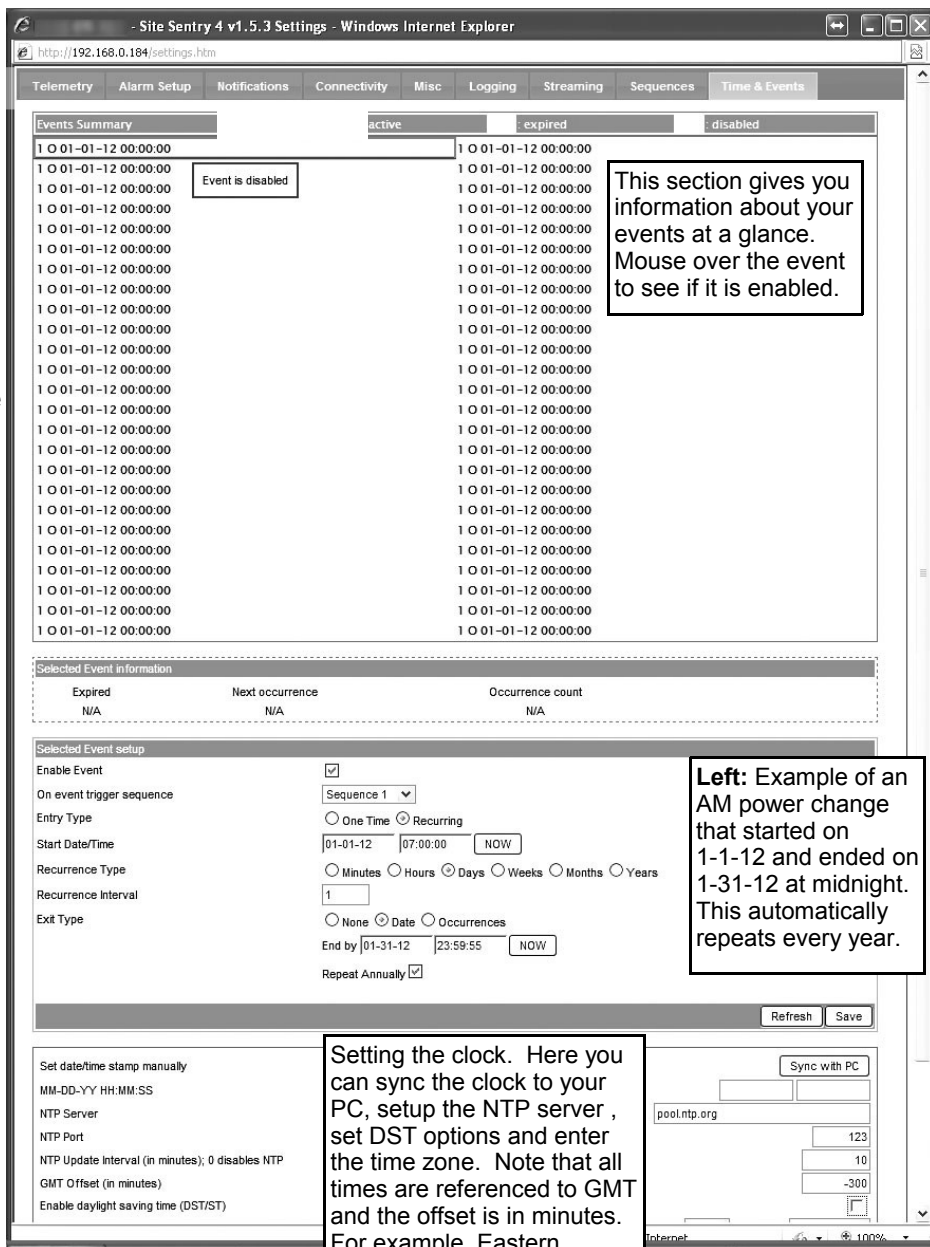
The time setup box lets you set the current time and also selects how often to automatically sync the WAM-2 clock to an NTP server. The NTP server list is embedded in the stack and is not currently user adjustable. In the 8-bit version of the product, time is currently used to time-stamp log entries, but may be used for other processes in the future. Setting NTP update to zero disables updating. You can also manually sync the Sentry's clock to your PC, if desired.

