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**GSI-2C Hardware  
and  
Simple Rulez Embedded Software  
  
Operator's Manual**

**In support of:  
Simple Rulez Software 1.1  
Hardware GSI-2C  
9/20/03**

|  |    |
|--|----|
| Chapter 1 Overview .....   | 4  |
| Features:.....   | 4  |
| Simple Rulez Software Features .....   | 5  |
| Chapter 2 Installation .....   | 7  |
| Chapter 3 General Operation.....   | 12 |
| Chapter 4 Setting Clock .....  | 13 |
| Chapter 5 Inputs .....   | 14 |
| Time .....   | 14 |
| Temperature .....  | 14 |
| Light Level.....   | 15 |
| IR Commands .....  | 16 |
| Digital Inputs .....   | 16 |
| Analog Inputs.....   | 16 |
| Chapter 6 Outputs.....   | 18 |
| Health LED .....   | 18 |
| Relays .....   | 18 |
| Digital Outputs.....   | 19 |
| Tones.....   | 19 |
| X10 Send.....  | 20 |
| Expansion Outputs (Relay or IO expansion boards) .....                           | 20 |
| Chapter 7 Event Programming .....  | 21 |
| Entering A New Event .....   | 21 |
| Clearing a Programmed Event .....  | 22 |
| Delay Timers.....  | 22 |
| Flag Value.....  | 23 |
| Examples.....  | 23 |
| Chapter 8 Logging.....   | 24 |
| Chapter 9 Settings .....   | 25 |
| Temp Units .....   | 25 |
| X10 Address .....  | 25 |
| X10 Housecode.....   | 25 |
| Relay Mode.....  | 25 |
| Logging.....   | 26 |
| Load Defaults.....   | 26 |
| Chapter 10 Serial Interface .....  | 27 |
| Input Command (I) .....  | 27 |
| Output Command (O) .....   | 28 |
| Dump Command (D) .....   | 28 |
| Set Time/Date Command (S).....   | 29 |
| EEPROM Utilities (E) .....   | 29 |
| Tone Command (Q) .....   | 30 |
| Health Command (H).....  | 31 |
| Digital Output Command (J).....  | 31 |
| Relay Output Command (R) .....   | 32 |
| Configure Settings Command (C).....  | 32 |
| Display Log Command (L).....   | 34 |
| Display Status Command (Z).....  | 35 |
| Chapter 11 GSI-2 Utility .....   | 37 |
| Using the GSI-2 Utility to download event programs from a file .....             | 38 |
| Changing GSI-2 settings using the GSI-2 Utility.....                             | 39 |
| Chapter 12 Downloading the SimpleRulez Software to the GSI-2.....                | 41 |
| Downloading Simple Rulez Software to the GSI-2 Using the HC08Loader Utility..... | 42 |
| Downloading Simple Rulez software to the GSI-2 Using the PRog08sz Utility.....   | 43 |
| Chapter 13 Specifications.....   | 44 |
| Physical.....  | 44 |
| Electrical .....   | 44 |
| Hardware.....  | 44 |
| Software.....  | 45 |



## Chapter 1 Overview

The Gunn Systems GSI-2C hardware platform is a versatile embedded platform with a high-speed microprocessor and simple on-board inputs and outputs.

Coupled with the embedded Simple Rulez software, the GSI-2 becomes a powerful yet simple logic controller that is fully operational from the front panel.

### **Features:**

The GSI-2 Controller (Hardware) Provides:

- Serial (RS-232) Interface
- 10 Mhz Microprocessor with 32K Flash ROM
- Real Time Clock with power outage backup
- LCD Display (20x2 characters) with backlight or Vacuum Fluorescent \*\*
- Simple Encoder/One-Button user interface (called *selector knob*); Keypad option also available.
- X10 Home automation interface (optional)
- 1 or 2 external Temperature sensors (Dallas 1 Wire interface)
- Audio tone Output (various frequencies and durations)
- 2 Single-pole 10 Amp Relays on-board (Plug able Terminal block connector)
- 4 High Current DC Switched Outputs (1/2 A)
- 1 Analog Input (0-5V DC inputs)
- Status LEDs: Processor (blue), and Health (bi-color)
- EEPROM (2K Bytes), socketed for easy removal Used for Log and configuration
- SPI Connector for expansion
- Mountable molded plastic box

Note: \*\* = Industrial range version with fluorescent display is optional

## **Simple Rulez Software Features**

The Simple Rulez embedded software is written in the C language. It provides:

- A user interface and menuing system that utilizes the GSI-2's LCD display and selector knob (or keypad). Allows easy configuration, status display, and event programming from the front panel.
- Communications are provided through RS-232 (9600 baud, 1 stop bit). ASCII terminal interface and intuitive menuing system.
- Communications through X10 control (programmable events, time sync).
- Programmable events (simple "If...Then"-style programming) and scheduling
- Event Logging (with time and date stamp).
- Value Logging (once an hour – temp, light, analog inputs, x10)
- EEPROM (non-volatile memory) Storage of settings, events, and logging.

### **Possible Outputs (programmable using events):**

|  |
|--|
| 10 Amp Relays (two)  |
| ½ Amp DC Outputs (four)  |
| Tones (once, once a minute, once every 8 seconds, once a second, variable Freq and vol.)     |
| Dual Color LED Indicator   |
| X10 Commands Sent (any address, any house code, Cmds: ALL ON, ALL OFF, ON, OFF, DIM, BRIGHT) |
| SPI – Expansion outputs (to future external relay board, D-A/A_D board)                      |
| Minutes and second timers, and flag value  |

### **Possible Inputs (programmable using events):**

|   |
|---|
| Time / Date Schedules                             |
| Temperature Sensor (up to 2 external temp probes) |
| Light level                                       |
| Infrared Remote                                   |
| X10 commands received (ON, OFF, BRIGHT, DIM)      |
| 4 Inputs (Analog or Digital)                      |
| Minutes and seconds timers and flag value         |

### **X10 Interface Provides (with optional X10 adaptor):**

- X10 Commands Sent, triggered by Programmed Events/Schedules
- X10 Commands Received trigger Programmed Events
- Time Sync (3:00 AM) with external computer (requires optional software)++
- Health LED Override++

X10 interface supports either the Power-Linc X10 adaptor (provides power and X10 communications) or TW-523.

