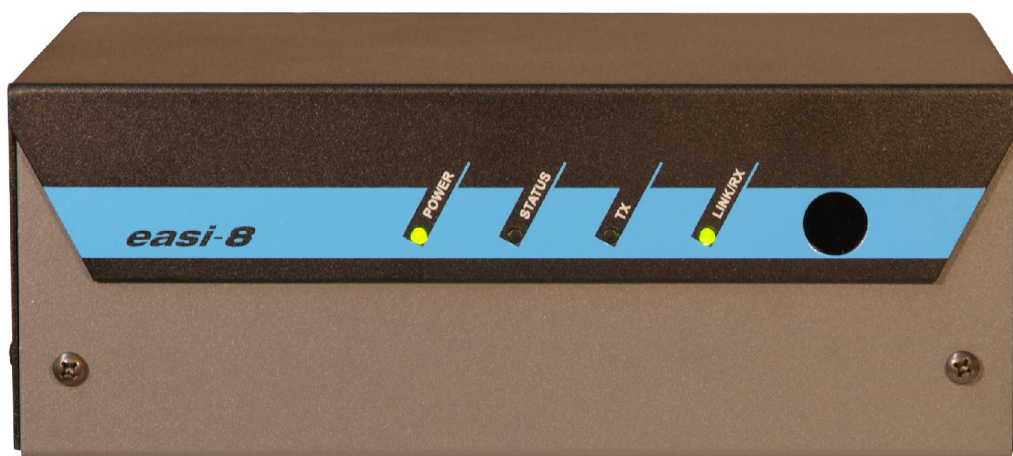


# *easi-8*



Beta Product Manual

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# *easi-8*

## Product Introduction

The *easi-8* was designed to implement a new level of facility monitoring and control at technical infrastructure installations.

*easi-8* allows for the continuous monitoring of eight versatile inputs configurable as either analog metering or binary status. These inputs are true differential instrumentation, auto-ranging inputs and accept either AC or DC, of either polarity.

Eight Form-C relay outputs on the *easi-8* allow for isolated control of customer equipment.

All monitoring, control, and programming functions are available via the WEB eliminating the need for a dedicated application program. Access to the units can be from any PC equipped with a browser.

The unit connects to the Network via a standard 10/100 BASE-T interface.

Sophisticated limit checking allows any user defined event to be reported via email or logged for later evaluation. Additionally, limit tests may initiate any of the relay outputs.

User defined Time of Day events may be triggered by an internal Real Time Clock. The RTC is backed up with an internal battery and can be synchronized via reference to a Network Time Protocol (NTP) server.

Redundant power supply inputs are available to enhance reliability.

An *easi-8* Temperature Sensor connects directly to an input channel allows for the measurement of temperature from -25 to +125 degrees centigrade.

An optional 19 inch mount allows two *easi-8* to be mounted in an equipment rack, occupying 3.5 inches (2 RU) of rack space.

# *easi-8*

## Specifications

### Metering Inputs

AC or DC measurement	0 to 256 volts
Auto-ranging or user defined at 1, 4, 16, 64, or 256 volts full scale.	
AC frequency range	20 to 400 hertz
Quantization	16 bits at each full scale range.
Absolute measurement accuracy, any range	2 percent
Input impedance	1.8 Megohms
Common mode rejection	> 36 dB

