

MODEL 2314/2316

SNMP ALARM ENCODER



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NOTICE OF FCC COMPLIANCE

NOTE

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference when this equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communication. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his/her own expense.

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1 Introduction

The 2314 and 2316 SNMP Alarm Encoders are remote devices for use with SNMP network managers. The **2314** encodes **8** input alarm points. The **2316** encodes **16** input alarm points. Both units encode 16 Boolean (composite) alarm points, 8 analog input voltages and include 4 Form-C control relay outputs (control points). The Boolean alarm points are created by entering Boolean expressions that combine the true/false state of any alarm point, status point, control point or analog point using the AND, OR, XOR and NOT operators. A 10/100BaseT LAN port connects to an IP network for access by any SNMP V2 compatible manager. With the exception of the number of alarm inputs, both the 2314 and 2316 SNMP Alarm Encoders are identical in operation.

The 2314/2316 SNMP Alarm Encoder is provisioned using a Web browser. An RS232 craft interface can be used to set IP Address, Netmask and Gateway. A Web browser can also be used to view the current state of all alarms, the current values of analog inputs and to activate or deactivate any control relays. Web access login is secured by an authorized user name and password. There are three levels of authorizations provided: one for viewing only, one for viewing and issuing controls, and one for administrative configuration functions. A secure HTTPS (port 443) web connection is also available if higher security is required.

Both the 2314 and the 2316 also include a Form-C *summary-alarm* relay. The summary relay operates (closes) for any critical (CR), major (MJ) or minor (MN) alarm. A status (ST) alarm does not cause the summary relay to close.

The front panel contains LED indicators for power, summary alarm, LAN connection status (link, activity), and individual alarm (or control point) states. The **2314** displays a single row of **8** alarm input LEDs, while the **2316** displays **16** alarm input LEDs, in 2 rows of 8 LEDs each. All connections are on the front panel. The rear panel is blank.



Figure 1. Model 2314 Front Panel



Figure 2. Model 2316 Front Panel

2 Description

Front Panel LEDs:

The Model 2314/2316 SNMP Alarm Encoder includes front panel LED indicators for unit power (PWR), summary point state (SUM ALM), and LAN connection and activity status (LINK & ACT). The 2314 includes 8 individual front panel alarm point status LEDs, while the 2316 includes 16 individual alarm point status LEDs (2 rows of 8 alarms each). These red LEDs display the current states of the unit's alarm points. LEDs are illuminated for asserted (ON) alarms (or controls - see below).

Pressing the Lamp Test button turns all front panel LEDs on (except the two LAN indicators) to test lamp functionality. If you hold the Lamp Test button down for over 3 seconds, then the first four top row LEDs (1 through 4) will show the current state of the 4 control relays. Releasing the LAMP TEST button returns all LEDs to their normal function.

Alarm Inputs:

The alarm inputs are optically isolated. Alarm inputs can be asserted either by connecting the input to station ground (normal input), or by removing ground from the input (inverted input). Each alarm input can be set for a delay (up to 9999 seconds) before asserting an alarm. The external device driving the inputs must handle a current of 2 milliamperes. The alarm inputs are scanned every 200 milliseconds. The alarm input connector is a female 50-pin CHAMP (AMP) on the front panel.

Alarm point vs. Status point:

Each of the alarm inputs may be configured to be an alarm point or a status point. Once asserted, an alarm point is latched until read (polled). Status points are not latched, this means the state of the point changes in real-time with the state of the input pin.

Delayed activation:

Each of the alarm inputs may have a delay associated with it. This is useful when you want to ignore short, intermittent events. The delay may be set from one second up to about 9999 seconds (2.77 hours). For example, if an input has a 10 second delay set, then the point must be continuously asserted (uninterrupted) at the input pin for a minimum of 10 seconds before the alarm point is considered 'ON' in the 2314/2316.

Control Outputs:

The 4 control outputs are provided by activation of Form-C relay contacts (normally open, common, and normally closed contacts). The Form-C contacts allow the power-off default to be wired as normally off or normally on. The relay output connector is a female 50-pin CHAMP mounted on the front panel. The contacts are rated for 1 Amp up to 48 volts DC, 0.6 Amps at 110 volts DC, and 0.6 Amps at 125 volts AC.

The default mode of operation for the control point is ON/OFF. An SNMP 'set' command of ON will close the relay, and a set OFF command will open the relay. The configuration program also allows you to make any of the outputs act in a momentary fashion. If momentary is selected, then the relay is operated for 200 milliseconds for ON command. OFF commands are ignored for relays configured as momentary.

Analog Inputs:

Both the 2314 and 2316 have 8 analog (voltage measuring) inputs. Each input can measure a voltage range of negative 90 volts to positive 90 volts.

The analog inputs are generally measured relative to a common ground. However, fixed pairs of inputs may be set to differential input mode. A maximum of 4 differential pairs is possible. In differential mode, the measurement is made between the two inputs of the pair, rather than between an input and ground. For example, if input 1 is set to differential mode, then input 1 becomes the positive input and input 2 becomes the negative input of the pair. If input 3 is set to differential mode, then input 3 becomes the positive input and input 4 becomes the negative input of the pair, and so on. The configuration program allows you to choose either single-ended (standard) vs. differential pair mode for analog inputs.

The input resistance for each analog input is 698k Ohms to ground.

Each analog input is RC low-pass filtered in order to reject higher frequencies. The time constant is approximately 0.05 seconds. The attenuation versus frequency table is below.

<i>Frequency</i>	<i>Attenuation</i>
DC (0 Hertz)	0x
5 Hz	1.6x
10 Hz	2.8x
20 Hz	4.1x
60 Hz	14.5x
120 Hz	29.2x
240 Hz	58.3x
1000 Hz	175x

Table 1. Analog Input Attenuation Versus Frequency

Shielded wire is recommended for connecting distant measuring points to the input connector, and shielded pair cable is recommended for connecting differential inputs to the input connector.

3 Installation

This 1U unit can be installed in 24 or 48 volt stations (18 to 72 volts operation) with either positive ground or negative ground. NOTE: Original 2314/16 units (sold prior to April 2011 serial# 1116062) were 48-volt-only units. The factory default is for Positive ground operation. The 2314/2316 SNMP Alarm Encoder is shipped with a 3-wire plug (snap-in DC power connector) with screw terminals.

The left-most connection (Sta Gnd) is chassis ground and must be grounded to station ground (rack ground). This ground wire is the return path to the battery for alarm inputs. For Positive Ground stations, this wire must have a conductive path back to the battery's Positive terminal. For Negative Ground stations, this wire must have a conductive path back to the battery's Negative terminal. The power input is reverse-voltage protected and under/over voltage protected.



Figure 3 . Positive Ground Jumper Power Input Example

Mounting ears are supplied for flush mounting in a 19-inch rack. The mountings may be reversed for 1.75-inch projection mounting.

STATION GROUND CONNECTION (STA. GND) CAUTION

Some telecom sites may require all station battery connections to be grounded at only one point near the battery bank. If your installation requires an isolated station battery input, you must run the Sta Gnd wire from the power connector at the front of the unit to a rack-ground so it gets to the station battery 'common' via the station ground.

Important! Do not attempt to operate the equipment without a dedicated station ground (STA. GND, chassis ground, rack ground) connection, as electrical damage may occur. The unit's rack mounting screws alone will not provide a reliable rack ground due to their anodized surfaces. This ground is also a reference ground for the alarm inputs, and this ground is also provided on the alarm-input connector. See the following Alarm LED Optoisolator Power section.

ALARM LED OPTOISOLATOR POWER

There is an internal jumper (see Figure 4) that selects the negative or positive lead of the battery input to **power** the alarm input optoisolators. For **POSITIVE GROUND** systems (factory default) the jumper should be in the **NEGATIVE - Station Battery** position. This selects the proper polarity voltage input to power the optoisolators. For **NEGATIVE GROUND** systems, the jumper must be switched to the **POSITIVE + Station Battery** position. If this jumper is in the wrong position, an alarm input will not be asserted when the alarm input is connected to Station Ground.

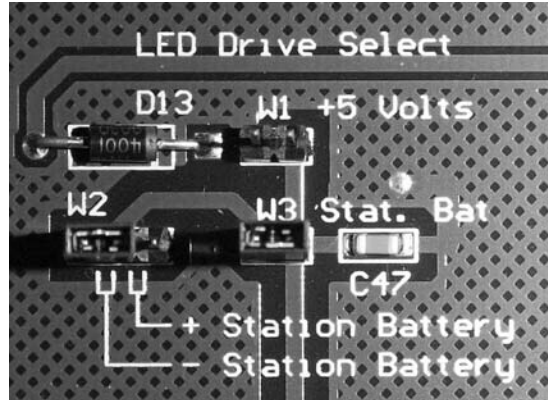


Figure 4. Battery Polarity Selection For Optoisolators

AC POWER RECOMMENDATION (AC power supply not included)

For the wide range 18 to 72 VDC supply voltage 2314/2316 RTUs, if DC Station Battery is unavailable and an AC power supply is required, the use of a 24V, 1.5 to 2.0 amp wall-mount or desktop style switching power supply is recommended. These power supplies may be purchased from many different sources and generally cost around \$20 to \$30. The power supply DC connector (typically a barrel style plug) will need to be removed and the power supply lead wires connected to the appropriate 2314/2316 DC power input connector terminals (provided with the unit). Connect the power supply **Positive** lead to the **Positive input** connector terminal and the power supply **Negative** lead to the **Negative input** connector terminal. The 2314/2316 DC power input connector **Sta. Gnd** terminal needs to be connected (jumper wire) to the proper power supply input terminal, which will depend on the ground reference used for the equipment connecting to the 2314/2316 Alarm Inputs. Make sure to follow the previous instructions regarding Station Ground requirements on page 4.