++ = See settings chapter for enabling automatic X10 functions

## **Chapter 2 Installation**

### **WARNINGS:**

**NEVER CONNECT THE GSI TO A TELEPHONE LINE; THE RJ-11 CONNECTOR IS FOR THE X10 POWER-LINC ADAPTOR ONLY, NOT TELEPHONE.**

**IF YOU ARE USING THE POWERLINC X10 ADAPTOR, YOU DO NOT NEED ANY OTHER POWER SOURCE (THE POWER-LINC ADAPTOR PROVIDES IT).**

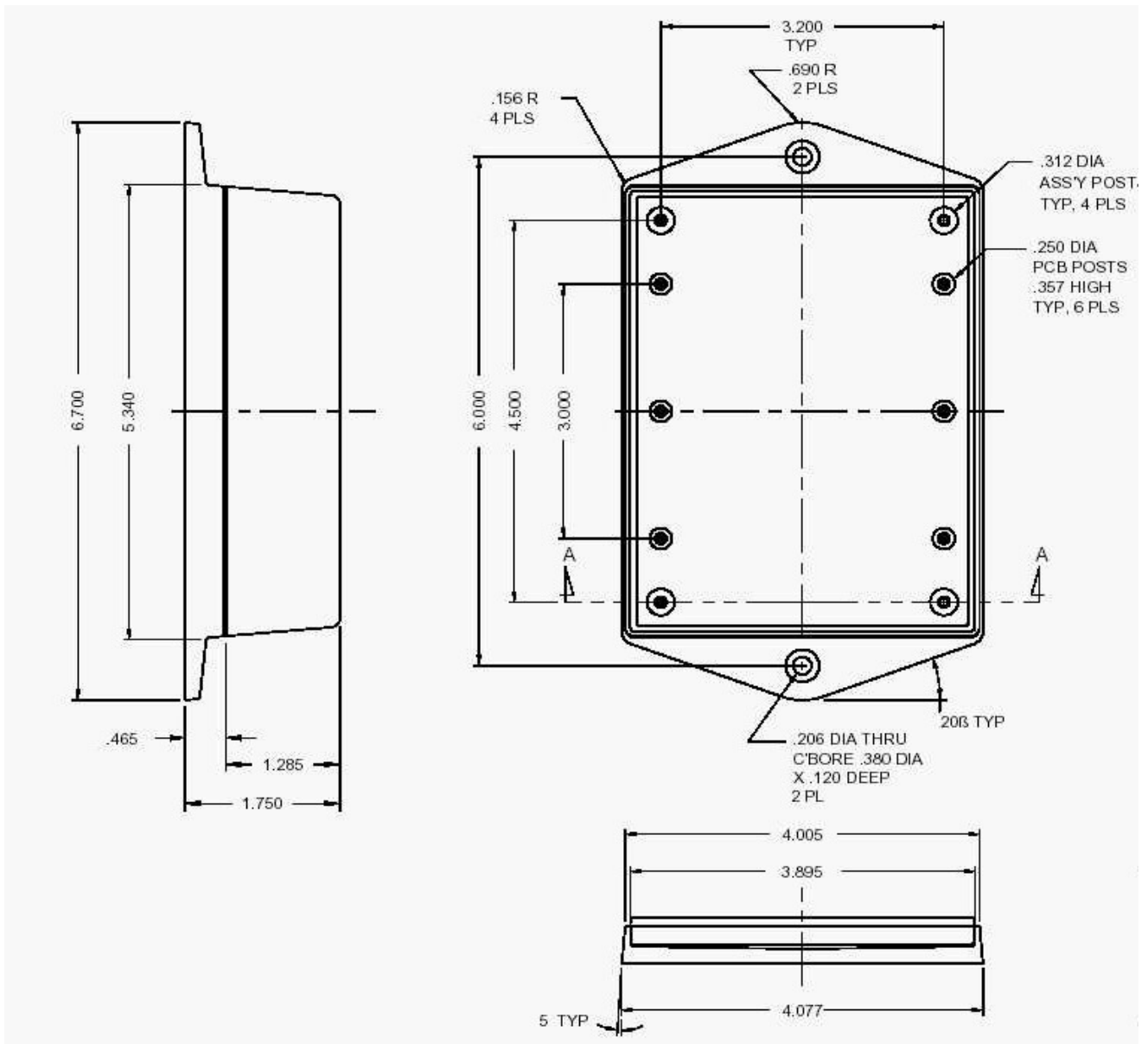
**ONLY THE RELAYS (TB2) MAY HAVE AC CONNECTED DIRECTLY TO THEM. CONNECTING 125VAC TO ANY OTHER POINT ON THE BOARD WILL ABSOLUTELY VOID ANY WARRANTY.**

**IF YOU FEEL YOU DON'T KNOW WHAT YOU ARE DOING AFTER FULLY READING THIS MANUAL, THEN ASK OR HIRE SOMEONE WHO DOES BEFORE INSTALLING AND USING THIS PRODUCT.**

**GUNN SYSTEMS RECOMMENDS USING A QUALIFIED ELECTRICIAN FOR ANY AC WIRING**

### Mounting the GSI-2C

The overall size of the GSI-2 is 6.7"W x 4.077"L x 3.75"H (Note that switch and cabling come out top; access "punch-out" on bottom for user cabling).





## **GSI-2 Connections:**

**Temp Probe** – You can use one or two temperature probes connected to the small mini jack type connector on the top left of the unit. If you have two temperature sensors you will need a Y cable. Note temperature sensors have a maximum length of 3 feet (1 M).

**Serial Port** - If you are connecting to a laptop or desktop PC use a standard serial cable to connect to the DB-9 serial connector (RS-232 serial connector) on the GSI-2.

### **Internal Connections –**

The following connections are provided inside the unit. Open the back cover by removing the 3 Philips screws. Two removable punch-out plugs are provided on the bottom of the case for routing wiring.

The terminal block (TB 1, the one with 10 terminals) positions are used for four digital or analog inputs. These are 0 to 5 volt inputs. These inputs are suitable for contact closure to ground, for example to connect a switch to an input connect one side to ground and the other to the input terminal.

### **Input Terminals (on TB1):**

Terminal 6 – Input 1

Terminal 7 – Input 2

Terminal 8 – Input 3

Terminal 9 – Input 4

Terminal 1 - Ground

Note 1: Terminal 1 is Ground, and Terminal 10 is +5V.

Note 2: The inputs include an onboard pull-up on RN1.

The terminal block (TB 1, the one with 10 terminals) positions are also used for four digital outputs. These are DC outputs (sink type) capable of sinking ½ amp DC.

### **Output Terminals (on TB1):**

Terminal 1 - Ground

Terminal 2 – Output 1

Terminal 3 – Output 2

Terminal 4 – Output 3

Terminal 5 – Output 4

Note: 10K pull-ups are included on-board (via RN1).

### Relays – (on TB2)

Pin 1 is to the left next to the 10 pos terminal block

PINS 1 and 2 are contacts for RELAY 1

PINS 3 and 4 are contacts for RELAY 2

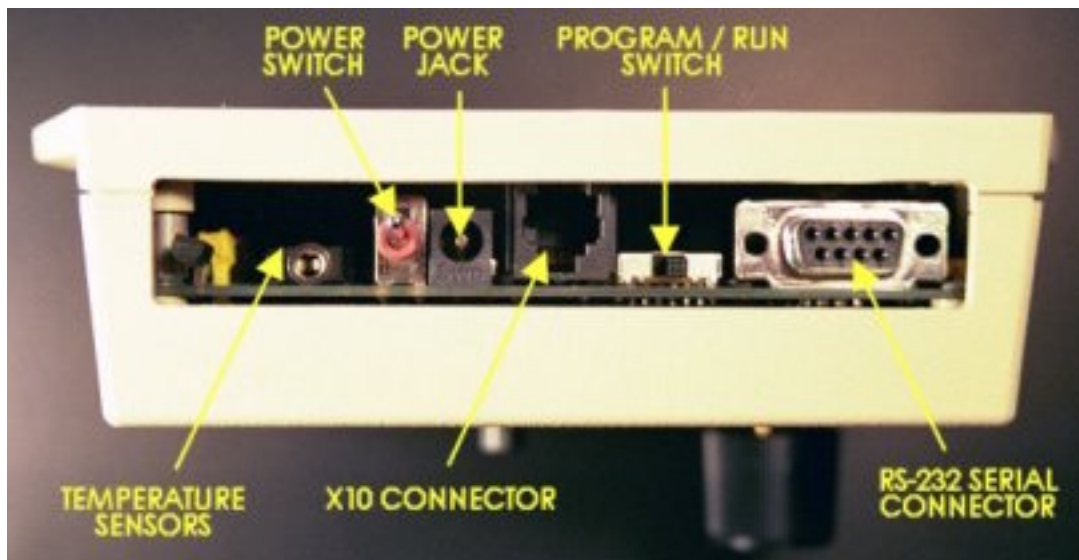
### Power –

**IF USING X10** - If you are using the optional X10 power pack (it will be labeled “PowerLinc”, then you will connect the small telephone (RJ-11) connector to the X10 connector. on the GSI-2.