### Metering Accessory Current Source

Compliance	10 volts
Maximum current per channel	0.5 mA

### Relay Output Contact Rating

24 VDC 50 watt maximum DC switched load.	2.0 Amps
120 VAC 120 VA maximum AC switched load.	1.0 Amps

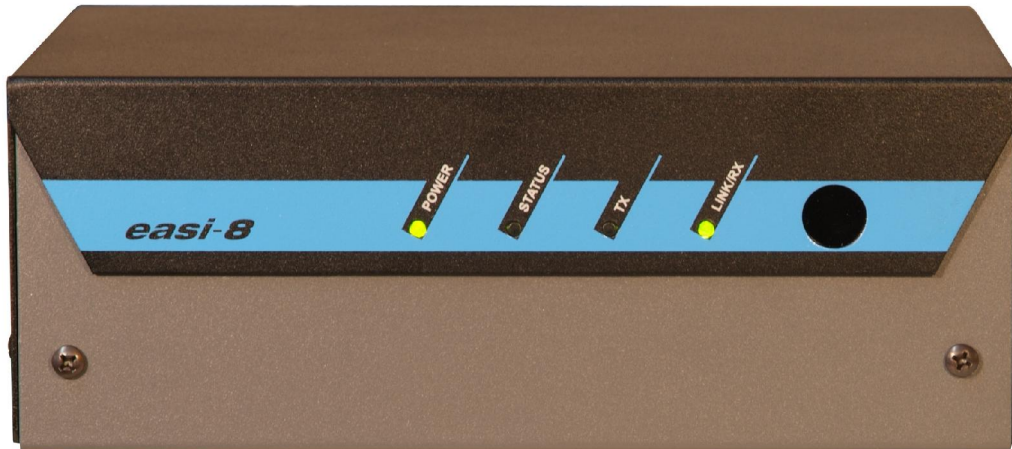
### Power Supply Inputs

DC Input range	10.5 to 18 volts
Power (Maximum)	8 Watts

Power supply inputs are internally fused and polarity protected.

# *easi-8*

## Connectors and Indicators



### Front Panel

#### ***Power***

Red	Upon application of DC input power.
Green	After boot operation complete and unit functioning.

#### ***Status***

Green	Slow blink, 1 second on, 1 second off, during normal operation.
-------	---

Red	Solid during flash memory erase. Slow blink during flash memory program. Fast blink during flash memory verify.
-----	---

#### ***TX***

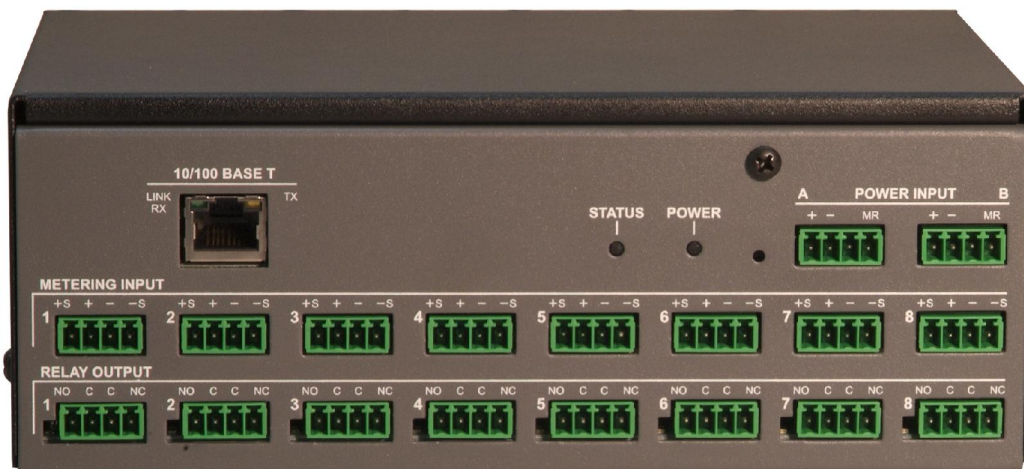
Green	During packet transmit.
-------	-------------------------

#### ***Link/RX***

Green	Solid indicates Ethernet link. Winks during packet traffic.
-------	--

# *easi-8*

## Connectors and Indicators



### Rear Panel Indicators

#### *Power*

Red	Upon application of DC input power.
Green	After boot operation complete and unit functioning.

#### *Status*

Green	Slow blink, 1 second on, 1 second off, during normal operation.
Red	Solid during flash memory erase. Slow blink during flash memory program. Fast blink during flash memory verify.