LAN CONNECTION: The SNMP Alarm Encoder is connected to the IP network using an Ethernet RJ45 jack and standard 10BaseT or 100BaseT wiring. The LAN port will automatically switch to 10BaseT or 100BaseT, depending on the connection type at the other end of the cable.

EXTERNAL I/O CONNECTOR

A 50-pin Champ (AMP) connector is used for alarm input, analog inputs and relay outputs.

It is best to order a pre-assembled cable assembly from a company such as Grayhill. One easy option is to use a cable with a 50-pin AMP connectors at each end and a 66M block (punch-down block) pre-wired to a 50-pin AMP connector. The cable end that connects to the 2314/2316 should be a male, connector. The other end should mate with the 66M block. 66M blocks can be ordered with male or female connectors. The punch down block can be mounted on the wall, and all the station connections brought to that block. Follow the pin assignments for the connector detailed at the end of this document (Table 8-1).

RELAY OUTPUTS:

Note the pin numbers carefully. Follow the pin assignments for the connector detailed at the end of this document (Table 5).

ANALOG INPUTS

The connector has separate pins for station ground and analog ground. These are connected together at the 'common' measurement point on the analog board.

Single ended measurements may be connected between an analog input pin and analog ground. For the most accurate measurements, a pair of wires should run from the device being measured to the model 2314/2316, with the 'ground' wire connected to an analog ground pin and the active wire connected to the analog input pin. A shielded wire is recommended for electrically noisy environments, and a shielded pair is recommended for differential input measurements.

The analog inputs are low pass filtered. There is no attenuation for frequencies below 1 Hertz. A 60-Hertz signal is attenuated 14.5 times relative to DC. Table 1 on page 3 contains attenuation data for other frequencies.

The main steps involved in installing a Model 2314/2316 SNMP Alarm Encoder are:

- Step 1:** Install the unit in a 19-inch rack and connect to station battery (verify power polarity and station ground connections). Connect the LAN cable, and 50-pin I/O cable.
- Step 2:** (Factory New units) Configure the unit with the proper IP address/netmask/gateway settings. Use either the RS-232 Craft Port or Web Browser to edit the factory default addresses. Verify that the device replies to pings for the new settings from another site in your network. This confirms that gateway IP address and netmask are correct. If you cannot ping the unit, check the settings using the craft interface (9600 8N1). If the unit responds to pings, most other problems can be resolved remotely using the web interface. Use the Web browser interface to connect to the 2314/2316 using the new IP address and finish configuring the rest of the 2314/2316 SNMP Alarm Encoder settings.
- Step 3:** It is a good idea to verify that all alarm inputs, control relay outputs and analog voltage inputs are working properly before leaving the site. This is easily done on-site using the web interface.
- Step 4:** Configure your SNMP manager for the 2314/2316 SNMP Alarm Encoder. Compile the Fial Incorporated registry MIB (fial-registry-mib.mib) and the Fial Incorporated Encoder MIB (fial-enc-mib.mib) into the manager. Note: Fial Inc. Encoder MIB is used for the 2311, 2314 and 2316 SNMP Encoder products. Add the Network Elements to be monitored.

4 Configuring the SNMP Alarm Encoder

Each SNMP Alarm Encoder must be configured prior to use. A default IP address (192.168.1.200, netmask 255.255.255.0, gateway 192.168.1.200) is preset in each SNMP Alarm Encoder shipped from the factory; however, you must set the actual IP address the device will use in your network. In addition, you must configure settings that allow SNMP managers to access and control the unit, and that regulate the sending of SNMP V2 notifications (autonomous messages or 'traps').

The 2314/2316 SNMP Alarm Encoder must be provisioned using a Web browser. However, a craft interface (RS-232 (9600 8N1)) is also available for initially setting IP address, netmask, gateway and administrator name/password should you be unable to connect using a Web browser. The craft interface screens are also accessible remotely via a **telnet** connection.

All 2314/2316 SNMP Alarm Encoders provisioning and configuration should be performed using a Web browser. The Web pages also provide a configuration download /upload function. This allows one unit's setting to be saved and uploaded to other units. See Complete Configuration using a Web Browser on page 12.

The web interface will not be accessible if you do not know the device's current IP settings. The physical craft port is always accessible for changing the IP settings.

Initial Network Configuration Settings with the Craft Serial Port

The Craft (serial) port interface uses RJ45 pins 4, 5 and 8 to provide an RS-232 connection for a PC COM port. The connections are shown in Table 8-2. The usual connection is with HyperTerminal at 9600 baud, 8-data bits, no-parity and 1-stop bit. Set Flow Control to 'none.' Power up the SNMP Alarm Encoder and after about 30 seconds the login prompt will appear (see Figure 5). The configuration menu is identical for both 2314 and 2316 encoders.

Model 2314/2316 SNMP Alarm Encoder

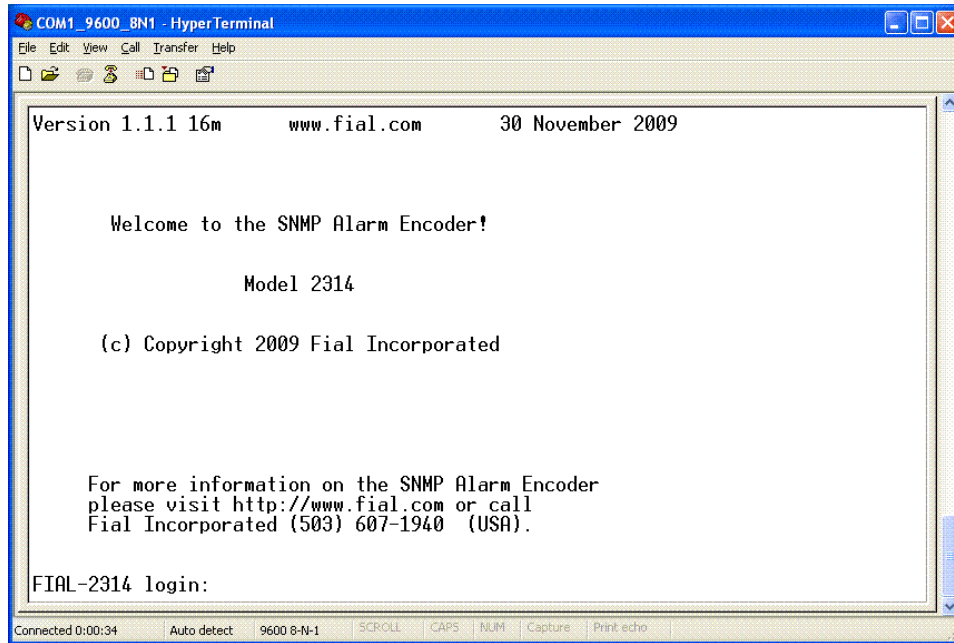


Figure 5. Craft Port Login Window

Log in with the proper user name and password. The factory default Administrator login name is **admin** and the factory default password is **remote**. The Main Menu will then be displayed.

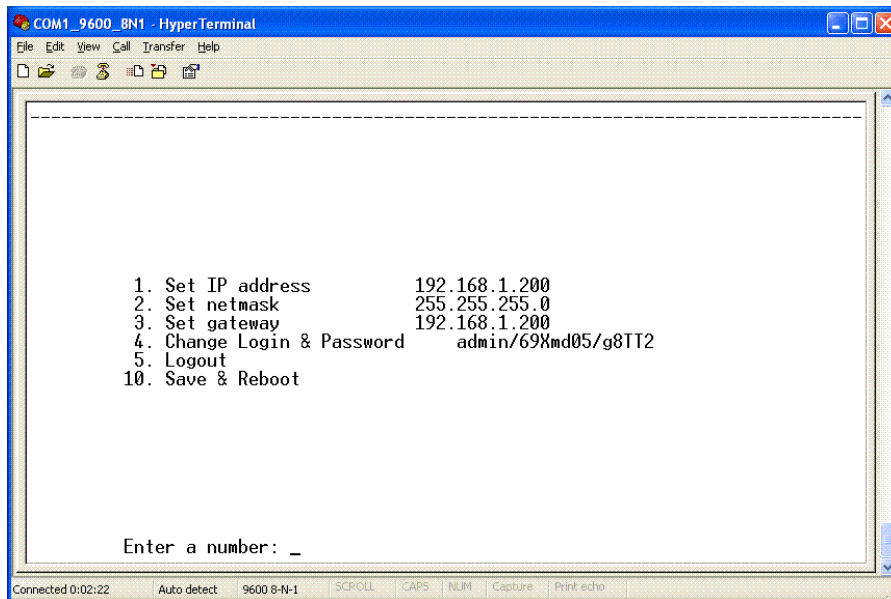


Figure 6. Main Menu

The Main Menu window has a list of several options for configuring the SNMP Alarm Encoder. To configure the device, complete the following steps:

1. Set the IP Address

To set a new IP Address for your SNMP Alarm Encoder, select 1 and press Enter. The Set IP Address window will appear.

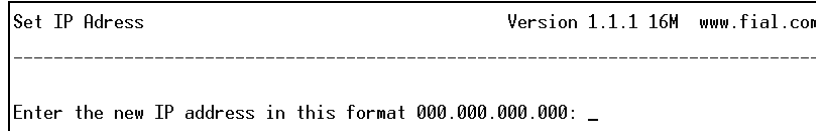


Figure 7. Setting IP Address Via HyperTerminal

After the prompt, enter the new IP address and press Enter.

NOTE: Do not select option 10 (**Save & Reboot**) until you have made any related netmask and gateway changes and then double-checked them. Not doing this may render the device inaccessible from the LAN (See IP Address restrictions on page 41).