**IF NOT USING X10** – If you are using the standard 12VDC power pack, plug the power jack into the jack next to the power switch.

**NOTE: The Program/Run Switch should be in the RUN Position (towards the Serial Connector) for normal operation.**

WARNING: Do not use the Powerline adaptor and any other power source at the same time or damage may occur.





## Chapter 3 General Operation

The operation of The GSI-2 is simple. Turning the *selector knob* allows you to choose entries and values. Pressing and releasing (tapping) the selector knob is the equivalent of the enter key and will accept the entry/value and move on.

The Menu button will always return you to the main menu.

NOTE: Pressing the MENU button while in Event Programming will abort the programming and NOT store the new or changed event. If you are in Event Programming and wish to save the event, tap the selector knob until the main menu displays to make sure the event is saved.

The Power switch is located on the top of the unit. Switching it away from the front display will turn the unit on. Once powered, the display should show the Sign On and Main Menu, and the Blue Lamp should flash. If these actions do not happen, check the power to the unit.

Normally the Blue Status Lamp will flash, indicating the GSI-2 is looking for events to handle. The faster the lamp flashes, the more events the unit has found active.

The Health Lamp (the Green/Red lamp) is normally steady green unless an event is controlling it (note the Health lamp can be overridden—i.e. forced—from the front panel or the X10 interface).

While the GSI-2 is running, the display shows information relevant to its event configuration. For example, if the unit is programmed to monitor the temperature, the display will show the current temperature, while if an event is scheduled for a particular time or date, the display will show the current time and date. When events are programmed monitoring different inputs, a rotating display shows relevant current readings.

## Chapter 4 Setting Clock

Probably one of the first things you'll want to do is set the clock. The clock is used for scheduled events (by time and by date) and used in logging.

Using the selector knob, turn until the entry says "**Clock:**" and gently press the knob.

The Display should read something like:

**Enter.Hour -> 10**  
**10:21.52 8/08/02**

Rotate the selector knob to select the correct hour, and press and release it to save this value and move on to the next entry (Minutes).

Continue until the all time and date entries have been selected. After the year is entered and saved, the display will return to the Main Menu.

Note that the clock will continue to run with no power for up to one week. After 1 week, the time setting may be lost.

## Chapter 5 Inputs

Since most programming starts with the inputs, we will first consider available inputs and options.

You can directly status the inputs easily. Using the selector knob, turn until the entry says “**Inputs:**” and gently press the knob.

### ***Time***

The current time and date are considered inputs. To set the clock, refer to the *Setting Clock* section.

The clock is maintained with a large capacitor, capable of keeping the time accurate without power for over a week. Unlike a battery, the capacitor does not need replacement.

Automatic daylight savings time correction is NOT provided; however, leap year is accounted for.

For programming events and logging, the clock has a 1 minute resolution.

Time may be synchronized via the X10 interface. The way this works is that once a day (at 3:00 AM) you can program your home automation system to send out a particular X10 command (master house code, as set in settings; address 16, refer to X10 chapter). The clock will be set to exactly 3:00 when received.

All times use the 24-hour format to avoid confusion. The 24-hour format is sometimes referred to as military time, and ranges from 0:00 to 23:59. 12:00 is noon and 0:00 is midnight. As an example, 21:00 would be 9:00PM.

Schedules are just events that are programmed for a specific time or day. Schedules mayt be scheduled on 15 minute intervals. Days can be selected as doy of month (1 – 31) or week day (SUN-SAT) or weekend (SAT or SUN) or Weekday (MON-FRI)

### ***Temperature***

The GSI-2 supports up to 2 temperature sensors. Temp sensors are referred to by sensor A or sensor B.

The optional external temp sensor is connected via the 1/8" mini-jack. The temp sensor probe may be purchased assembled from GSI. If you wish to make one yourself, use a DS-1822 sensor IC (available from Digi-Key Corp.) and 1/8" 3 wire (stereo) mini-jack. The tip is pin 2, the ring is pin 3, and the middle ring is pin 1 (note the 3'[or 1 meter] max wire length).

In order to install two sensors a Y cable must be used. Radio Shack® stores often stock such a cable (a stereo 3.5MM mini-jack Y cable).

**WARNING:** Do not unplug the external temperature with the GSI-2 unit powered on. Turn off the GSI-2, then unplug the connector.

The temp sensors may be set to read in degrees Fahrenheit or Celsius (see chapter on *Settings*).

The temp sensor is read once per minute (twice per minute if two sensors are connected). An exception to this occurs when the Temp is being statused (displayed from the input menu), at which time the temperature is read once per second (to keep the display up to date).

Minimum and Maximum temperature readings (since power-up) are also displayed.

Events may be programmed for any range of temperatures on either of the probes.

**WARNING: DAMAGE MAY OCCUR IF YOU DO NOT TURN OFF POWER WHEN CONNECTING OR DISCONNECTING TEMPERATURE PROBES**

## ***Light Level***

The light sensor detects ambient light from 0 to 99%. This reading is relative and un-calibrated to any particular standard, but provides useful indication of lighting conditions. The light sensor is located just above the selector knob.

The light sensor value is averaged over 8 periods. A period is normally defined as 1 minute, but is increased to 1 second when the light sensor value is displayed (from the Input menu or using the utility). So when actively displaying the light sensor value, the lighting level is averaged over 8 seconds. When normal events are running, the lighting level is averaged over 8 minutes. This works well for detecting sunrise and sunset without creating too many spurious events.

If you are looking to trigger an event based on a particular lighting level, the best approach would be to take a reading of the lighting level by viewing the value displayed

on the Input menu in the actual lighting conditions (keeping in mind the 8-second averaging).

## ***IR Commands***

The infrared remote detector scans for television (Sony) remote control commands.

Events may be programmed to trigger when any number from 1 to 9 on the remote control is pressed. Any pre-programmed or universal remote control should work if set to transmit Sony TV Codes.

## ***Digital Inputs***

The terminal block (TB 1, the one with 10 terminals) positions are used for four digital or analog inputs.

Input Terminals:

Terminal 6 – Input 1

Terminal 7 – Input 2

Terminal 8 – Input 3

Terminal 9 – Input 4

Terminal 1 - Ground

Note 1: Terminal 1 is Ground, and Terminal 10 is +5V.

Note 2: The inputs include an onboard pull-up on RN1.

## ***Analog Inputs***

The first digital inputs also doubles as an analog input. A simple 8-bit A-D converter converts the input voltages to values from 0 to 255 (255 would be close to 5 volts).

Accuracy is 5% (suitable for most applications).