#### *TX*

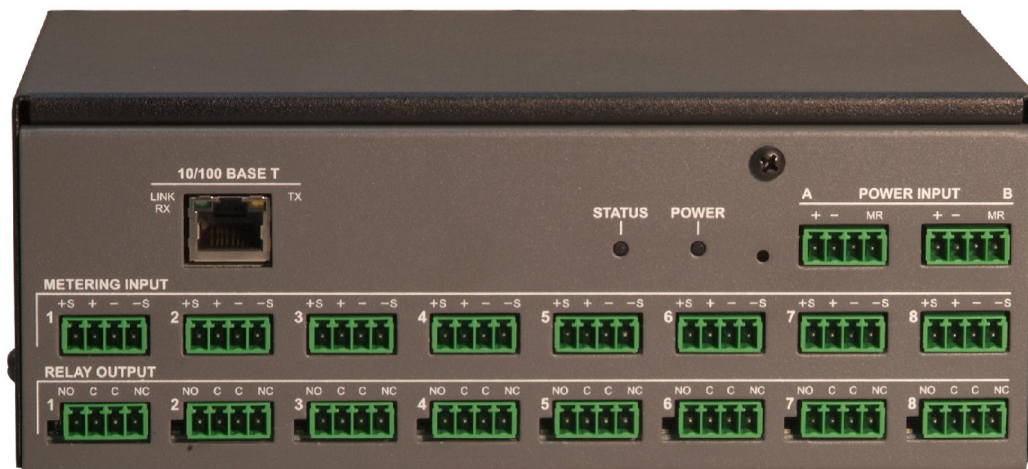
Yellow	During packet transmit.
--------	-------------------------

#### *Link/RX*

Green	Solid indicates Ethernet link. Winks during packet traffic.
-------	--

# *easi-8*

## Connectors and Indicators



### Rear Panel Connectors

#### *Power A & B*

- + DC supply input positive terminal.
- DC supply input negative terminal.
  
- MR Metering Reference / Chassis Ground

#### *Metering Inputs*

- +S Accessory current source positive.
- + Metering channel input positive.
- Metering channel input negative.
- S Accessory current source negative.

#### *Relay Outputs*

- NO Normally Open.
- C Common.
- C Common.
- NC Normally Closed.



# *easi-8*

## Connectors and Indicators

### *10/100 BASE-T Ethernet RJ-45*

1	TX+
2	TX-
3	RX+
4	Terminated
5	Terminated
6	RX-
7	Terminated
8	Terminated

# *easi-8*

## Hardware Installation

### *Physical Location and Mounting*

Mount the *easi-8* chassis in a location convenient to the devices being managed. The unit may be mounted in a standard equipment rack by removing the two 6-32 Phillips screws in the front and securing it to the rack mount adapter.

Additionally the *easi-8* may be secured to the backer board in a telephone closet or inside a transmitter cabinet using the supplied mounting brackets. Remove the lid screws and reinstall them through the bracket holes. Secure the brackets to the desired mounting surface.

The *easi-8* may be mounted in any physical orientation. Choose one that allow easy access to the rear connectors and circulation around the vents.

### *Power Connections*

Connect the supplied wall transformer to the *easi-8* power input at either A or B. For redundancy, an additional supply of 10.5 to 18 volts may be connected at the other input.

One power consideration might be a 12 volt sealed lead acid battery with a float charger. This offers a redundant source that persists during local power failures. A 12 volt 7.0 amp hour battery is an excellent choice and provides in excess of 12 hours of operation.

### **\*\* Important \*\***

For the best metering accuracy and protection of the unit from electrostatic discharge, connect a ground return to the **MR** (metering return) terminal on either power input or both. This can be a short length of wire to a grounded equipment rack, the grounded metal exterior of the monitored equipment, or the protective ground of the AC power service.

### *Network Connection*

Connect the *easi-8* to you local area network, hub, concentrator, or Ethernet switch with the supplied network cable. Networks using 10 Megabit speeds may connect with two twisted pairs on pins 1,2,3 and 6. 100 Megabit speeds require all four pairs. The two additional pairs are terminated in the RJ-45 connector to improve the return loss of the network cable at the higher speed.

# *easi-8*

## Hardware Installation

### *Metering Inputs*

Connect the voltages to be monitored to the metering inputs. **Be sure to use cable suitable for the voltages employed.** Use the center two pins of the metering connector. Respect the polarity indicators for proper polarity display on DC voltages. AC may be connected irrespective of the polarity markings.

The metering inputs are true differential amplifiers. Either input pin may be grounded. Both input pins will tolerate up to 500 volts before damage will occur.

When sampling voltages below 10 volts from single ended sources, use a twisted pair to carry both input terminals to the equipment to be monitored. Connect one of the twisted pairs to the source and one to ground or reference near the source. This will reduce metering errors caused by common mode induction.

The metering inputs can also be used to indicate binary status. Logic voltages can be wired directly to the + & - (center) pins. Status operation will then be set up during programming.