2. Set the Netmask

To set the new netmask for the SNMP Alarm Encoder, select option 2 and press Enter. The Set netmask window will appear.

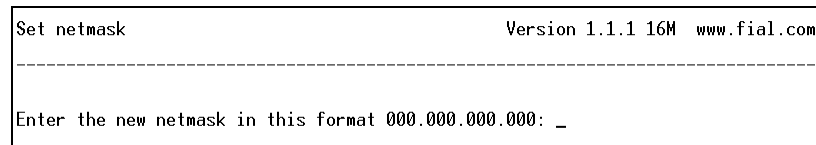


Figure 8. Set Netmask via Craft Screens

After the prompt, enter the netmask and press Enter.

NOTE: Do not select option 10 (**Save & Reboot**) until you have made any other changes for the device and verified them. Doing otherwise may render the device inaccessible from the LAN. (See IP Address restrictions on page 41).

3. Set the Gateway

To set the new gateway for the SNMP Alarm Encoder, select option 3 and press Enter. The Set Gateway window will appear.

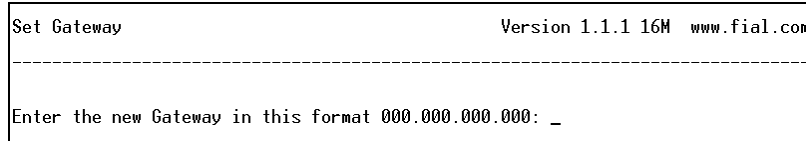


Figure 9. Set Gateway Via HyperTerminal

After the prompt, enter the Gateway address and press Enter. The gateway address should be an IP address of the IP router port to which the 2314/2316 is connected. The router should provide a network connection that reaches the SNMP manager(s).

NOTE: Do not select option 10 (**Save & Reboot**) until you have made any other changes for the device and verified them. Doing otherwise may render the device inaccessible from the LAN. (See IP Address restrictions on page 41).

4. Change Login & Password

Each SNMP Alarm Encoder has a default login (*admin*) and password (*remote*) programmed at the factory. Both the login name and password are case sensitive. Any user with the administrator login and password will have access to the Craft port of the device and web page configurations. For security purposes, it is recommended that the login names and passwords for each device be changed during the initial configuration.

If you forget the new login/password or are unable to log in to the device, the administrator login and password can be reset to the factory default by holding down the lamp test button while the device is restarted (reset). You must hold down the button for approximately 40 seconds until the power-on lamp test is done. No other provisioning (such as IP address) will be affected.

To change the administrator login name and password for an SNMP Alarm Encoder, select option 4 and press Enter. The Set Login & Password window will appear.

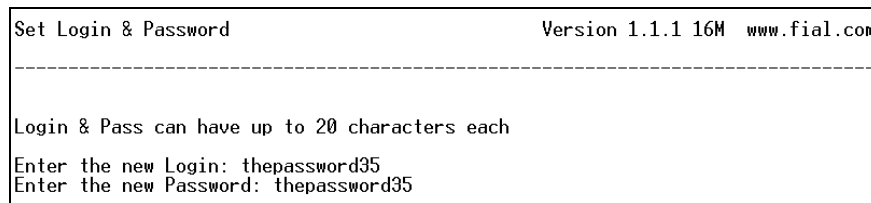


Figure 10. Set Login & Password via Craft Screens

To change the login and password, follow the prompts: enter the new login, enter the new password, and then re-enter the new password. Remember that both the login and password are case sensitive. A-Z, a-z, 0-9, and hyphen are the only characters allowed for the login. The password can be any combination of characters, numbers and special characters. Passwords should be longer than 8 characters in length. For more information, refer to Login & Password in the Notes section on page 42.

5. **Logout**

To log out of the SNMP Alarm Encoder configuration session, type 5 and press Enter. If you are using HyperTerminal you will be logged out of the device and presented with the login screen again. If you connected using telnet, Logout will close your telnet connection. **NOTE:** If you have changed settings, then select 10 (**Save & Reboot**) before logging out.

6. **Save & Reboot**

After all changes have been made for the SNMP Alarm Encoder, choose option 10 (**Save & Reboot**). This will save your changes, and the device will restart with the new settings. If you do not choose Save & Reboot, any changes made in this login session will not take effect. The reboot process takes 30 to 40 seconds to complete.

Complete Configuration using a Web Browser

To provision a new 2314/2316 SNMP Alarm Encoder using a Web browser, you must know the IP address of the device and be able to ping the unit. You can connect the encoder directly to a computer with an Ethernet Crossover cable (see Cross-Over Ethernet Cable Wiring - opposite end on page 54), or connect both your computer and the SNMP Alarm Encoder to a hub or a switch with a standard Ethernet cable. The computer should have Microsoft Internet Explorer Web browser 6.0 or later, or Netscape 7.1 or later or Firefox as a default Web browser. For Netscape 7.1, verify that **Enable JavaScript for Navigator** is "checked" in the Edit/Preferences/Advanced/Scripts & Plugins/Verify device. Most Opera and Mozilla browser releases will also work.

If this is a factory new 2314/2316 and you are ONLY connecting the LAN port on your computer and on the encoder together, set your computer to an IP address in the range of 192.168.1.2 to 192.168.1.253, netmask to 255.255.255.0. Set your gateway address to match the IP address of your computer. (Do NOT use IP address 192.168.1.200, since this is the SNMP Alarm Encoder factory default address).

For example, set your computer IP address to 192.168.1.10, your netmask to 255.255.255.0, and your gateway to 192.168.1.10. Open your Web browser program.

If this is the initial configuration of the SNMP Alarm Encoder, enter `http://192.168.1.200` into the browser's URL/address bar and press Enter. The SNMP Alarm Encoder Welcome page should appear, (see Figure 11).

If the Model 2314/2316 IP address has already been changed, you will need to know its current IP address in order to connect using a Web browser. Enter the current IP address of the encoder in the browser's URL/address bar. If you do not know the unit's current IP address, you may find this out (or change it) using the serial Craft port interface.

*Warning: When you change the IP address, gateway and netmask using the Web browser or telnet interface, you will probably lose your IP connectivity with the device. This will happen when you choose Save & Reboot. If the device is local, you may then need to change your computer IP settings to access the 2314/2316 SNMP Alarm Encoder's web server. **You normally do not want to change the IP address, netmask or gateway if the device is remote from you!***

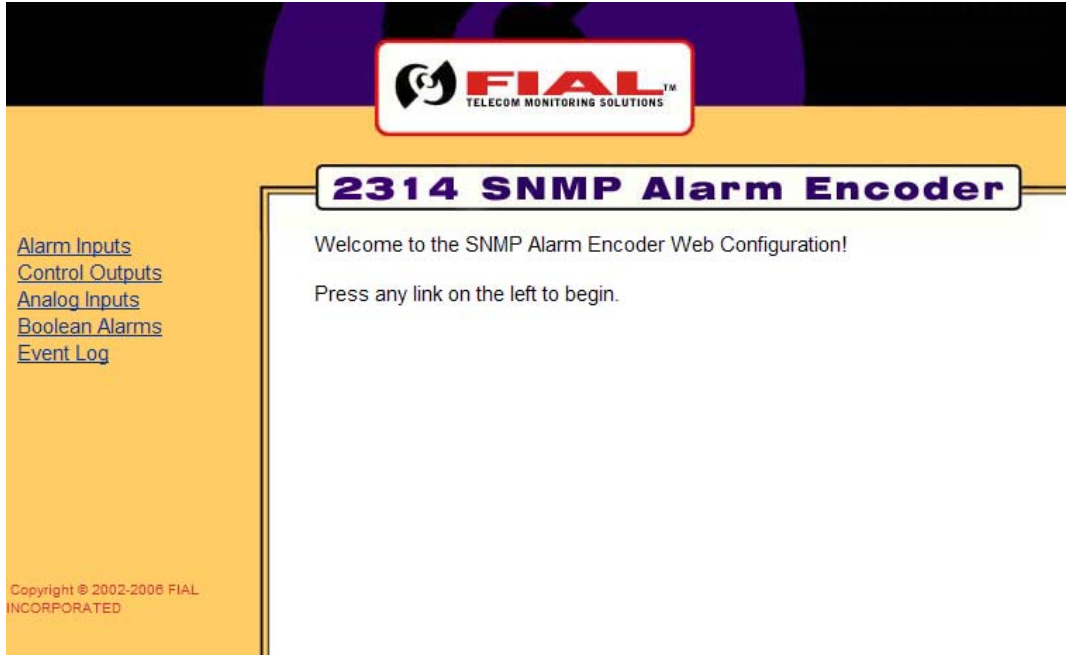


Figure 11. Initial Welcome Page

The left side of the Welcome page has links to other pages, such as **Alarm Inputs**, **Control Outputs**, **Analog Inputs**, **Boolean Alarms** and **Event Log**. To view the Event Log page or make any changes to the provisioning, you must first select a menu item on the left side to begin a login dialog.

To access any of the main Welcome page options, click on the hot links in the left pane. Click on a link on the left, for example the **Event Log** link, and the Enter Network Password login screen will appear (see Figure 12). You must log in with a valid user name and password to access any of the links.

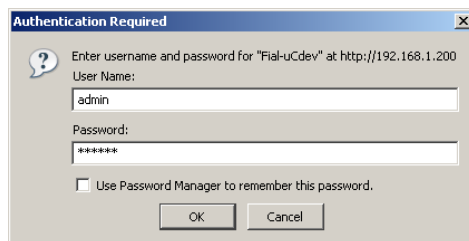


Figure 12. Enter User Name & Password Via The Web

If this is the first time the device has been provisioned, enter the factory set administrative user name (**admin**) and password (**remote**) in the fields and click OK. Both entries are **all lowercase**. Otherwise, enter the correct user name and password for administrative privileges in the appropriate fields and then click OK. This opens up the initially selected link page, such as the Event Log page (see Figure 13).