See the input terminal descriptions in *Digital Inputs* section.

Events may be programmed so that a range of values on the analog inputs will activate an output.

Note: The 0-5V analog input can support using 4-20 ma sensors on the analog inputs, but you MUST provide the current loop load resistors. A 250-Ohm resistor between



Terminal 10 and the input terminal will provide the necessary load. 4-20 ma inputs do not get full 8-bit resolution.

RN1 contains the input and output pull-up resistors. It is recommended that you remove the pull-ups on the analog input, remove RN1, trim or cut Pin 6, and re-insert RN1.

## Chapter 6 Outputs

Usually, outputs are controlled via programmed events. Programmed events are, of course, triggered by a specified input (see the *Inputs* chapter).

The two exceptions are these:

- 1) Outputs (Health LED, Relays, and Digital Outputs) may be “forced” ON or OFF using the front panel. A forced output will override any programmed events and stay in the forced state until the selector knob on the front panel is pressed.
- 2) The Health LED may be overridden from factory pre-programmed operations on the X10 interface (see the *X10 Address* section).

### **Health LED**

The Health LED is a bi-color (Red/Green) LED on the front panel that is controllable from events (or special X10 commands).

The purpose of the Health LED is to provide system status at a quick glance. Under normal conditions, the Health LED will display a steady green.

You can program events to make the Health LED flash Red from 1 to 4 times followed by a delay.

#### Chart of Health Values

|     |  |
|-----|--|
| 0   | Green  |
| 1-4 | Blink Red this number of times followed by a delay |

### **Relays**

The GSI-2 has 2 high current relay outputs. These relays are capable of 10 Amps at 125 VAC. Note that the relays actually have a higher rating, but the terminal blocks are only rated for 10 AMPS, so 10 AMPS is the Maximum. Max voltage is 125 VAC.

The relays may be set to either a) respond directly to events (Normal operation, true=ON), b) Pulse once (“Once” setting) when an event goes true, or c) flash once a second (“Flash” setting) while the event goes true. Refer to the *Settings* chapter.

Note that when a relay is *forced* ON or OFF, it will either go to ON or OFF (it will ignore the relay mode chosen in settings, i.e. it will NOT flash or pulse once).

## **Digital Outputs**

The GSI-2 provides 4 high current DC outputs. These are open collector Sink type logic outputs capable of sinking up to 0.5 Amps DC (30 VDC max pull-up).

Output Terminals (on TB1):

Terminal 1 - Ground

Terminal 2 – Output 1

Terminal 3 – Output 2

Terminal 4 – Output 3

Terminal 5 – Output 4

Note: 10K pull-ups are included on-board (via RN1).

On-board LEDS will illuminate when the outputs are pulled to ground (logic 0 = LED ON).

**WARNING: YOU MUST REMOVE OR DISABLE THE PULL-UPS IF THE OUTPUTS ARE CONNECTED TO A SUPPLY GREATER THAN 5 VOLTS.**

RN1 contains the input and output pull-up resistors. To remove the pull-ups, remove RN1, trim or cut Pins 2 thru 5, and re-insert RN1.

## **Tones**

A small speaker is located on-board to provide audio output.

Tones are programmed as follows:

### Tone Values

|     |  |
|-----|--|
| 1   | Beep once an event goes true (least annoying, but may be missed).  |
| 2   | Chirp Once a minute.   |
| 3   | Chirp every 8 seconds.   |
| 4   | Beep Once a second.  |
| 5-9 | Continuous tone. The higher the number the louder and longer the beep. Setting 9 is the most annoying and loudest! |

A terminal block (TB4) is located on-board if you wish to connect an external speaker or PA system to the audio output. TB-4 may not be stuffed on all boards but may be easily added (5mm term block available from most electronic vendors).

## ***X10 Send***

X10 commands may be sent to any address or housecode.

The following commands are supported:

- All On (Light modules only)
- All Off
- On
- Off
- Bright (3 steps each)
- Dim (3 steps each)

When an event goes true, the X10 command is sent TWICE and then waits for an event to go false then true again before sending again (In other words, the X10 command DOES NOT continue to send as long as the event is true).

Therefore, unlike relays and outputs, you must program events to turn both ON and OFF the X10 device, as appropriate.

## ***Expansion Outputs (Relay or IO expansion boards)***

The GSI-2 supports expansion boards connected to the SPI bus. A relay board (5 relays) and an IO board (8 DC outputs) are supported by Simple Rulez software.

The outputs may be set on or off. On will activate a relay if using a relay board or turn on (Sink to ground) a DC output if using the IO board.

## Chapter 7 Event Programming

Up to 9 events (numbered 1 through 9) can be programmed on a GSI-2 unit. The events are stored in EEPROM, so they are retained through power outages.

Normally the GSI-2 ships with all the events cleared (and you can start programming at event 1).

If you received a programming sheet from the factory with events listed, this means that the factory has already added the events, and you should not have to do anything but install the unit and turn on the power.

Normally the Blue Status LED will flash, indicating the GSI-2 is running and checking for events and things to do. The speed of the Blue Lamp flash is directly related to the number of events active. The Blue LED will go ON Steady if you are in event programming mode to indicate that no events are being checked (it should start to flash again after you exit back to the main menu).

Events are processed in order, starting at 1, and continuing to 9. None of the relay or digital outputs are activated until all the events are processed. This means that if event 1 sets the relay ON, but event 3 sets it back OFF, the relay will remain OFF (it will NOT pulse or toggle).

### ***Entering A New Event***

To program an event:

1. Hit the MENU button, then scroll to the EVENTS Menu. Push the Selector Knob to activate event programming.
2. Select an event number (1 – 9).
3. Select the *Input* to cause an event to happen (list of inputs provided).
4. Select the Input *value* to cause an event (for example, time is 1:00, or temp is 69, or light level is 80, etc). Value options are appropriate to the input type, and will vary.
5. Any more Inputs? If not, select THEN; otherwise select AND / OR (and number of the event to and/or to).
6. Select Output to activate (List of outputs provided).
7. Select the value of the output (ON or OFF or X10 Command).

You're done! The event is stored in non-volatile memory (which retains events with power off).

NOTE: Pressing the MENU button while event programming will abort the programming and NOT store the new or changed event. If you are in event programming, tap the selector knob until the Main Menu displays to make sure the event is saved.

## ***Clearing a Programmed Event***

To clear an existing event:

1. Hit the MENU button, then scroll to the EVENTS Menu. Push the Selector Knob to activate event programming.
2. Select the event number (1 – 9) that you want to clear.
3. When Prompted to choose the Input, scroll all the way back to “...”.
4. Push the Selector Knob. The event is cleared immediately.

## ***Delay Timers***

There are two delay timers (DLYS, and DLYM) for use by the event programs. DLYM is in minutes and times up to 255 minutes, while DLYS is a seconds timer (up to 255 seconds). Delay timers ALWAYS count down until they hit zero.

Timers work this way: An event can be programmed set a delay timer as an output and set it to a specific value. For example:

```
IF X10 7 ON THEN DLYS 60
```

This sets a timer to 60 seconds. From here the timer begins to count down to zero (stopping at zero) once a second (choose DLYM instead if you want to count down once a minute). You can then make events activate when a timer hits a range of values. For example

```
IF DLYS 5to10 THEN RELAY 1 ON
```

This will set the relay to ON when the DLYS timer hits the count of 10, and turns it back OFF at 5 (5 seconds later).