If the equipment being monitored supplies dry contacts for status, the +S pin should be strapped to the + input, and the -S pin strapped to the - input. This will supply a 10 volt ballasted source to the input. The contacts should then be tied to the + & - inputs. The dry contact will short out the resistor ballasted current source during closure and the input will see 0 volts during the **ON** state and 10 volts during the **OFF** state.

### **\*\* Important \*\***

When metering voltages from sources greater than 24 volts AC or DC or any voltage from high current sources such as batteries, locate a fuse block near the voltage source. Install a fast blow fuse such as 100 milliamp to protect the wiring running to the *easi-8* from shorts and other faults.

### *Relay Outputs*

The Form-C relay outputs should be cabled to provide control contacts to the supervised equipment. The relay contacts are rated a 2 amps @ 24 VDC, or 50 watts of switched DC load, 1 amp @ 120 VAC, or 120 VA switched AC load. **Be sure to use cable suitable for the voltages and currents employed.**

# *easi-8*

## Software Configuration

Preparation for Software Configuration.

To perform the initial set up on the *easi-8* we need to set the IP address to one within the local LAN address space.

Power up the *easi-8* and connected it to a network. A PC with browser software installed also should also be connected to the network. The unit comes delivered with the default IP address of **192.168.1.1**.

To initiate communications with the *easi-8* the IP address of the PC will needs to be set to **192.168.1.2**. On a Windows PC this is accomplished by selecting Control Panel from the Start Menu, then selecting >Network and Internet Connections>Network Connections>Local Area Connection>Change The Settings of this Connection. A new pane will appear titled “Local Area Connection Properties”. Select Internet Protocol (TCP/IP) and press the button “Properties”. Select the bubble “Use the following IP address” and type in the 192.168.1.2 address with a Subnet Mask of 255.255.255.0 and press OK.

Start the browser and type “<http://192.168.1.1>” in the location bar.

The *easi-8* WEB page should appear.

Click on **Login**. Enter the Username *admin* with a Password of *admin*.

Once logged in select **System**. A new menu bar will appear. Click on **Config**. The Configuration form will appear. Enter a new IP address as assigned by your IT department, compatible with the LAN segment on which you wish to operate the *easi-8*. Then press **Submit Changes**. Select **Reboot** on the system menu and **Confirm Reboot**.

The *easi-8* will reboot with the new IP address. Return the PC to its normal IP address, restart the browser and login to the *easi-8*.

Continue now with Software Configuration as documented on the following pages.

The following documentation convention will be used: Top level menu selections will be shown in bold, all caps, ie. **SYSTEM**. Sub menu selections will be shown in bold Italics, ie. **Config**. Programmable fields on a form will shown bold ie. **Name**.

All configuration forms have a **Submit** button that transmits the data to the *easi-8*.

# *easi-8*

## Software Configuration

After login in to the *easi-8* select **SYSTEM** at the top level menu.



### **SYSTEM** > *Config*

- Name** Each *easi-8* host needs to have a unique name assigned in this field so the other units can reference it's channels. We suggest that you name it something simple, related to its operation ie. 'Generator'.
- IP Address** The unit needs to have a unique IP address assigned.
- IP Port** The default port is 80 as is standard with most WEB services but may be set to any valid port number security or other reasons.
- IP Netmask** Typically 255.255.255.0, consult your IT administrator.
- IP Gateway** Address of the up stream router for connection beyond the local LAN segment.
- SMTP IP Address** Address of the Simple Mail Transfer Protocol server used to send outgoing email for notifications from the unit.
- NTP Server IP Address** Address of the Network Time Protocol server used to correct the internal Real Time Clock for accuracy.
- Admin Password** Administrator access level password. This level allows all access.
- Control Password** Control access level password. This level allows and control of the supervised equipment, but not set up of unit configuration parameters.
- Time Zone** Select the appropriate time zone to correct UTC to the local time.
- Submit Changes** Transmits the contents of the above form to the unit for storage.

# *easi-8*

## Software Configuration

### **SYSTEM > *Clock***

This form allow for the manual setting of the Date and Time in the Real Time Clock.

### **SYSTEM > *Contacts***

A list of email contacts may be entered here for use in event driven notifications from the unit. When events are programmed one of these contacts may be specified. Multiple email addresses can be entered as one contact by separating addresses with commas.