The screenshot shows the 'SNMP Alarm Encoder' interface. At the top center is the FIAL logo with the tagline 'TELECOM MONITORING SOLUTIONS'. Below the logo is a title bar 'SNMP Alarm Encoder'. On the left side, there is a navigation menu with links: Alarm Inputs, Control Outputs, Analog Inputs, Boolean Alarms, Event Log, IP Settings, RTC Time/Date, SNMP Notifications, Set Login & Password, Config File, Firmware Upgrade, Undo all changes, and Save & Reboot. The main content area is titled 'Event Log' and contains a table with the following data:

Name	State	Severity	Service Affecting	Occur Date Time	Point Table Index
inverted delayed test	True	CR	Yes	Mon Nov 03 18:53:10 2003	Alarm Table 31
Door Open	True	MN	No	Mon Nov 03 19:05:23 2003	Alarm Table 2
AC Power Fail	True	MJ	No	Mon Nov 03 19:05:23 2003	Alarm Table 6
Battery Discharging	True	MJ	No	Mon Nov 03 19:05:23 2003	Boolean Table 2
alarm8	True	ST	No	Mon Nov 03 19:05:24 2003	Alarm Table 8
alarm10	True	ST	No	Mon Nov 03 19:05:25 2003	Alarm Table 10

Figure 13. Event Log Page

Now that you have logged in with administrative permissions, a new set of links have been added to all of the pages. They are **IP Settings**, **RTC Time/Date**, **SNMP Notifications**, **Set Login & Password**, **Config File**, **Firmware Upgrade**, **Undo all changes** and **Save & Reboot**. For more login related issues, refer to Login & Password in section 6 - Notes.

The Alarm Inputs Page

To provision or modify an Alarm point, click the Alarm Inputs link in the left pane. The Alarm Inputs page will appear, as shown in Figure 14.

Alarm Inputs

Point	Name	State	Severity	Service Affecting	Delay	Inverted
1	Door Open	True	MJ	No	10	No
2	Tech at Site	True	MN	No	0	No
3	Sta Batt Low Voltage	False	CR	No	0	No
4	AC Mains Fail	False	MJ	No	0	No
5	AC 5-minutes fail	False	CR	No	300	No
6	Generator running	False	MJ	No	0	No
7	Generator overcrank	False	MJ	No	0	No
8	Tower Lights fail	False	MN	No	0	No

Edit Alarm Point:	1
Name:	Door Open
Severity:	MJ
Service Affecting:	No
Delay:	10 seconds
Inverted:	No
Submit	

Figure 14. Alarm Inputs Page Via The Web

The Alarm Inputs page (as shown in Figure 14), displays the provisioning table for the 8 external alarm points in this unit. You may have to use the thumb bar to view all alarm points. Alarm information includes Alarm Point number, Name, current State, Severity, Service Affecting, Delay period and Inverted condition.

You need not provision points that are unused, but all 8 points are always present in the table as viewed by an SNMP manager. Use the dialog table at the bottom of this screen to provision each alarm point. The dialog table does not appear if the user is not logged in with administrator privileges. To provision an alarm point, edit the following fields found at the bottom of the screen:

Edit Alarm Point: Use this drop-down box to select the alarm point you wish to edit.

Name: Enter a name for the selected alarm. Any characters are allowed in this field. Alarm names can be the same as other alarms; however, this is not recommended for obvious reasons. Names may be up to 29 characters long. The column width adjusts to fit the name.

Severity: Select the Severity level for the selected alarm point. The possible Severity levels are: CR, MJ, MN, and ST. Only CR, MJ and MN generate notifications when asserted. To make

ST (status) points generate notifications, choose YES to 'Add ST events to the event log' on the IP Settings web page.

Service Affecting: Select *Yes* if the selected alarm point is Service Affecting, or *No* if the selected alarm point is Not Service Affecting. The term 'Service Affecting' means that traffic has been dropped or that a major communications disruption has occurred.

Delay: Enter the Alarm Delay in seconds for the selected Alarm. Only the digits 0-9 are allowed. The maximum Delay for an Alarm is 9999 seconds (2.77 hours). The Delay is the amount of time the alarm input pin must remain asserted before the State is changed to True. For example, an alarm with a Delay of 30 seconds must be continuously asserted (grounded) for 30 seconds before the State is changed to True. If the assertion state of the point is 'inverted,' then the input pin must remain floating or connected to station battery (not grounded) for 30 continuous seconds before the State is changed to True.

Inverted: Select *Yes* if the selected Alarm is Inverted, or Select *No* if the Selected Alarm is Not Inverted. The factory default is No. 'No' means the alarm is asserted by connecting the alarm input pin to station ground. Yes (inverted) means the alarm input pin is normally connected to station ground, and that the alarm is asserted when the pin is disconnected from ground allowing it to be pulled to station battery.

Once all changes have been made, press the **Submit** button. The Submit button must be pressed to register any changes made on each screen. Changes are stored in a temporary file on the device, keyed to your IP address. You can submit changes on many different screens before doing a **Save & Reboot**. To actually *install* the changes, the **Save & Reboot** link on the left side must be selected, and you must confirm the request by again entering the administrator name and password. Others are thus prevented from entering changes if you leave your desk. If you do not choose Save & Reboot, your submitted changes will be erased after a few hours of inactivity.

After the unit reboots, you need not log in again unless you have restarted your Web browser. This is because your Web browser still holds proper authentication keys. However, if you restart your Web browser, you will have to log in again. The SNMP Alarm Encoder does not store HTML 'cookies' on your computer.

The Control Outputs Page

The SNMP Alarm Encoder has 4 Form-C relays, called control points. To provision or modify a control point, click the Control Outputs link in the left pane. The Control Outputs page will appear, as shown in Figure 15.

Control Outputs

Point	Name	Momentary	State	Desired State
1	Generator Start	Yes	Off	On / Off
2	Generator Stop	Yes	Off	On / Off
3	Outdoor Spkr	No	On	On / Off
4	spare	No	Off	On / Off

Edit Control Point:	1 ▾
Name:	Generator Start
Momentary:	Yes ▾
	<input type="button" value="Submit"/>

Figure 15. Control Outputs Page Via The Web

This page displays the table for the 4 Control Points. Control information includes: Control Point number, Name, Momentary action setting, current State and Desired State. The Desired State column is only visible if you have logged in as the administrator or 'Control' operator.

State: This column indicates the current ON/OFF condition of the control point. **On** means that the relay is currently activated and that the common contact is connected to the normally open contact. **Off** means that the relay is currently inactive, and that the common contact is connected to the normally closed contact. If a control point is set for Momentary operation, the relay will close for a minimum of 200 milliseconds and then the relay will open. You may not be able to see the current state change for Momentary controls. This depends on how quickly the Control Outputs page is refreshed after a Momentary control is issued.

Desired State: This column allows you to change the State of a control point. You may click on the *On* or *Off* links in this column to turn the respective relay ON or OFF. If the control is set to momentary, then clicking the ON link will actuate the relay for 200 milliseconds. For momentary controls, the momentary ON will happen so quickly that you generally will not see a change in the State column. In that case, check the event log for confirmation that the momentary control operated correctly. However, you may also occasionally see the State change to TRUE after a Momentary control and stay that way until you refresh the page.

The state of the Controls is changed by clicking the On or Off link in the Desired State column. If the control state information on your browser screen is old, you may get the message: **“Your control could not be done. The state of the Controls has changed.”** This means that someone else has already changed that control point to the state you requested, via an SNMP set command, or via a Web browser action, but your web page view has not yet been updated to reflect that change. Refresh your page view to fetch and display the current point states.

Use the dialog table at the bottom of the screen to provision the 4 control points. This dialog will not appear unless you are logged in as administrator. To provision a Control, edit the following fields:

Edit Control Point: Use this drop-down box to select the Control point you wish to edit.

Name: Enter a name for the selected Control. Any characters are allowed in this field. Control names can be the same as other Controls; however, this is not recommended for obvious reasons.

Momentary: Select *Yes* for Momentary operation of the selected Control point. Select *No* for standard ON/OFF operation of the selected Control point. If a Control point is set to Momentary, an ON operation will cause the relay to close for a minimum of 200 milliseconds after which the relay automatically opens again.

After all changes have been made, press the **Submit** button. The Submit button must be pressed to register any changes made on this screen. You can submit changes from many screens before doing a final Save & Reboot. To actually *install* the changes, click the Save & Reboot link on the left side and enter the administrator login name and password.

The Analog Inputs Page

To provision or modify an analog input point, click the Analog Inputs link in the left pane. The Analog Inputs page will appear, as shown in Figure 16. The Analog Inputs page displays three sections: the current analog point settings section, the differential and voltage range settings section, and the edit alarm input point dialog section.

Analog Inputs

Point	Name	Alarm State	Severity	Service Affecting	Value	Units	Low Threshold	High Threshold	Offset	Multiplier
1	48V Station Batt	False	MJ	Yes	-56.08	Volts	-57.120	-42.000	0.0000	1.0000
2	Deisel Fuel	False	MJ	No	243.42	Gallons	30.0000	250.0000	0.2700	45.3300
3	Site Temp F	False	MJ	No	57.60	F	55.0000	80.0000	32.0000	1.8000
4	HPA 1 Temp	False	MJ	No	91.80	F	80.0000	140.0000	0.0000	18.0000
5	pressure gauge	True	MJ	No	2.22	psi	2.5000	5.0000	0.0000	0.4370
6	analog6	False	ST	No	0.00		0.0000	0.0000	0.0000	1.0000
7	analog7	False	ST	No	0.00	volts	-90.000	90.0000	0.0000	1.0000
8	analog8	False	ST	No	0.00	volts	-90.000	90.0000	0.0000	1.0000

Differential	Range	Range
No	1 +/- 90	2 +/- 90
No	3 +/- 90	4 +/- 90
Yes	5 +/- 90	6 Differential
No	7 +/- 90	8 +/- 90

The table on the left lists the input voltage ranges set for each analog input. For differential inputs, inputs 1 and 2 form a pair, inputs 3 and 4 form a pair, etc.