With the two events programmed as above, the following will happen: When an X10 ON command to address 7 is received, the DLYS counter is started at 60. Once per second it decrements. When it hits 10 (50 seconds later), RELAY 1 will turn ON. When it hits 5 (5 seconds later), RELAY 1 will turn OFF.

Remember:

DLYS = Decrements (counts down) once a second until it hits zero.

DLYM = Decrements (counts down) once a minute until it hits zero.

When Delay timers are used as an output, the delay timer value is set on the *Transition* of the event when going true.

## ***Flag Value***

There is one flag value. The can be considered a program variable that can be set (or incremented/decremented) by events. The flag value can be tested for in an event.

Using the flag value a simple counter can be constructed to count events and activate outputs based on count.

The flag value can also be used as a logic value by setting and testing for 0 or 1

When Flag values are used for an output, the flag values are set on the *Transition* of the event when going true.

## ***Examples***

### Some Example Events

Example: I want to turn on a relay (controlling my irrigation system) whenever the Temperature goes below freezing (this assumes the Temp units are set to F).

Program: 1) IF TEMP 0to32 THEN RELAY 1 ON

Example: I want my pool light (on X10 address A7) to turn ON at dusk, and turn OFF at 9:00 PM.

Program: 1) IF LGT 0to50 THEN X10 A7 ON  
2) IF TIME 21:00 to 23:59 THEN X10 A7 OFF

## Chapter 8 Logging

Refer to the *Settings* chapter for turning logging OFF or ON.

The SimpleRulez supports two types of logging, Events and Values.

When Event logging is enabled logs when a programmed event happens or goes away.

Value logging logs any of the values used in the event programming once per hour. For example, if you have an event programmed using temperature as an input, then temperature is logged once an hour.

Both types of logging, Value and Event, may be enabled at the same time. Changing or turning on logging will automatically clear the log.

Logs may be viewed from the front panel (select Log from the main Menu).

Logs may be downloaded from the RS-232 port (refer to Serial interface chapter), or with the GSI-2 Utility (refer to GSI-2 Utility chapter).

If want only to log an input, you can set up a dummy event with no outputs (output type is '...'). This will work with either value or event logging.



## Chapter 9 Settings

### **Temp Units**

Either Fahrenheit (F) or Celsius (C) may be selected.

### **X10 Address**

The X10 Address is the address the unit responds to for X10 commands for Time Sync and Health.

The following special X10 Operations are PRE-PROGRAMMED to respond to this address:

#### Special X10 Operations

| <b>X10 Command</b> | <b>Pre-Programmed Function</b>   |
|--------------------|--|
| OFF                | Time Sync Command, Sets the clock to 3:00AM.                                       |
| DIM                | Sets Health Code (Health LED) to Green and RESET all forces (local over-rides).    |
| BRIGHT             | Sets the Health LED to flash RED (Each BRIGHT command increments the Health Code). |

### **X10 Housecode**

This is the X10 housecode used for X10 reception. This is only used for receiving X10 commands. When sending X10 commands, the housecode is set in the event programming.

### **Relay Mode**

You can select one of three modes for the relays to operate in: Normal, Once, Flash.

**Normal** – Follows the state of the event; if the event is true, the relay is ON.

**Once** – When the event goes true, the relay will turn ON for 1 second then turn OFF. The event must go false, then true again before the relay will activate again.

**Flash** – While the event is true the relay will cycle ON and OFF (good for flashing lights or horns).

Note: Both relays follow the same mode setting; they cannot be configured independently.

## ***Logging***

This setting will turn on or off the logging option. Turning the logging option on by selecting either EVENT logging, VALUE logging, or BOTH types of logging. Changing or turning on logging will clear the log.

EVENT logging will log the start and end of all of the events programmed.

VALUE logging will log any values used by event logging once an hour.

## ***Load Defaults***

This will re-load all the factory defaults and CLEAR ALL EVENT PROGRAMMING.

Simple-Rulez also provides another way to reset the GSI-2 to the Default Settings on startup. To restore default settings during startup:

1. Flip the Power Switch to OFF.
2. Hold down the MENU button and flip the Power Switch to ON. The display should read "Press Enter to Load Defaults".
3. Quickly release the MENU button and push the Selector Knob. The GSI-2 will start up with default settings.

If you do not push the Selector Knob within 20 seconds, the GSI-2 will start up as normal. If you still wish to restore the default settings, begin the process again at step 1.

## Chapter 10 Serial Interface

The DB-9 serial interface uses standard RS-232 communications at 9600 Baud with 1 stop bit.

You can use any terminal emulation program (such as Hyper Terminal in Windows®, or Minicom with Linux) to communicate with the GSI-2.

Press: ? <**ENTER**> to see a menu of commands available.

Available Commands:

I <adrs> - Read Memory & I/O (Hex Entry)  
O <adrs> <val> - Set Memory & I/O Values (Hex Entry)  
D <adrs> <number> - Dump Memory (Hex Entry)  
S <hour> <min> <month> <day> <year> - Set Time/Date  
E [RW] <adrs> <val> - EEPROM Read/Write  
Q <value> - Set Tone (0-9)  
H <val> - Set Health (0-4)  
J <num> <val>- Activate Outputs  
R <num> <val> - Relay Activate  
C <T,R,X,H,L,?> <val> - Configure Settings  
L - Display Log  
Z <0-9>- Status and Display Inputs  
F - Clear Forces  
P <?,1-9> - Event Program  
A - Load Default Parameters  
X - X10 Test

### ***Input Command (I)***

This command is used to read the memory or I/O registers.

The address is specified in hexadecimal.

Syntax:

I <address>

where: address = memory address to read in hexadecimal (0 – FFFF)

Example:

User entry: *I 10<enter>*

Output: *Value at 10 -> 22*

## ***Output Command (O)***

This command allows raw memory writes.

The address and data is specified in Hexadecimal.

**WARNING: This command is intended for program debugging purposes only. Use at your own risk. Writing memory locations can have unintended effects on program operation.**

Syntax:

O < address > <value>

where: address = memory address to write in hexadecimal (0 – FFFF)

value = value to write to memory or IO (0 – FF)

Example:

User entry: *O 10 22<enter>*

Output: *Value set 10 = 22*

## ***Dump Command (D)***

This command is used to read a block of memory or IO registers, and dump (display) the content.

The address is specified in hexadecimal.

Syntax:

D < address > <amount>

where: address = memory address to start the read in hexadecimal (0 – FFFF)

amount = amount of memory to dump (0 – FF)

Example:

User entry: *D 80 20<enter>*

Output:

*80 ->20 0 0 0 0 32 20 F 2 9 3 0 0 0 0 1*

*90 ->BC 1 B5 0 0 1 BC 22 B5 70 5 0 0 0 95 22*

## ***Set Time/Date Command (S)***

This command allows setting the time and date. The parameters are in decimal.

Syntax:

S <hour> <min> <month> <day> <year> <dow>

where: hour = hour, 24 hour format (0 – 23)

min = minutes (0-59)

month = date month (1-12)

day = day of month (1 – 31)

year = year (0- 99)

dow = (1-7, 1 = Sunday)

Example:

This example sets the time to 4:35 PM on Aug 8 2002, Thursday.