Telemetry	Alarm Setup	Notifications	Connectivity	Misc	Logging	Sequences	Time
Set date/time stamp manually Sync with PC							
MM-DD-YY HH:MM:SS							
NTP Server pool.ntp.org							
NTP Port 123							
NTP Update Interval (in minutes); 0 disables NTP 10							
GMT Offset (in minutes) -300							
Save							

Event Scheduler (32-bit only):

The 32 bit version of the WAM-2 contains a basic event scheduler with 50 events. This scheduler can be used to automate AM pattern and power changes. The granularity of time resolution is + or - 600ms, so it can be used to pre-roll audio cuts or switch transponders at appropriate intervals prior to taking a program. The event scheduler can be programmed to run once, repeat constantly, or repeat for a specific duration (such as a month). Repeating events that end can be programmed to repeat during the next year so that they can repeat themselves every year during the same month, if desired.

The events are triggered by the onboard clock. The clock can be setup to observe daylight savings time (DST), but if DST is used, any AM change schedules will need to be manually adjusted to compensate for the 1 hour difference. The onboard clock syncs itself to time servers but will continue to keep time if the network is disconnected. However, if the power is disconnected, the clock will stop and hold at the most recently stored second. When power is re-applied, the RTC will begin counting again and, if there is a network time (NTP) server available, the WAM-2 will self-sync its clock within a few minutes.



Left: Example of an AM power change that started on 1-1-12 and ended on 1-31-12 at midnight. This automatically repeats every year.

Setting the clock. Here you can sync the clock to your PC, setup the NTP server, set DST options and enter the time zone. Note that all times are referenced to GMT and the offset is in minutes. For example, Eastern Standard time is -300 minutes or 5 hours.

Firmware Upgrades

The SiteSentry can be field upgraded when new features are added or when bugs are corrected. A special password protected Webpage is the gateway to upgrading. After upgrading, you must always reset your unit to factory defaults, so be sure that you have saved your configuration data before starting the upgrade process.

Note that the streaming versions of the SiteSentry units use a 32 bit processor core while the non-streaming versions use an 8-bit core. The firmware loader tool and firmware files are different for each processor.

Save your configuration data before you begin.

Step 1. You must download or have the CircuitWerkes firmware loader tool from our Website. You must also have the firmware files for your product. The firmware files are typically zipped up together in one file. It's OK if the version numbers don't match as long as the two files are from our original zip file.

The firmware loader utility is the same for all SentryX products, including the WAM-2. The only difference is if the core is 32bit or 8 bit as described above.

You do not need to download multiple copies of the loader tool. Install the firmware loader tool on your PC.

Specific 8-bit instructions:

Step 2. Run the FW loader tool and select the DFF (8bit) file that you downloaded for your product.

Step 3. Set the IP address of your product in the loader tool and upload the DFF file to your unit.

Specific 32bit instructions:

Step 2. Run the FW loader tool and put the IP address of your unit into the loader. Press the connect button and, if successful, you should see the bootloader version number displayed.

Step 3. Browse for and select the .HEX file that you downloaded for your product using the "Load Firmware" button and upload the .HEX file to your unit using the "Flash Firmware" button.

All units:

Step 4. Using a browser, log into `###.###.###.###/imageflash`

If you're using a port other than 80, it would look like this: `###.###.###.###:PORT#/imageflash`

Step 5. Login as Admin and use the administrator code that you have set. Default = 12345678.

Step 6. Click the "choose" button and browse to find the .BIN file that you will be uploading.

Step 7. Click "Upload" to send the new BIN to the product.

Step 8. Reset your product to factory defaults. If using the hardware reset, do it at least 2x. Each time you reset the unit, wait, with power applied, for 10 seconds before removing power for the next reset. The hardware reset is done by removing the top cover and shorting the reset pins while powering up the board. Reset pins are found near the front panel LEDs.

Step 9. Import/Upload your configuration data back to the unit and save the changes. Note that connectivity settings and passwords have to be done manually, one at a time.

Note: If you have trouble, reboot the product. During the 1st 5 seconds, the unit will assume a default IP address of 192.168.0.200. If you reboot the unit and immediately push the connect button, you may be able to connect on that node, even if it is outside of your routers netmask. After the first few seconds, the unit will return to its previous IP address or a DHCP address.