Edit Alarm Point:	1
Name:	48V Station Batt
Severity:	MJ
Service Affecting:	Yes
Low Threshold:	-57.120
High Threshold:	-42.000
Units:	Volts
Offset:	0.0000
Multiplier:	1.0000
Differential:	No
Range:	+/- 90
<input type="button" value="Submit"/>	

Figure 16. Analog Inputs Page Via The Web

The Analog Inputs page current settings section displays provisioning information for the 8 analog inputs. Each point is described by Analog Point number, Name, Alarm State, Severity, Service Affecting, Value, Units, Low Threshold, High Threshold, Offset and Multiplier values.

The middle table shows differential and range settings of the current configuration for any differential point pairs, as well as the assigned voltage range for each analog input point. This tracks the changes you SUBMIT on this page, but you must also SAVE & REBOOT for the changes to be implemented.

Use the edit analog point dialog section at the bottom of the screen to provision each analog point. This dialog will not appear unless you are logged in as administrator.

To provision an analog input, edit the following fields:

Edit Analog Point: Use this drop-down box to select the Analog point you wish to edit.

Name: Enter a name for the selected Analog point. Any characters are allowed in this field. Analog names can be the same as another Analog point; however, this is not recommended for obvious reasons.

Severity: Select the Severity level for the selected Analog point. The possible Severity levels are: CR, MJ, MN and ST. This indicates the seriousness of the alarm event occurring when the value falls below the low threshold or rises above the high threshold.

Service Affecting: Select *Yes* if the selected alarm point is Service Affecting, or *No* if the selected alarm point is Not Service Affecting when its value is outside the low and high thresholds. The term 'Service Affecting' means that traffic has been dropped or that major communications disruption has occurred.

Low Threshold: Enter the Low Threshold (most negative) value for the selected Analog point. If the scaled Value is more negative than the Low Threshold, the Alarm State will be set to True. This value is based on the converted input value after the offset and multiplier correction.

High Threshold: Enter the High Threshold (most positive) value for the selected Analog point. If the scaled Value is more positive than the High Threshold, the Alarm State will be set to True. This value is based on the converted input value, after the offset and multiplier correction.

Units: Enter the Units for the selected analog. Any characters are allowed in this field. An example might be gallons, Volts, Amperes, gallons or dBm.

Offset: Enter the Offset for the selected analog point. The Offset is added to the raw analog reading, and then multiplied by the Multiplier to calculate the Alarm Value. The offset is set in measurement range units (Volts). Offsets are often used if a sensor yields a non-zero voltage when the measured quantity is actually zero. Positive or negative offsets may be entered.

Suppose a sensor reports gallons of diesel fuel, and reads 1 volt for zero gallons, and 8 volts for 600 gallons. Then an offset of minus 1 causes the range to become zero to 7 volts, and a multiplier of 85.7 would yield values between zero and 600 gallons. You might also set the low threshold to 50. Then you would get an alarm condition (and an SNMP notification) below 50 gallons.

Multiplier: Enter the Multiplier for the selected Analog. The Offset is added to the raw Analog measurement; the result is then multiplied by the Multiplier to calculate the Alarm Value. Negative multipliers may be entered if you wish to reverse the sign or polarity of the value measured.

Differential: Select *Yes* if the Selected Analog input is differential, or *No* if the selected Analog input is single-ended. Single-ended measures the electrical potential between an analog input pin and ground. Differential measures the electrical potential between a pair of pins, irrespective of their relationship to ground. For differential inputs the pairing is fixed: Input 1 is paired with input 2, input 3 with input 4, input 5 with input 6 and input 7 with input 8. Note that this is different from a 2311 pairing of 1 with 9). You can have a mix of single-ended inputs and differential-pair inputs in one unit.

Range: The analog input range is fixed at negative 90 volts to positive 90 volts. The inputs auto-range and show values to two decimal digits of precision.

After all changes have been made, press the **Submit** button. The Submit button must be pressed to register any changes made on this screen. You can submit changes from many screens before doing a final Save & Reboot. To actually *install* the changes, click the Save & Reboot link on the left side and confirm the request by entering the administrator name and password.

Note: As you submit changes, the entries in the alarm table will change, but the **Value** and **Alarm State** columns will reflect pre-existing measurements settings currently in effect. You will not see your changes reflected in the Value column until you save and reboot. In other words, you can change a multiplier from 1 to 1000 and units from Volts to millivolts, but the Value column will show a Volts reading obtained with the original multiplier until you Save & Reboot.

The Boolean Alarms Page

Boolean (composite) alarm points are virtual alarm points created by combining the true/false states of standard hardware alarm, status, analog and control points using Boolean operators ('AND,' 'OR,' 'XOR' and 'NOT'). By combining hardware points this way, you can create an expression (a Boolean alarm) that will be true if the true/false state of all of the individual points satisfy the expression. Note: Boolean alarm points cannot include other Boolean points, only standard hardware points.

To provision or modify a Boolean point, click the Boolean Alarms link in the left pane. The Boolean Alarms page will appear (see Figure 17), displaying a table of currently defined Boolean Alarms and an edit Boolean Alarm point dialog section.

Boolean Alarms

Point	Name	State	Severity	Service Affecting	Expression
9	Site Intrusion	False	ST	No	AL1 AND NOT AL2
10	boolean10	False	ST	No	
11	boolean11	False	ST	No	
12	boolean12	False	ST	No	
13	boolean13	False	ST	No	
14	boolean14	False	ST	No	
15	boolean15	False	ST	No	
16	boolean16	False	ST	No	
17	boolean17	False	ST	No	
18	boolean18	False	ST	No	
19	boolean19	False	ST	No	
20	boolean20	False	ST	No	
21	boolean21	False	ST	No	
22	boolean22	False	ST	No	
23	boolean23	False	ST	No	
24	boolean24	False	ST	No	

The Boolean Alarms will appear as rows 9 to 24 in the SNMP alarm table

Figure 17. Boolean Alarms Page Via The Web

The top of the page displays a table listing the current provisioning information for up to 16 Boolean Points, which are numbered 9 through 24. Boolean information includes Boolean Point Number, Name, the point's current State, Severity, Service Affecting and Expression.

Use the edit dialog at the bottom of the page to provision new or edit existing Boolean points. This edit dialog will not appear unless you log in using the administrator login name and password. Note: If the point already has an expression defined, you are only able to add additional items to the existing line or to UNDO the last item.

In the example above, if alarm point 1 is asserted (site door is open) and alarm point 2 is NOT asserted (technician-at-site switch) then an intrusion alarm is activated. The door open alarm has a 10 second delay on the alarm input page, so the technician has 10 seconds after opening the door to throw the 'tech-at-site' switch.

See Section 7 - Creating Boolean Alarm Points and Expressions on page 45 for detailed information on creating Boolean Alarm points and expressions.

The Event Log Page

To view the Event Log, click the Event Log link in the left pane. The Event Log page will appear, as shown in Figure 18. Each event listed also triggered an SNMPv2 notification (i.e. trap) to be sent to any SNMP managers listed in the Notify Table.

Event Log

Name	State	Severity	Service Affecting	Occur Date Time	Point Table Index
pressure gauge	True	MJ	No	Sun Nov 29 07:15:25 2009	Analog Table # 5
48V Station Batt	True	MJ	Yes	Sun Nov 29 07:15:27 2009	Analog Table # 1
Generator Start	True	CT	No	Sun Nov 29 07:16:15 2009	Control Table # 1
Generator Start	False	CT	No	Sun Nov 29 07:16:15 2009	Control Table # 1
Deisel Fuel	True	MJ	No	Sun Nov 29 07:16:55 2009	Analog Table # 2
Generator running	True	MJ	No	Sun Nov 29 07:17:04 2009	Alarm Table # 6

Figure 18. Event Log Page Via The Web

The Event Log page displays a table listing the Alarm, Control, Analog and Boolean points that have changed states and that have a Severity of CR, MJ or MN. If 'Add ST events to the Event Log' is set to *Yes* in the IP Settings, then points with a Severity of ST are also shown in the Event Log. Event Log information includes the point Name, State, Severity, Service Affecting, Occur Date Time and Point Table index.

The Point Table Index column indicates the type of event (Alarm, Control, Analog or Boolean) and the row number in the corresponding static table.

Up to 100 Events (rows) can be stored in every SNMP Alarm Encoder. When the Event Log is full and a new Event is added to the Event Log, the oldest Event is removed. In effect, the table scrolls upward. This screen does not refresh automatically. When looking at the most recent items (bottom of table), click the browser refresh button to see new events while maintaining the end of table position.

The IP Settings Page

The IP settings, DNS Server address and NTP (or SNTP) Time Server address are provisioned in the IP Settings page. To make changes, first click on the IP Settings link on the left side of the page. The IP Settings page will appear, as shown in Figure 19 on the next page.