### **SYSTEM > *Email Queue***

A page that shows status and counter information on the Email notification process. This page can be used in troubleshooting undelivered messages.

### **SYSTEM > *Upload Firmware***

This page allows the user to upload new firmware to the *easi-8* providing for future upgrades in features and performance. It takes approximately 50 seconds to transmit the new file system image to the units and program the flash memory. The unit must then be power cycled or remotely rebooted for the new software to become active. All user programming is preserved through the upgrade process.

### **SYSTEM > *Reboot***

The *easi-8* may be rebooted remotely by pressing the Confirm **Reboot** button on this page. The unit will schedule the reboot to occur after it have shut down all currently running software processes, protecting all data from possible corruption from an asynchronous reset. The entire reboot cycle usually takes about 30 seconds to be back up and running.

### **SYSTEM > *Boot Log***

The *easi-8* writes log entries into a file every time that the system is rebooted. This can be useful for troubleshooting power and other problems.

### **SYSTEM > *Mac Address***

Displays the current Mac Address assigned to the unit.

# *easi-8*

## Software Configuration

### **HOSTS >**

This page allow other *easi-8* units to be aggregated as part of a larger system. Once data for the additional unit is entered the **Add** button submits the data.

### **INPUTS >**

This menu provides for the set up of the individual metering channels. Once the **INPUTS** selection is made a sub menu appears with the 8 metering channels that are available on the rear panel of the unit, plus four *Product* channels. These product channels are software derived pseudo inputs that can be evaluated and processed identically to the hardware input channels. *P12* will contain the math product of hardware channels 1 and 2, *P34* the product of channels 3 and 4. After the data from the associated hardware channels is multiplied it may be further scaled and calibrated like a normal input.

The product channels are useful in the computation of power, ether for the indirect power determination method of broadcast transmitters or computation of KVA consumed on an electrical service.

Set up of an input whether a hardware or product channel is the same.

### **INPUTS > Channel N**

- |                         |   |
|-------------------------|---|
| <b>Label</b>            | The name of the input channel to be displayed on the Monitor pages.   |
| <b>Units</b>            | The units to be displayed on the Monitor pages, ie. volts, amps, gallons, watts, etc.   |
| <b>Input Gain Range</b> | Pull down table lists <b>Auto Range</b> or the user may specify a fixed range for the input channel of <b>1V</b> , <b>4V</b> , <b>16V</b> , <b>64V</b> , or <b>256V</b> . These ranges were selected to allow for 26 bits of equivalent resolution over the input range of a channel. The channel always auto ranges from lowest to highest value. The manual selection of a fixed range aids the speed in which a sample that is switched on or off may be evaluated. An example would be the measurement of an AC service at 120 VAC. If auto ranging is employed, and the service is switched on, it might take up to 5 seconds for the auto range to evaluate the 120 volts. If the channel is fixed at <b>256V</b> the measurement is available in one second. |

# *easi-8*

## Software Configuration

If a fixed range is selected that is lower than the sample, ie. 120VAC into a 1V channel, no damage will occur and the **SAT** (saturation) indicator on the Monitor page will be illuminated red for that channel.

- Squaring** Squaring is used when an input voltage sample represents a quantity of power. An example of this would be the sample from a reflectometer diode in a high power broadcast operation. The sample is quantized, calibrated, and mathematically squared. This allows the channel to display a value for watts, or percentage of power, from the diode sample.
- Calibration Offset** Calibration offset provides for a fixed amount to be added to the channel result. The circuits within the *easi-8* have a small amount of offset. When a channel is un-connected or shorted it might display 12 millivolts when the actual input is 0 volts. If the channel reads 0.012 in this condition, a -0.012 offset can be entered and the channel will be accurately “zeroed” this is normally not a problem on samples greater than 500 millivolts but it can be significant on low voltage thermocouple probes or reflectometer diodes. An offset value can also be creatively used to overcome other problems in voltage and current sampling.
- Calibration Multiplier** The multiplier scales the sample voltage to a value that the user wants to be displayed. To correctly display the voltage on a generator battery (12 volts) use a multiplier of 1.0. If the 5.5 volt input sample is derived from a 32,000 volt supply, use a multiplier of  $32000 / 5.5$  or 5,818.2.
- Calibration Raw Input Value** This is the current sample voltage input to the channel when this page was loaded. You may update this value at anytime by reloading the channel page. Note that any previously entered data that was not updated by **Submit** will be lost when you reload. Calibration Raw Input Value is presented as a convenience to aid in the calculation of the multiplier.
- Calibration Display Value** In lieu of calculating the multiplier, you may directly enter the value you wish to display as represented by the current Raw Value. The multiplier will be automatically calculated when you move the cursor out of Calibration Display Value table. Remember to **Submit** any changes made.
- Mute Enable** The event actions of a metering channel such as email notification or control outputs may be muted by one of 32 *binary mute variables*. Muting allows notification and control of a channel be suppressed. If muting is