Specifications

Dimensions	1.75" H x 8.5" W x 6" D 1RU rack-shelf-mountable
Weight	approx. 3 lbs.
Power	15Vdc @2 00mA supplied by included 117VAC @ 60 Hz wall adaptor
Relays	6 SPDT relays rated at 10va @ 15 VDC. 4 DPDT relays rated at 1 A @ 30 VDC, 0.3 A @ 125 VAC for 5×10^5 cycles



CAUTION: While the WAM-2's DPDT relays can handle 120 VAC, this practice is very dangerous and is strongly discouraged by CircuitWerkes. Switching of hazardous voltages should only be done in a manner that isolates the voltages from accidental contact with people. Don't ever switch lethal voltages directly with the WAM-2! Ever.

Metering Inputs 4 DC audio inputs in 3.5mm depluggable screw terminals capable of accepting 0 to 10V with reference to ground. Negative voltages can be measured via the (-) metering inputs.

Audio Inputs Balanced stereo input on the WAM-2 or unbalanced on the WAM-2. Can detect silence or overload.

Temperature sensor Displays ambient temperature at the back panel of the PCB. Configurable for F or C. Low and High temp alarms.

Status Inputs 2 contact-closure inputs. Pull to ground to activate or supply your own voltage (jumper configured).

Ethernet Internal Web server with DHCP or static IP capability. Browser must have Javascript.

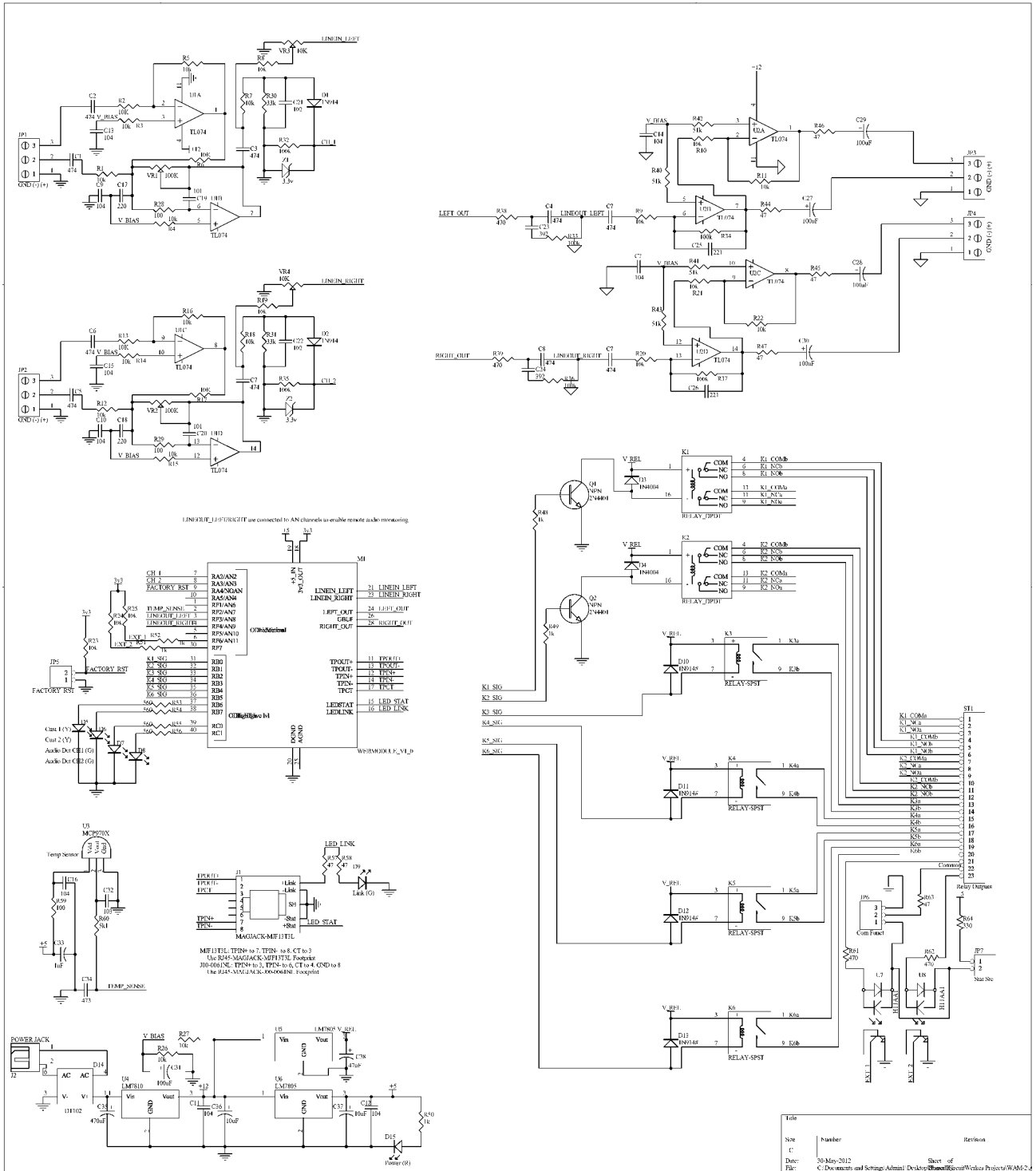
Relay outputs Six total relays on board. Two are DPDT with contacts rated at 1amp. The remainder are SPST with contacts rated at 10VA (100ma MAX NON-Inductive). All relays can be momentary or latching