2314 SNMP Alarm Encoder	
IP Settings	
Hostname:	FIAL-2314
IP:	192.168.1.200
Netmask:	255.255.255.0
Gateway:	192.168.1.200
DNS Server:	
NTP Time Server 1: G=0 B=1	192.168.1.2
NTP Time Server 2: G=0 B=1	192.168.1.33
System Location:	yourlocation
System Contact:	yourname@yourcompe
Allow Public Read Only access:	Yes <input type="button" value="v"/>
Add ST events to the Event Log:	No <input type="button" value="v"/>
Disable port 80(http):	No <input type="button" value="v"/>
Disable port 23(telnet):	No <input type="button" value="v"/>
Mac Address:	00:06:3B:01:00:AD
Serial Number:	
Software Version:	1.1.1 16M
<input type="button" value="Submit"/>	

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Figure 19. The IP Settings Page

Enter new values for the following fields on the right-hand pane:

Hostname: Enter a host name for the device. A - Z, a - z, 0 - 9, and hyphen are the only characters allowed. Twenty characters maximum. This name is reported as SNMP object 'system.sysName.0.'

IP: Enter the IP address for this device. (See IP Address restrictions on page 41 for IP address restrictions). The entry is checked for a properly formed value.

The default IP address for every SNMP Alarm Encoder is 192.168.1.200. At a minimum, you must change the last three digits of the IP Address for all subsequent boxes. (Example: 192.168.1.201).

NOTE: Do not Save & Reboot after changing the IP address, Netmask or Gateway, until you have made all other changes and verified them. Doing otherwise may render the device inaccessible to you as a result of an IP settings change.

Recommended: Make all changes desired on the various web pages, then a single Save & Reboot.

Gateway: Enter the gateway IP address for this device. Packets will be sent to the gateway if the destination IP address does not match the IP address range (zone) for the device. The gateway is usually a router that sends IP packets to their proper destination. The entry is checked for a properly formed value.

Netmask: Enter the netmask for the device. The IP address and netmask are closely linked, and must be determined by an IP network administrator or someone familiar with the IP address mappings for the sites on your local area network (LAN). See NOTE 2 below for additional netmask information.

DNS Server (optional): Enter the IP address for a Domain Name Server (DNS) on your network. The DNS entry is only required if you enter hostname.domain instead of IP address in an NTP Time Server entry. If you are not using an NTP Time Server to set the SNMP Alarm Encoder time then you can leave this field empty.

NTP Time Server 1 (optional): Enter the IP address (or hostname.domain) for an NTP or SNTP (Simple Network Time Protocol) server on your network. The SNMP Alarm Encoder can automatically synchronize its system clock with the time server using UDP port 123. If you enter hostname.domain you must also enter an IP address in the DNS Server field just above. That DNS must be able to resolve the hostname to the proper IP address.

If you do not use a time server, the Encoder time and date must be set manually, and the time may drift up to plus/minus 2.5 seconds per day.

The Primary Domain Controllers in Windows 2000 domains act as SNTP servers. Any Windows 2000 Server can be instructed to act as a time-server. Many UNIX/Linux systems use the **xntpd** program to serve NTP and SNTP requests. Use a time-server with a GPS (or better) clock if you wish to have very accurate SNMP timestamps; or, set your time-server to synchronize itself with a free stratum-1 or stratum-2 time-server on the Internet. The SNTP network traffic for the 2314/2316 is extremely low. The data in the UDP synchronizing packet is only 48 bytes long, sent and received once every 3 hours.

NTP Time Server 2 (optional backup time server): Same as above. If two time-servers are entered, the Encoder only uses the one that continues replying. If that one later fails to reply, the Encoder starts using the other unit, toggling between time-servers after each failure. After a successful time update, three hours will elapse until the next check. After a failed update,

one hour will elapse until the next check with the other time-server. However on startup, the second time-server will be checked immediately if the first fails to respond.

The legends for each NTP Time Server contain data of the form: **G=45 B=4**. The **G=** counts the number of normal time-server request/replies since startup. The **B=** counts the number of requests that timed out or returned bad data. Note: If the first time-server is working normally and the network drops very few IP packets, then the second time-server may not be used for months or longer.

System Location (optional): Enter the location of this SNMP Alarm Encoder. Only letters, numbers, dashes and spaces are allowed in this field (64 characters maximum). This value is returned when a manager fetches the MIB-II value called 'system.sysLocation.'

System Contact (optional): Enter the contact information for this SNMP Alarm Encoder. Only letters, numbers, the @ sign, and spaces are allowed (62 characters maximum). Often a telephone number or email address is used. This value is returned when a manager fetches the MIB-II value called 'system.sysContact.'

Allow Public Read Only access: Select Yes if this SNMP Alarm Encoder will allow SNMP Public read access, or No if this SNMP Alarm Encoder will not allow SNMP Public read access. By entering Yes, any host can fetch SNMP data using the community string **public**. The community string **public** allows read-only access, no write access. If you select NO, then only the managers using one of the passwords listed under SNMP Notifications can read data from the unit.

Add Status (ST) events to the Event Log: Select Yes if this SNMP Alarm Encoder will log ST events, or No if this SNMP Alarm Encoder will not log ST events. CR (critical) MJ (major) and MN (minor) events will always be logged. All events that are placed in the Event log will also generate an SNMP v2 notification or inform request that will be sent to the SNMP managers configured on the notify setup page.

MAC Address: All SNMP Alarm Encoders contain a factory-assigned MAC Address. The Media Access Control (MAC) address is the network card address for the Ethernet port. It is a unique number, different for every Ethernet network card ever manufactured and thus, cannot be changed.

Serial Number: The serial number displays the FIAL factory serial number for the device. This number cannot be changed.

Software Version: The software version number identifies the release or build version of the firmware installed in the device. The user cannot change this number. The software version may change if a TFTP firmware upgrade is performed.

Once all changes have been made, press the **Submit** button. The Submit button must be pressed to register any changes made on each screen. Changes are stored in a temporary file on the device, keyed to your IP address. You can submit changes on many different screens before doing a final Save & Reboot. To actually *install* the changes, the **Save & Reboot** link on the left side must be selected, and you must confirm the request by again entering the administrator name and password. Others are thus prevented from entering changes if you leave your desk. If you do not choose Save & Reboot, your submitted changes will be erased after a few hours of inactivity.

After the unit reboots, you need not log in again unless you have restarted your Web browser. This is because your Web browser still holds proper authentication keys. However, if you restart your Web browser, you will have to login again. The SNMP Alarm Encoder does not store HTML 'cookies' on your computer.

The RTC Time/Date Page

To modify the Real Time Clock (RTC), click the RTC Time/Date link in the left pane. The RTC Time/Date page will appear, as shown in Figure 20.

RTC Time/Date

Current RTC Date and Time			Current System Date and Time		
Sun 07/27/03 07:03:06			Sun Jul 27 07:03:07 2003		
Date			Time		
MM: 07	DD: 27	YYYY: 2003	HH: 07	MM: 03	SS: 06
			Submit		

Pressing submit will make changes to the RTC immediately

This will set the operating system clock as well as the battery-backed-up RTC onboard clock chip.

If an NTP time server is being used, it will set the battery-backed-up onboard RTC clock once per day.

Figure 20. RTC Time/Date Page Via The Web

The RTC Time/Date page (as shown in Figure 20), displays the current Date and Time of the RTC and the System Clock.

Use the dialog table at the bottom of the screen to change the date and time. This entry table will not appear unless you log in using the administrator name and password.

To set the RTC and the System Clock, edit the following fields:

Date MM: Enter the Month in this field. Only the digits 0-9 are allowed. The Month must be a value between 1 and 12.

Date DD: Enter the Day in this field. Only the digits 0-9 are allowed. The Day must be a value between 1 and 31.

Date YYYY: Enter the Year in this field. Only the digits 0-9 are allowed. The Year must be a 4-digit value.

Time HH: Enter the Hour in this field. Only the digits 0-9 are allowed. The Hour must be a value between 1 and 23. UTC time is recommended. Note: Network Time Servers only provide UTC (i.e. GMT) time.

Time MM: Enter the Minutes in this field. Only the digits 0-9 are allowed. The Minutes must be a value between 1 and 59.

Time SS: Enter the Seconds in this field. Only the digits 0-9 are allowed. The Seconds must be a value between 1 and 59.

After all changes have been made, press the **Submit** button. Pressing the Submit button will cause your RTC clock changes to be instantly saved in the unit. For the most accurate result, press the submit button about 1 second before the actual time you entered, to allow the transmission and processing delay. You do not need to select Save & Reboot in order to change the time/date settings—the Submit button acts instantly.

Most users will use UTC time for all alarm reporting devices. UTC is best for networks that span time zones. Also, UTC does not suddenly change for daylight savings time. This unit will not perform a 'daylight savings time' change. Such a change confuses many alarm managers and their reporting functions.

Note: It is useless to change the time and date if the unit is successfully using an NTP or SNTP Time Server. The SNTP client will override your time and date settings (to match the Time Server's) within a few hours or so.

Note: To verify that the unit is successfully communicating with a time-server, see the **IP Settings** web page. The **G= #** is the number of good time updates, and the **B= #** is the number of bad time updates. You can also test the SNTP function. Change the time by 15 minutes or so, and then restart the unit (use Save & Reboot on the web page screen). The time should automatically return to the correct time after the restart is complete, if the provisioned time-server is reachable on the IP network.

The SNMP Notifications Page

This screen configures the unit to send SNMP V2 notifications (called Traps in SNMP V1).

To specify or edit an SNMP Manager, click the SNMP Notifications link in the left pane. The SNMP Notifications page will appear, as shown in Figure 21.