User entry: *S 16 35 8 8 2 5*

Output: NONE

## ***EEPROM Utilities (E)***

This command allows raw access to the contents of the EEPROM. The EEPROM is used to store configuration settings, event programming, and log data.

Be careful; writing to the EEPROM can cause unpredictable results.

Note: All values are in hexadecimal.

**WARNING: This command is intended for program debugging purposes only. Use at your own risk. Writing EEPROM locations can have unintended effects on program operation.**

Syntax:

E [RWD] <address> <value>

where: address = EEPROM address (in hexadecimal)

value = EEPROM data (for write operation, in hexadecimal)

Example:

This example dumps the whole EEPROM starting at location 0.

User entry: *E D 0*

This example reads the EEPROM at location at 58.

User entry: *E R 58*

Output: *EEPROM read at 58 = 1*

This example writes the EEPROM at location at 58 with a value of 0x12 (hexadecimal).

User entry: *E W 58 12*

Output: *EEPROM write at 58 = 12*

### ***Tone Command (Q)***

This command will force a tone to be output until the force is cleared. This command will override any events that cause a tone until the force is cleared (See the *Clear Force Command*).

Note that the tone is output until the force is cleared (by the *Clear Force* command, or by the selector knob).

Tones are programmed as follows:

#### Tone Values

|     |  |
|-----|--|
| 1   | Beep once an event goes true (least annoying, but may be missed).  |
| 2   | Chirp Once a minute.   |
| 3   | Chirp every 8 seconds.   |
| 4   | Beep Once a second.  |
| 5-9 | Continuous tone. The higher the number the louder and longer the beep. Setting 9 is the most annoying and loudest! |

Syntax:

*Q <value>*

where:

value = tone type (see table above)

Example:

User entry: *Q 3*

Output: *Tone 3*

## **Health Command (H)**

This command will force the Health LED to blink red or display green. This command will override any events that cause a health display until the force is cleared (See the *Clear Force Command*).

### Chart of Health Values

|     |  |
|-----|--|
| 0   | Green  |
| 1-4 | Blink Red this number of times followed by a delay |

Syntax:

H <value>

where:

value = health type (see table above)

Example:

User entry: *H 3*

Output: *Health Forced 3*

## **Digital Output Command (J)**

This command will force a digital output to an OFF or ON state. This command will override any events that cause a digital output until the force is cleared (See the *Clear Force Command*).

Note: Outputs 1 through 4 are the outputs on the GSI-2 board. Outputs 5 – 12 are expansion board outputs (Relay or IO board). Therefore relay 1 on the expansion board is output 5 (you would use the command J 5 1 to turn on the relay)

Syntax:

J <number> <value>

Where:

number = output number (1 – 12)

value = digital value (0 or 1)

Example:

User entry: *J 1 1*

Output: *Output Forced*

## **Relay Output Command (R)**

This command will force the relays to either SET or RESET state. This command will override any events that cause a relay output until the force is cleared (See the *Clear Forces* Command).

Syntax:

R <number> <value>

Where:

number = relay number (1 – 2)

value = digital value (0 or 1)

Example:

User entry: *R 1 1*

Output: *Relay Forced*

## **Configure Settings Command (C)**

This command will set (or view) the configuration settings.

Configuration settings are:

T - Temperature Units (values = C or F)

R - Relay Mode (values = N, O, F)

X - X10 Address (1-16)

H - X10 House Code (A-P)

L - Logging Enable/disable (value= EVENT, VALUE, BOTH or OFF)

? -Status the current settings

**Temp Units (T)** - Either Fahrenheit (F) or Celsius (C) may be selected

**X10 Address (X)** - The X10 Address is the address the unit responds to for X10 commands for Time Sync and Health

The following X10 Operations are PRE-PROGRAMMED to respond to this address that is configured:

### Special X10 Operations

| <b>X10 Command</b> | <b>Pre-Programmed Function</b> |
|--------------------|--------------------------------|
| ON                 | BUZZ the buzzer once.          |



|        |  |
|--------|--|
| OFF    | Time Sync Command, Sets the clock to 3:00AM.                                       |
| DIM    | Sets Health Code (Health LED) to Green and RESET all forces (local over-rides).    |
| BRIGHT | Sets the Health LED to flash RED (Each BRIGHT command increments the Health Code). |

**X10 Housecode (H)** -This is the X10 housecode used for X10 reception. This is only used for receiving X10 commands. When sending X10 commands, the housecode is set in the event programming.

**Relay Mode (R)** - You select one of three modes for the relays to operate in: Normal, Once, Flash.

**Normal (N)** – Follows the state of the event; if the event is true, the relay is on

**Once (O)**– When the event goes true, the relay will turn ON for 1 second, then turn OFF. The event must go false, then true again before the relay will activate again.

**Flash (F)** – While the event is true the relay cycle ON and OFF (good for flashing lights or horns).

Note: Note both relays follow the same mode setting; they cannot be configured independently.

**Logging (L)** - This setting will set ALL, VALUE, EVENT, or OFF (0) the logging option. Turning the logging option on by selecting either EVENT logging, VALUE logging, or BOTH types of logging. Changing or turning on logging will clear the log.

EVENT logging will log the start and end of all of the events programmed.

VALUE logging will log any values used by event logging once an hour.

Syntax:

C <type> <value>

Where:

type = configuration types (T,R,X,H,L,? - see chart above)

value = configuration value (see chart above)

Example:

This command enables event logging

User entry: *C L I*

Output: *None*

This command sets the temperature to read in Celsius

User entry: *C F C*

Output: *None*

This command displays the settings

User entry: *C ?*

Output:       *Relay Mode: NORMAL*  
              *Logging: OFF*  
              *Temp Units: F*  
              *House Code: A*  
              *X10 Address:15*

### ***Display Log Command (L)***

This command will display the event log information. Logging must first be enabled (see configuration setting command). Following display of the results, a 'Y' or 'y' will clear the log. To keep the log, simply type any other key.

Syntax:

*L*

Example:

User entry: *L*

Output:*Log:*

*Log:1 Event:3       At 13:36 8/3*  
      *Log:2 Event:3       At 13:36 8/3*  
      *Log:3 Event:3       At 13:36 8/3*  
      *Log:4 Event:3       At 13:36 8/3*  
      *Log:5 Event:3       At 20:09 8/8*  
      *Log:6 Event:5       At 0:00 8/9*  
      *Log:7 Event:2       At 7:09 8/9*  
          *Log END*  
      *Clear Log?*

In response to the “Clear Log” prompt, a ‘Y’ or ‘y’ will clear the log. To keep the log, simply type any other key.

### ***Display Status Command (Z)***

This command will display the current status information of the unit’s inputs.

If no type is specified, all of the inputs will be displayed.