# *easi-8*

desired on the current metering/status channel, enable muting by checking the box.

- Mute#** This pull down table allows for the selection of one of the 32 binary mute variables. If enabled in the previous step, the channel event action will be suppressed when the mute variable is **SET**.
- Debounce** This pull down provides values from 0 to 10 seconds. This is the time that an evaluated limit must persist continuously on the channel for an event action to be initiated. This suppresses actions on transients like power bumps.
- Display Type** Sets the display to either a linear meter or binary (two state) indicator for status information. The limit programming forms located below also change dramatically for this selection.
- Meter Range** Specifies the display range of the meter on the Monitor Pages. The meter may display the full range represented by the sample, ie 0 to 150 percent, or an expanded scale, 90 to 105 percent.

## *Limit Programming*

The *easi-8* contains powerful *rules based* evaluation software that gives the user many options in generating actions based on the condition of the metering or status channels. Each metering channel has 5 zones of evaluation, 2 upper and 2 lower limits, along with a *No Limits Exceeded* zone. This powerful approach yields complete flexibility in user programming.

Actions generated in the No Limits Exceeded zone can be useful in providing notification when out of limit conditions return to normal. In addition each limit can generate action on on a positive or negative test basis. An example of this would be an input sample that rises *above* the first *upper* limit programmed threshold will evoke a *positive* action. That same sample falling back *below* the *upper* limit evokes a *negative* action that can be completely separate and distinct. Similarly, a sample falling *below* a *lower* limit actions *positive* while rising *above* the *lower* limit actions *negative*. A good tool for remembering this is to equate *above* and *upper* to +1 and *below* and *lower* to -1, then multiply the two numbers. The result will be either positive or negative.

Limit thresholds will be displayed as hash marks along the top edge of the displayed meter. Unused limits may have threshold beyond the meter range for clarity. The common programmable fields of all limits are described on the following page.

# *easi-8*

## Software Configuration

### *Limit Programming (continued)*

<b>Threshold</b>	Set with the <i>Display Value</i> (not sample value) where you want the limit action to occur.
<b>Color</b>	Sets the displayed indicator color for either the metering bar or the status condition.
<b>Status Label</b>	Program with text to represent the <i>High</i> or <i>Low</i> status states (This item shown only if the display type is set for status).
<b>Action Output</b>	This pull down programs the relay outputs for this action to: <i>Do Nothing</i> (-), <i>Set</i> , <i>Clear</i> , <i>Toggle</i> (change the current state to the opposite), or <i>Pulse</i> (set then clear). Pulse timing is set in the <i>Output</i> menu.
<b>Action Mute</b>	An action may <i>Set</i> , <i>Clear</i> , or <i>Toggle</i> any of the 32 binary mute variables.
<b>Action Log</b>	This specific action can be logged to one of 4 levels with the Date and Time.
<b>Action Email</b>	This action can generate an email for notification of the event. The pull down selects the contact from the previously programmed list.

### OUTPUTS >

<b>Pulse Length</b>	The length of time that a relay is <i>Set</i> when commanded to <i>Pulse</i> can be programmed from 0.1 second to 10.0 seconds in tenth of a second increments.
<b>Initial States</b>	The initial state of any output relay at boot up time may be programmed to be <i>Clear</i> , <i>Set</i> , <i>Pulse</i> , or <i>Previous State</i> (last relay state before loss of power or reboot evoked).

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## Software Configuration

### TIME OF DAY > N

Sixty-four time of day events may be programmed with the pull down forms.