SNMP Notifications

Manager	Name	IP Address	Traps	Send	Community
1	Main NOC	10.5.22.7	Enabled	Inform Request	*****
2	Backup NOC	10.8.3.140	Enabled	Inform Request	*****
3	manager3		Disabled	Notifications	*****
4	manager4		Disabled	Notifications	*****
5	manager5		Disabled	Notifications	*****

Edit Manager:	1
Name:	Main NOC
IP Address:	10.5.22.7
Traps:	Enabled
Send:	Inform Request
Community:	*****
Submit	

Inform Request Settings (for all managers)	
Retries:	5
Timeout Seconds:	1
Submit	

Figure 21. SNMP Notifications Page Via The Web

The SNMP Notifications page consists of three sections. The top section displays a table that lists the provisioning information for up to five managers that can receive notifications and perform controls on this unit. The 2314/2316 SNMP Alarm Encoder uses the manager's IP address and the Community string to validate a manager that is accessing it via SNMP commands. Only managers that are listed in this table will have access to this unit via SNMP 'set' commands. Manager information includes manager table entry Number, Name, IP Address, Traps (either enabled or disabled), Send (either Notification or Inform Request) and Community string. The manager must also use the same community string as listed in this table.

Use the dialog section in the middle of the page to provision each required manager. The SNMP Notifications page will not even be listed unless you are logged in with the administrator password.

To provision a Manager, edit the following fields:

Edit Manager: Use this drop-down box to select which of the five Managers you wish to edit.

Name: Enter a name for the selected Manager. Only letters, numbers, dashes and spaces are allowed in this field. This name only helps to identify the manager and is present in the SNMP notifications table. It is not used for any other purpose.

IP Address: Enter the IP address for the selected Manager. (See IP Address restrictions on page 41 for IP address restrictions).

Send: Select **Notifications** if the selected Manager will be sent SNMP v2 notifications (traps). Select **Inform Request** if the selected Manager will be sent SNMP v2 inform requests.

Community: Enter the Community string (i.e. password) that the selected Manager will use to access this unit via SNMP commands. A - Z, a - z, 0 - 9, and hyphen are the only characters allowed. A manager **must** be using the IP address entered here as well as this Community string in order to perform controls. Each manager can have a unique Community string value.

After all changes have been made, press the **Submit** button. The Submit button must be pressed to register any changes made on this screen. You can submit changes from many screens before doing a final **Save & Reboot**. To actually *install* the changes, click the Save & Reboot link on the left side and enter the administrator login name and password to confirm.

Inform-Request Settings (for all managers):

The table on the bottom of the screen controls Inform-Request retries and timeouts. An SNMP notification (trap) is an autonomous (automatic) message sent to a manager when an alarm condition has occurred. An **inform-request** is basically a notification (trap) where the manager is expected to reply and confirm that the manager has received the message. If the 2314/2316 SNMP agent does not receive the 'inform' within a certain time, the 2314/2316 SNMP agent will re-transmit the same Inform-Request message again. The recommended Inform-Request retries setting is 2. This yields a total of 3 attempts. The maximum setting is nine.

The recommended **timeout seconds** setting is 2 seconds. If you have network legs that transport IP at low bit-rates, you may have to adjust this time upward. This is especially true if there are several routers in a low bandwidth network that delay the packet by a full packet transmission time. Most systems will use a value between 1 and 3 seconds.

The inform-request **retries** can be set between 1 and 9 retries. If you want zero retries, then use a 'notification' instead of an inform-request. A setting of 'one' means that two inform-requests will be sent, unless the manager responds (confirms receipt) to the first inform-request before the Timeout Seconds value. A 'retries' setting greater than 3 is probably a waste of network bandwidth and resources.

The inform-request feature helps improve performance for networks that are unreliable (dropped packets). It cannot compensate for a manager that is shut down for a period of time. In that situation, the manager is expected to poll the 2314/2316 SNMP Event Table to bring itself up to date after the manager starts up. The 2314/2316 SNMP Event Table holds the last (most recent) 100 events. This typically covers a period of hours to days.

The 2314/2316 inform-request queue only processes one event at a time. If three reportable events happen at about the same instant, the 2314/2316 will first do the notifications and all the inform-request tries/retries for the first event. It will then process the second event, and so on.

Suppose you have two managers receiving inform-requests, and one is shut down. Inform-requests to the 'working' manager may be delayed somewhat because of the retries to the manager that is down. Suppose retries = 2 and timeout seconds = 2. After a fast sequence of reportable events, the 'working' manager will have a wait of (3-tries * 2-seconds) = 6 seconds between receiving inform-requests for successive events.

The 2314/2316 SNMP agent never sends notifications or inform-requests faster than one per second. This avoids network congestion and resulting packet loss.

Note the two submit buttons on this web page. The upper submit button is used when changing the parameters for a manager. The lower submit button is only used for setting the retries and timeout values. Remember, you must do a 'save & reboot' operation for any 'submit' changes to take effect.

A manager may set its Send Notifications column to True (1) or False (2) in order to turn its notifications (or Inform-Requests) on and off.

If a manager is to receive Inform-Requests, then both columns (Send Notifications and Send Inform-Requests) must be 'True'. If a manager is to receive notifications, then the Send Notifications column must be set to true and the Send Inform-Request column must be false. The following table shows all possibilities:

Table 2. Notification/Trap and Inform Request Settings

Notification/Trap activity	Send Notifications	Send Inform Request
<i>Nothing sent</i>	<i>False</i>	<i>False</i>
<i>Nothing sent</i>	<i>False</i>	<i>True</i>
Notifications sent	True	False
Inform-Requests sent	True	True

To start/stop Notifications/Inform-Requests, a manager changes the value in the 2314/2316 MIB using an SNMP 'set' command. The manager's IP address and write community string must match the values in the row being changed.

After changing Inform-Request settings, press the **Submit** button. The Submit button must be pressed to register any changes made on this screen. You can submit changes from many screens before doing a final Save & Reboot. To actually *install* the changes, click the Save & Reboot link on the left side and enter the administrator login name and password to confirm.

Web Browser interface - Logins and Passwords

There are three different **web interface** login types: Admin, Control and View. Each login type has its own configurable login name and an associated password. Both login name and password are case sensitive.

Table 3. Login Names and Passwords

Login Type	Factory default login name	Factory default password	Description
Admin	admin	remote	Allows provisioning and viewing of all settings in the SNMP Alarm Encoder. Allows Save & Reboot, Configuration download/upload, and Firmware Upgrade. This user may also set control points (relays) ON and OFF with the web interface.
Control	control	remote	Allows viewing of all alarms, controls, Boolean alarms and analog values via the web interface. This user may also set control points (relays) on and off with the web interface.
View only	user	public	Allows <u>viewing-only</u> of alarms, controls, Boolean alarms and analog values. No controls permitted.

The factory default Administrator login (**admin**) and password (**remote**) for each device should be changed for security reasons. The Control user password (and optionally the Control login name) should also be changed; likewise, the View Only login name and password. To change the login names and passwords, click the Set Login & Password link in the left pane.

Set Admin Login & Password

Login:	<input type="text" value="admin"/>
Password:	<input type="password"/>
Re-enter Password:	<input type="password"/>
	<input type="submit" value="Submit"/>

Set Control Login & Password

Login:	<input type="text" value="control"/>
Password:	<input type="password"/>
Re-enter Password:	<input type="password"/>
	<input type="submit" value="Submit"/>

Set View only Login & Password

Login:	<input type="text" value="user"/>
Password:	<input type="password"/>
Re-enter Password:	<input type="password"/>
	<input type="submit" value="Submit"/>

Figure 22. Set Login & Password Via The Web

To change the login and password, complete the following fields:

Login: Enter the new login name for the device.

Password: Enter the new password for the device.

Re-enter Password: Re-enter the new password for the device.

Remember that both the login and password are case sensitive. A-Z, a-z, 0-9, and hyphen are the only characters allowed for the login. The password can be any combination of characters, numbers and special characters. Passwords should be longer than 8 characters in length.

After all changes have been made, press the **Submit** button. The Submit button must be pressed to register any changes made on this screen. You can submit changes from many screens before doing a final Save & Reboot. To actually *install* the changes, click the **Save & Reboot** link on the left side and enter the administrator login name and password to confirm.

The Config File

The configuration file screen displays a text box of all current device settings. If you have 'Submitted' changes with the **Submit** button, the configuration file in Figure 23 will display those changes. **However, the revised data is not saved unless you perform a Save & Reboot.** If you do not do a Save & Reboot, your changes will be erased after a few hours, and you will be required to log in again. If you do not 'Save & Reboot' before you leave for a meeting, your 'submits' may be all undone. When someone resets a remote unit you are provisioning before you save and reboot, your changes will be lost.

You can make changes to a SNMP Encoder's configuration and 'Submit' them, then copy the resulting configuration file for use in another unit – all without actually changing the original unit. You may undo your session's changes (back to the units 'saved' configuration) using the 'Undo all Changes' selection in the left screen pane.

Config File

```

ip 192.168.17.40
gw 192.168.17.1
mask 255.255.255.0
admin admin
password 69Xmd05/g8TT2
view user
password 69Xmd05/g8TT2
control control
password 69Xmd05/g8TT2
hostname 2311-Pikes-Peak
serialno 20310001
dns 17.10.10.5
ntp1 192.168.0.42
ntp2 ticktock.telecom.com
syslocation Pikes Peak
syscontact JohnDoe@telecom.com
publicaccess 1
addstevents 0
webcontrols 1
communitystring private remote private private private
ALARM1 MJ 0 0 10 Door Open
ALARM2 MN 0 0 0 Tech at Site
ALARM3 CR 0 0 0 Sta Batt Low Voltage
ALARM4 MN 0 0 0 AC MainsFail
ALARM5 CR 0 0 300 AC 5minuteFail
ALARM6 MN 0 0 0 Generator 1 Running
ALARM7 MN 0 0 0 Generator 2 Running
ALARM8 MJ 0 0 0 Generator 1 Overcrank
ALARM9 MJ 0 0 0 Generator 2 Overcrank
ALARM10 MJ 0 0 0 Waveguide Press

```

Submit

Figure 23. Configuration Text Screen

To save the contents of the Config File text box, click anywhere within the text area, and then press **control-a** (control key and 'A' key together) to highlight all text. Follow this with a **control-c** (control key and 'C' key together) to copy the text area to the operating system clipboard. Next, start up a text editor (i.e. Notepad or WordPad), click anywhere within its text area, and do a **control-v** or a 'paste text' operation. Save the new file under an appropriate name for later use.