Alarms 16 onboard alarms can respond to 81 possible conditions, each. Responses can consist of single or up to 3 actions, performed in sequence, with user defined pauses. A list of available actions lets the user define which actions can be taken for a given alarm.

Notifications The onboard e-mailing function can send e-mails or SMS messages when alarm conditions are present. In future release of multiaudio software, you will be able to trigger notifications if any of the audios enter alarm. For secured mail servers, the software will have an option to use the default mailer program, such as Outlook Express, to send the notifications.

Logging A simple log is kept and updated at a user defined interval (default 3hrs). The log can be downloaded via the Webserver and/or e-mailed by running a sequence periodically. Each log entry is time and date stamped. Time and date are kept updated by an internal pool of NTP servers. If NTP is not available, the clock can be manually set and the clock will continue to operate without NTP.

WAM-2 Schematic.



Warranty

CircuitWerkes, Inc. (Manufacturer) warrants that this product is free of defects in both materials and workmanship. Should any part of this equipment be defective, Manufacturer agrees, at its option, to:

- A. Repair or replace any defective part free of charge (except transportation charges) for a period of two years from the date of the original purchase, provided the owner returns the equipment to the Manufacturer at the address set forth below or stated at time of RMA issue from Manufacturer. No charge will be made for parts or labor during this period:
- B. Furnish replacement for any defective parts in the equipment for a period of two years from the date of original purchase. Replacement parts shall be furnished without charge, except labor and transportation.

This warranty excludes assembled products not manufactured by Manufacturer whether or not they are incorporated in a Manufacturer product or sold under a Manufacturer part or model number.

THIS WARRANTY IS VOID IF:

- A. The equipment has been damaged by negligence, accident, act-of-God or mishandling, or has not been operated in accordance with the procedures described in the operating and technical instructions; or,
- B. The equipment has been altered or repaired by other than Manufacturer or authorized service representative of Manufacturer; or,
- C. Adaptations or accessories other than those manufactured or provided by Manufacturer have been made or attached to the equipment which, in the determination of Manufacturer, shall have affected the performance, safety or reliability of the equipment; or,
- D. The equipment's original serial number (if applicable) has been modified or removed.

NO OTHER WARRANTY, EXPRESS OR IMPLIED, INCLUDING WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR USE, APPLIES TO THE EQUIPMENT, nor is any person or company authorized to assume any warranty for Manufacturer or any other liability in connection with the sale of Manufacturer's products.

Manufacturer does not assume any responsibility for consequential damages, expenses or loss of revenue or property, inconvenience or interruption in operation experienced by the customer due to malfunction in the purchased equipment. No warranty service performed on any product shall extend the applicable warranty period.

In case of unsatisfactory operation, the purchaser shall promptly notify Manufacturer at the address set forth below in writing, giving full particulars as to the defects or unsatisfactory operation. Upon receipt of such notice, manufacturer will give instructions respecting the shipment of the equipment, or such other matters as it elects to honor this warranty as above provided. This warranty does not cover damage to the equipment during shipping and Manufacturer assumes no responsibility for such damage. All shipping costs shall be paid by the customer.

Repair or Service Information

In the event of the need for service or repair, call CircuitWerkes at (352) 335-6555 for a Return Merchandise Authorization number (RMA). Then carefully package the unit along with a note of the problem and send it to the address below. Be sure to include your contact information (address - not PO Box - telephone numbers) and best time to call.

This warranty extends only to the original purchaser and is not assign-able or transferable.

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