- Enabled**      Checking this box enables the generation of an events based on the day, date, and time programming on the form. A time of day event can be programmed but left un-enabled until a future date.
- Day of (-) Week**      Settings allows functions to take place on a specific week day. The dash tells the rule evaluator software to bypass this field and not respect the day of week.
- Month**      A specific month may be specified or *Any* will be true for all months. Month specific programing allows AM radio stations to program a full year's worth of power changes.
- Day**      A specific calendar day may be specified or *Any* will be true for all calendar days of the month. Alternate main transmitter could be automatically switched on the 1<sup>st</sup> day of each month.
- Hour**      A specific hour may be selected.
- Minute**      A specific minute may be selected.
- Second**      A specific second may be selected. This feature is great for network source selection, switching satellite down link or up link transmitters.

### *Time of Day Actions*

- Action Output**      This pull down programs the relay outputs for this action to: *Do Nothing* (-), *Set*, *Clear*, *Toggle* (change the current state to the opposite), or *Pulse* (set then clear). Pulse timing is set in the *Output* menu.
- Action Mute**      An action may *Set*, *Clear*, or *Toggle* any of the 32 binary mute variables.
- Action Log**      The *Action Log* under time of day is different than with metering limit. Logging under time of day causes a snapshot of all current channel values and output states to be logged on one of 4 levels with the date and time.

# *easi-8*

## Software Configuration

### *Time of Day Actions (continued)*

**Action** As in *Action Log* above, this action generates an email for notification  
**Email** with a snapshot of all channel values and output states along with the current date and time. The pull down selects the contact from the previously programmed contact list.

### **LOGGING > Level N**

Logged events can be viewed, specific events deleted, or all events deleted from this menu. Each one of the four specific log levels can be viewed or all logs merged and viewed together. The logging levels hold 64 events with the most recent event at the top of the level and the oldest events at the bottom. The logging levels are prioritized with level 0 having the highest priority. When the sixty-fifth event comes along, it is placed at the top of the specified level, the oldest message of the lowest priority level is bumped and the overflow counter is incremented. The overflow counters can be viewed for each level and *Reset* as determined by the user.

### **MUTES > N**

A pull down menu allows for the programming each of the 32 binary mute variables. The mute may be left in the *Variable* mode where it can be *Set*, *Cleared*, or *Toggled* by any metering, status, or time of day action.

Additionally the mute may be hard assigned to a Status Channel state or Output Relay state, as listed in the pull down.