Types that can be displayed are:

| Value | Type                      |
|-------|---------------------------|
| 1     | Time                      |
| 2     | Temperature               |
| 3     | Last X10 command received |
| 4     | Light Sensor              |
| 5     | Last IR command received  |
| 6     | Digital Inputs            |
| 7     | Analog Inputs             |
| 8     | Date                      |
| 9     | Delay Timer Values        |

Syntax:

Z [Type]

Where:

Type = Optional input type (see table)

Example:

User entry: Z

Output: 8:27.00 8/09/02

*83F Lo81 Hi84*

*Light 12 %*

*IR Fun: 0*

*Anlg>31,32,3,143*

*Inputs>0,0,0,0*

*DlyS 0, DlyM 0*

*Flag=1*

User entry: Z 2

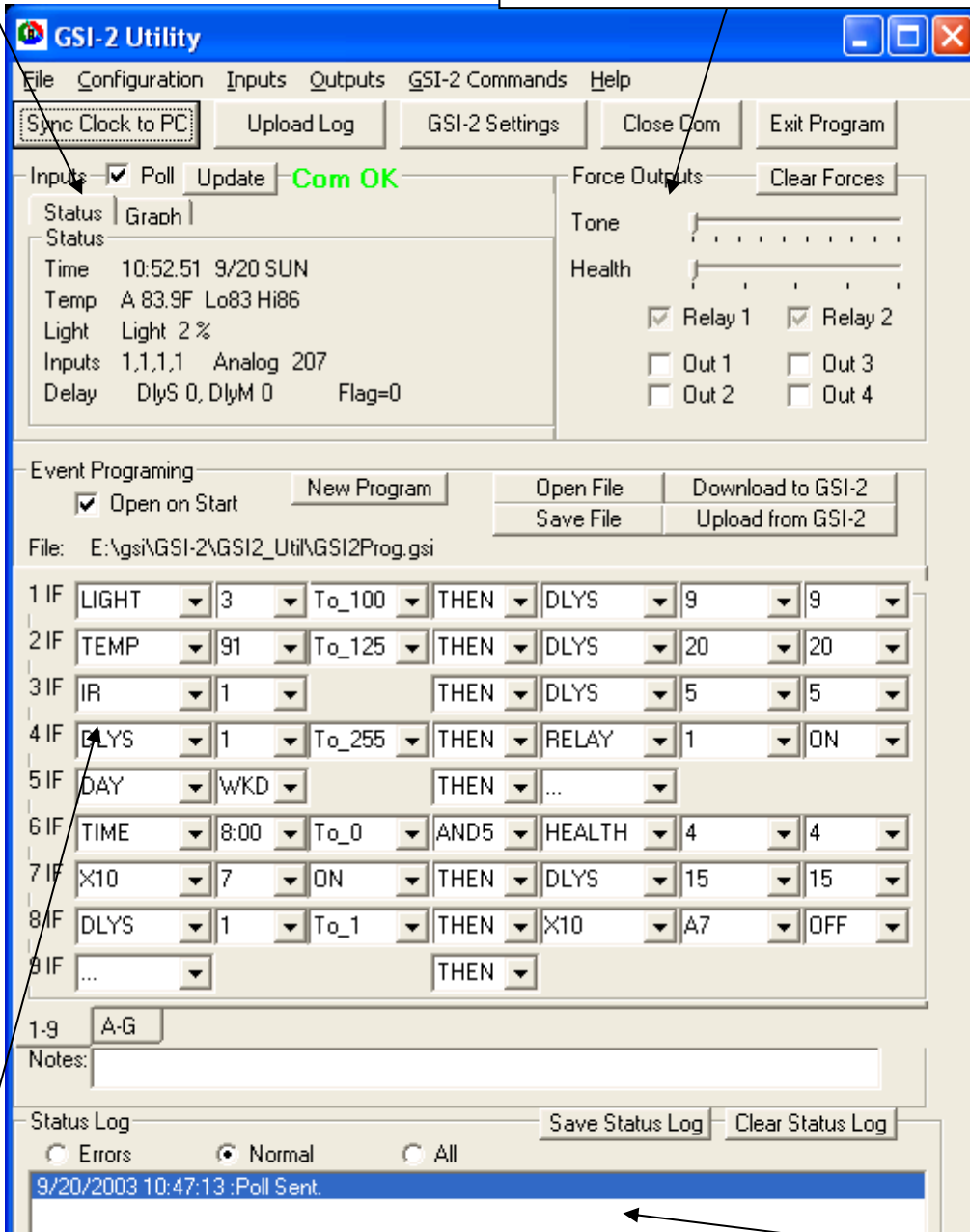
Output *83F Lo81 Hi84*



# Chapter 11 GSI-2 Utility

Inputs - Status and Graph Display, Select Poll to update every second.

Force Outputs - Select to override the programmed events. Click 'Clear Forces' to return to normal programmed operation.



Event Programming - Select inputs to trigger events and outputs to respond for each event to program. Open and Save to files, and download to GSI-2

Status Display - Look here for messages.

The GSI-2 Utility allows configuration and operation of the GSI-2 from a PC running Microsoft Windows®. Connect the GSI-2 to the PC through a standard RS-232 serial cable, available at any computer store. The GSI-2 requires a male DB-9 connector.

Once started, select the communications (serial) port through which you will communicate to the GSI-2.

Make sure no other programs are using the same communications port.

If you have problems communicating, check the Status Log box for messages.

Once communications are established, the label on Inputs section of the screen will display “Com OK” in green. If you enter in simulation mode, the box will display “Simulate”.

Selecting the “Poll” check box will cause the utility to update the inputs display once per second. The graph section can graph a temp or light sensor value.

Selecting any of the outputs to “Force” will cause the output to activate until the forces are cleared.

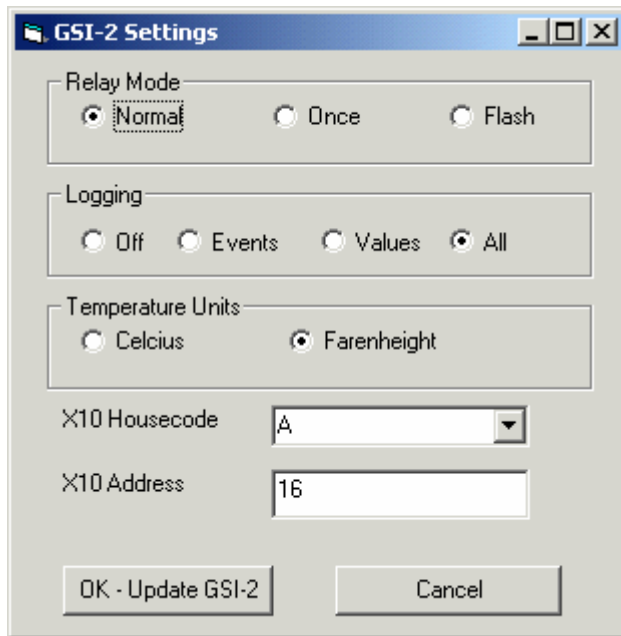
### ***Using the GSI-2 Utility to download event programs from a file***

- Start the GSI-2 utility and connect to the GSI-2 (Open Com).
- Click on the “Open File” button.
- Select the file you wish to download. Files containing event programs usually end with a .gsi extension.
- Click on the “Download to GSI-2” button.

It may take a few seconds to download; watch the Status Log for indications of any errors. The Progress Bar should move to indicate activity.

## Changing GSI-2 settings using the GSI-2 Utility

Select the button labeled “GSI-2 Setting” on the main screen.



**Temp Units (T)** - Either Fahrenheit (F) or Celsius (C) may be selected.

**X10 Address (X)** - The X10 Address is the address the unit responds to for X10 commands for Time Sync and Health.

The following X10 Operations are PRE-PROGRAMMED to respond to this address that is configured:

### Special X10 Operations

| X10 Command | Pre-Programmed Function  |
|-------------|--|
| ON          | BUZZ the buzzer once.  |
| OFF         | Time Sync Command, Sets the clock to 3:00AM.                                       |
| DIM         | Sets Health Code (Health LED) to Green and RESET all forces (local over-rides).    |
| BRIGHT      | Sets the Health LED to flash RED (Each BRIGHT command increments the Health Code). |

**X10 Housecode (H)** -This is the X10 housecode used for X10 reception. This is only used for receiving X10 commands. When sending X10 commands, the housecode is set in the event programming.