### *Mutes from Other Hosts*

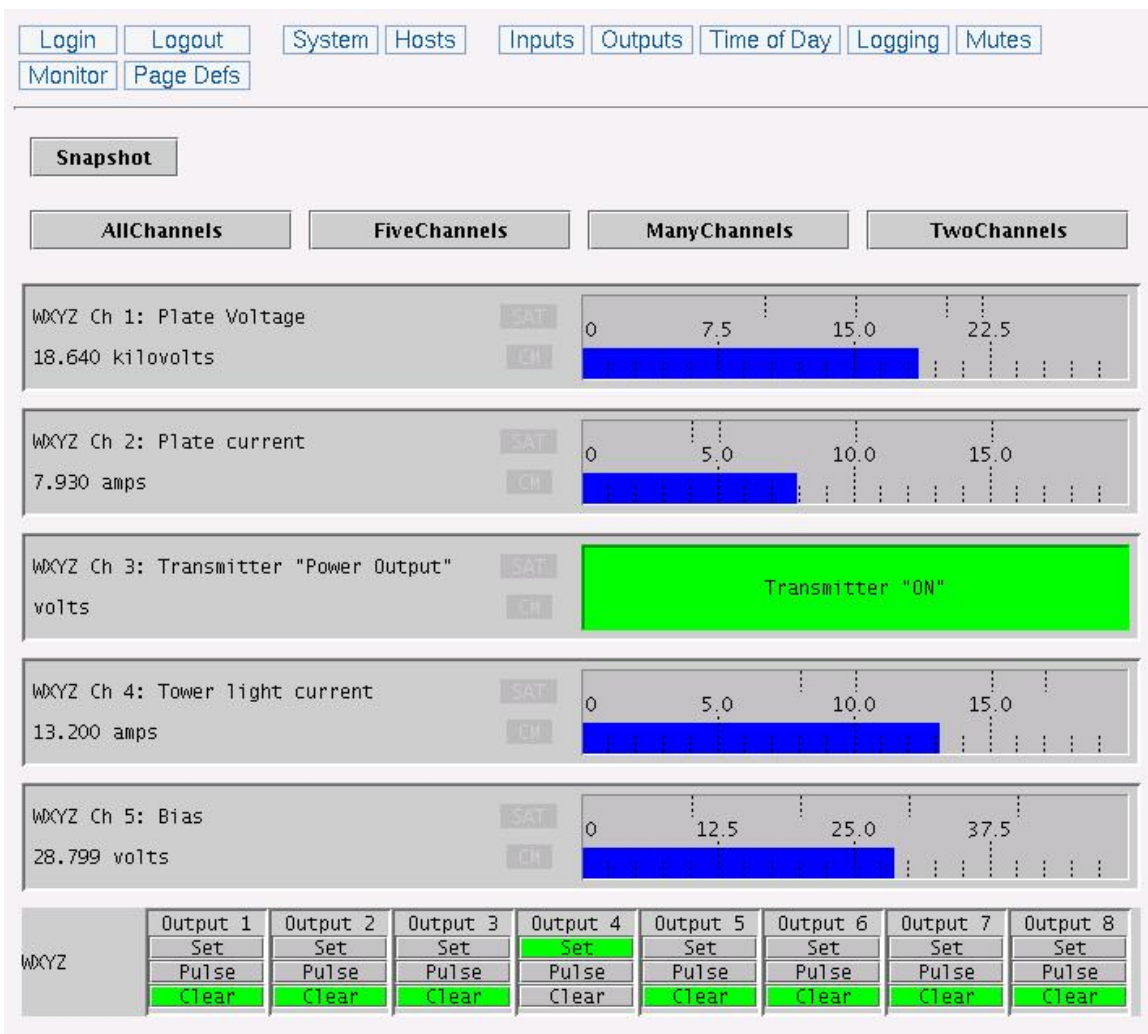
When multiple *easi-8* units are employed, the 32 mute variables on a unit may be referenced by other units, if the unit to be referenced is in the *Hosts* list. The mute pull down menu will then list the additional units' 32 mute variables for use locally.

# *easi-8*

## Software Configuration

### MONITOR >

The Monitor button will download a Java application to the browser to display pre-configured display pages. The Java applet polls the units in real time, updating the display as changes occur. An example monitor screen is shown below.



# *easi-8*

## Software Configuration

### **PAGE DEFS >**

This selection provides for the programming of multiple display pages that can be referenced by the *Monitor* function. A display pane will support 13 display entries allowing all 12 channels of data plus the Output Controls to be simultaneously displayed. Meters, status indicators, and Output Controls may be assembled in any order and may also be declared on multiple display pages. The pages must be named for convenient reference by users.

In multiple unit installations the channels and outputs of all boxes listed in the *Hosts* list will be available for selection in the pull down menus.

A shortcut button, *Preload Form with Typical Values*, allows all items to be populated quickly with the contents of the unit. *Reset Selections*, provides quick clearing of forms and *Add This Page*, submits this data to the *easi-8*.

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## Temperature Sensor

The *easi-8* ships with an *easi-8* Temperature Sensor. The sensor is powered from the ballasted current source pins on the Metering Input channel. The Sensor comes with a short length of twisted pair cable that mates with the RJ-45 on the sensor board and the Phoenix Connector blocks on the *easi-8*.

The sensor is accurate to within 3 degrees and very linear from -25 to +125 degrees Centigrade ( -13 to 257 degrees Fahrenheit).

Connect the Sensor to an input channel and set the channel with an *Offset Value* of -67.840 and a *Multiplier* of 160. The display will then read out directly in degrees Centigrade (or Celsius).

Connect the Sensor to an input channel and set the channel with an *Offset Value* of -90.112 and a *Multiplier* of 288. The display will then read out directly in degrees Fahrenheit.

A longer cable can be substituted. This requires two twisted pairs, one on pins 1 & 2 the other on pins 3 & 6 of the RJ-45. Connect this pins of the sensor to the *easi-8* input as follows:

Sensor	<i>easi-8</i>
1	+S
2	-S
3	+ In
6	- In