**Relay Mode (R)** - You select one of three modes for the relays to operate in: Normal, Once, Flash.

**Normal (N)** – Follows the state of the event; if the event is true, the relay is on.

**Once (O)**– When the event goes true, the relay will turn ON for 1 second, then turn OFF. The event must go false, then true again before the relay will activate again.

**Flash (F)** – While the event is true the relay cycle ON and OFF (good for flashing lights or horns).

Note: Note both relays follow the same mode setting; they cannot be configured independently.

**Logging (L)** - This setting will set ALL, VALUE, EVENT, or OFF (0) the logging option. Turning the logging option on by selecting either EVENT logging, VALUE logging, or BOTH types of logging. Changing or turning on logging will clear the log.

EVENT logging will log the start and end of all of the events programmed.

VALUE logging will log any values used by event logging once per hour.



## **Chapter 12 Downloading the SimpleRulez Software to the GSI-2**

The GSI-2 stores the operating software/firmware (i.e.; SimpleRulez) in flash memory. Flash memory is retained event during power outages.

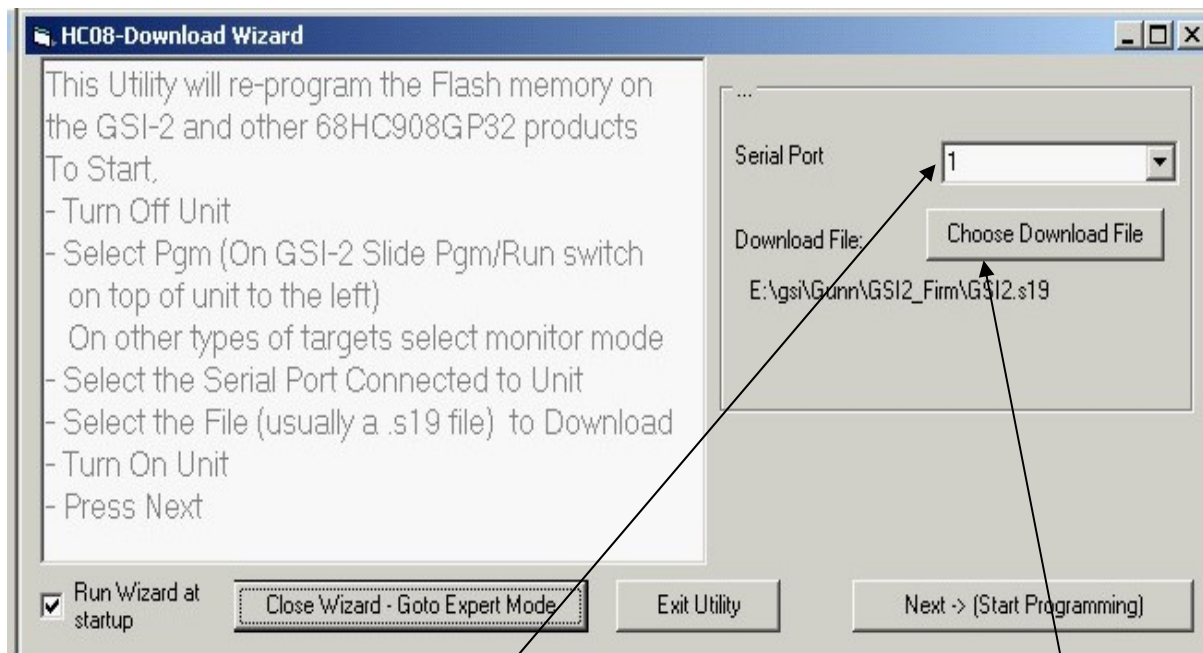
In order load or update the operating software for the GSI-2, you will need a Loader utility.

There are two such utilities available that work with the GSI-2. They are both free, and can be downloaded from the Internet.

## Downloading Simple Rulez Software to the GSI-2 Using the HC08Loader Utility

The HC08Loader utility is available freely on the Internet at Gunn Systems' web site: [www.gunnsys.com](http://www.gunnsys.com)

- Turn off power to GSI-2.
- Download and install the loader program (HC08Loader) from Gunn Systems.
- Start the HC08Loader Utility.
- Select the File you wish to download (an updated copy or SimpleRulez can be obtained at [www.gunnsys.com](http://www.gunnsys.com)). Normally this file will be a S19 file type (something.S19).
- Select the Serial (COM) port to which the GSI-2 is connected. Com Ports 1 though 16 are supported. You can use a standard serial cable to connect the PC to the GSI-2.
- Select Next.
- The Status Box on the left side will display instructions. You may want to refer to the log on the main window for more information if anything fails.



Select Serial (COM) port

Select File to Download

### ***Downloading Simple Rulez software to the GSI-2 Using the PRog08sz Utility***

- Turn off power to GSI-2.
- Download and install the downloader program (PRog08sz) from P&E Microsystems ([www.pemicro.com](http://www.pemicro.com)).
- Start the Prog32sz utility to program the flash on the GSI2.
- Select the program function on the GSI unit (Slide the prog switch on the top to the left).
- When Prompted to reset the unit, turn on the unit and select OK.
- When prompted select the algorithm 908\_gp32\_highspeed.08p
- Select Program->Erase Module
- Select File->Specify S Record
- Select the File you wish to download (an updated copy or SimpleRulez can be obtained at [www.gunnsys.com](http://www.gunnsys.com)). Normally this file will be a S19 file type (something.S19).
- Select Program->Program Module

After done programming, turn off the GSI-2 and move the prog/run switch to run (right side).

## Chapter 13 Specifications

### *Physical*

0 – 70 Degree Celsius

### *Electrical*

Power +12 - +16V DC

200 ma (LCD Model)

300 ma (Fluorescent Model)

Clock Power (time maintained for up to 1 week with power removed)

### *Hardware*

CPU: 9.8 MHZ 68HC908GP32

Memory: ROM – 32K

RAM - 512 Bytes

EEPROM 1K – 4K EEPROM (depending on option)

Clock: Automatic Month end calculation and leap year compensation  
Year 2000 (Y2K) compatible

IR Detector:

Max Reception Distance: 8 Meters Min

Carrier Freq. 38Khz

Relays:

10 A at 250 VAC, 10A at 30 VDC

Max Switch Capacity: 300W

Operations: 100,000 Min Cycles

Audio Output:

250 mw

Temp Sensor:

-55C to 125C

2 C Accuracy (from -10C to +85C)

12-bit resolution

Digital Output:

500 ma max sink

50VDC max voltage

Analog Input

8-bit resolution

0 – 5 VDC input

5% Accuracy

## **Software**

16 programmable events

2 timers (1 minute timer, 1 second timer)

1 flag variable

1 second poll cycle

Light Level Averaging – 8 minutes

Temperature Resolution – .1 degree C or F

Logging – approximately 320 log entries with 25160 (2Kx8) EEPROM

Logging options: Event, Value (Value = temp, light, analog, x10)

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