To upload a Config File, first open the saved file (created with NotePad or WordPad) with your text editor. Click anywhere within the text area and type **control-a** to select all of it, and then type **control-c** to copy the text to the clipboard. Erase the contents of the current Config File text box and paste in the contents of the clipboard. **Now, make sure to click the 'Submit' button at the bottom of the screen to register the new configuration settings. When you upload and 'submit' a Config file, the IP address, netmask, gateway, serial number and MAC address are not changed.** This allows you to import a basic configuration from another unit without losing the current IP address, netmask, gateway, serial number and MAC address settings unique to each unit. You can make other last minute changes on the web pages before the Save & Reboot. Finally, perform the Save & Reboot.

Never edit the Config File directly. There is an associated checksum saved with the Config File and there is no way to make changes and re-enter the checksum manually.

Do not edit the saved configuration file on your computer because the checksum will become invalid. The 2314/2316 will reject a configuration with an invalid checksum.

Firmware Upgrade

The program code (firmware) in the SNMP Alarm Encoder may be upgraded over the network. You must set up a TFTP server on a Windows or a Unix/Linux machine. The configuration image file and an associated checksum file must be placed in that TFTP directory. You then enter the IP address of the TFTP server and the name of the configuration image file (currently **fial23141.1.2_16m.cramfs** for release 1.1.2 of the 2314, and **fial23161.1.2_16m.cramfs** for release 1.1.2 of the 2316). The file will be downloaded into the unit, and will automatically program into the unit if the checksums are OK.

Firmware Upgrade

The image shows a web form for firmware upgrade. It has a dark blue header with the text 'Firmware Upgrade'. Below the header, there are two input fields: 'IP Address:' and 'File Name:'. To the right of the 'File Name:' field is a 'Submit' button.

Figure 24. Firmware Upgrade Via TFTP

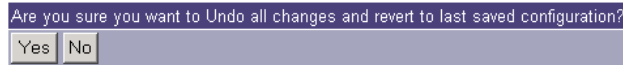
The unit will make two attempts to contact the TFTP server. If this fails, the SNMP alarm encoder will stop, and reboot with the old firmware. Be sure the TFTP server is running and has the latest copies of the following two files in its directory (**fialXXXXn.n.n.cramfs** and **cksum_fialXXXXn.n.n.cramfs**, where **XXXX** is either **2314** or **2316**, and **n** is a one or two digit number). Check the IP address and the File name carefully before pressing the Submit button. Please see the notes section for additional information and examples.

It is possible to run a TFTP server on any Windows machine, even a laptop machine. There are free programs available to implement a Windows TFTP server. The following program by Ph. Jounin is recommended: <http://tftpd32.jounin.net/>

Undo All Changes

At times, you may wish to undo configuration changes already submitted. To undo these changes and revert to the last *saved* settings, click the Undo All Changes link in the left pane. This will only work on changes submitted during this login session, as long as you have not clicked the Save & Reboot button and entered the appropriate name and password.

Undo All Changes Confirmation



Are you sure you want to Undo all changes and revert to last saved configuration?

Yes No

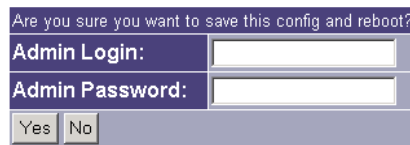
Figure 25. Undo All Changes Screen

When you undo your editing changes, it only affects 'Submits' you have made during this session. It does not affect any other administrative user that has also made changes. Each administrative login gets its own copy of the configuration file to change.

Save & Reboot

After all changes have been made, press the **Save & Reboot** link in the left pane. This link installs all of the temporary changes stored each time the Submit button was pressed on the various screens. Confirm the request by clicking YES when prompted. **The reboot operation will turn OFF any controls (relays) that are currently ON. Make sure that this will not cause any problems in your network.**

Save & Reboot Confirmation



Are you sure you want to save this config and reboot?

Admin Login:

Admin Password:

Yes No

Figure 26. Save & Reboot Screen

If you do not choose Save & Reboot, any submitted changes will be erased after a few hours of inactivity.

5 Configuring the SNMP Master

In order for an SNMP manager to properly interrogate the 2314/2316 SNMP Alarm Encoder alarm, analog, control, Boolean and event data, and to process any traps (notifications or inform requests), the SNMP manager should have the Fial Incorporated Registry MIB and 2314/2316 Encoder MIB compiled into the manager.

First, compile the Fial Incorporated registry MIB *fial-registry-mib.mib* into your SNMP manager, then compile the 2314/2316 encoder MIB *fial-enc-mib.mib*. These MIBs are on a CD shipped with the 2314/2316 SNMP Alarm Encoder. If you do not have these MIBs, please contact Fial Incorporated (www.fial.com) and they will be provided.

The 2314/2316 SNMP Alarm Encoder object data is contained in tables beginning at OID 1.3.6.1.4.1.4822.2.3.1. Walk or browse the encoder MIB to view the data. There are four main tables storing the data, encEventLogTable (OID:1.3.6.1.4.1.4822.2.3.1.2), encAlarmPointTable (OID:1.3.6.1.4.1.4822.2.3.1.3), encControlPointTable (OID:1.3.6.1.4.1.4822.2.3.1.4) and encAnalogPointTable (OID:1.3.6.1.4.1.4822.2.3.1.5). All nodes are fully described within the MIB.

SNMP Notifications:

The 2314/2316 SNMP Alarm Encoder can report alarm and control events to SNMP managers using SNMP v2 notifications. Up to five different SNMP managers can be sent notifications for these events. Configuring the 2314/2316 notification table is explained in **The SNMP Notifications Page** on page 29.

SNMP Controls:

Only managers provisioned in the 2314/2316 SNMP Notifications table are allowed to 'set' controls. SNMP set requests from managers whose IP addresses are not present in the SNMP Notifications table are rejected. Set requests are also rejected if the 'write' community string does not match one of the strings in this table.

A set request must also contain the *current* spinlock value for the control point being set. The spinlock value is a number managed internally by the 2314/2316 and associated with each control point. A manager must first *read* (SNMP get) the current spinlock value for the target control point, and then use that value in its set request. The spinlock value insures that only one manager at a time manipulates a specific control point, and that the manager is informed of success or failure of the set. The set request contains two variables: the spinlock and the requested state (on/off).

The following example assumes a 2314/2316 with an IP address of 192.168.1.200 and with the Fial 2314/2316 SNMP Alarm Encoder MIBs compiled into your SNMP manager. Using your SNMP manager, browse the 2314/2316 SNMP Alarm Encoder **encControlPointTable** (OID: 1.3.6.1.4.1.4822.2.3.1.4) to read the current spinlock values for the 16 control points (see Figure 27 below). Make sure the community strings match!

Model 2314/2316 SNMP Alarm Encoder

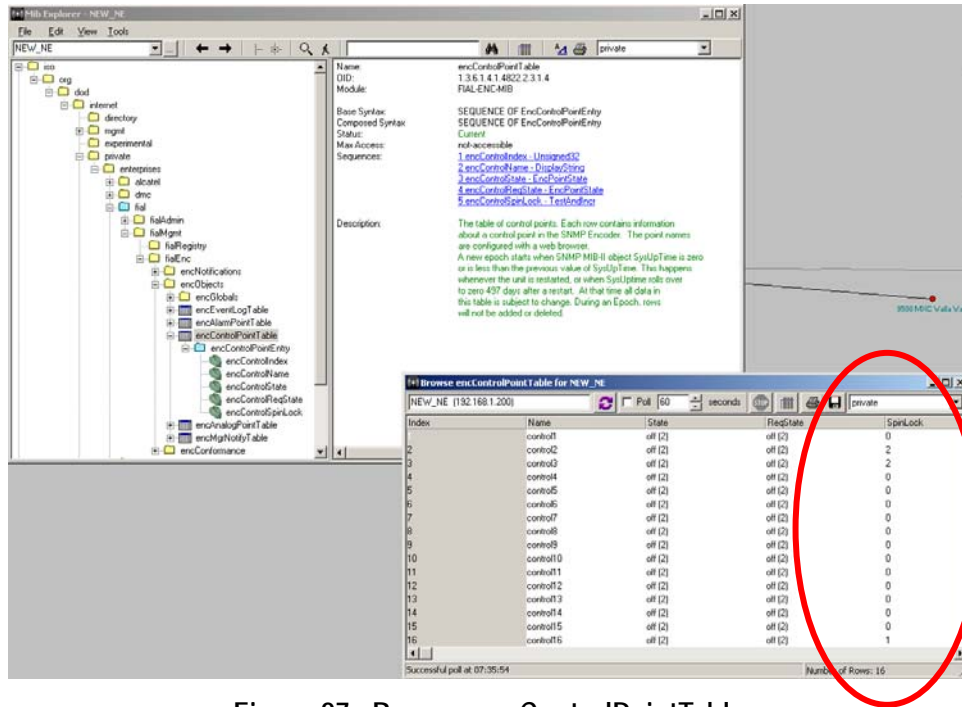


Figure 27. Browse encControlPointTable

Configure the first variable as the spinlock associated with the desired control point (relay). Select the `encControlSpinLock` node (OID: 1.3.6.1.4.1.4822.2.3.1.4.1.5) and configure the variable (see Figure 28). Enter the *index* of the spinlock that matches the *index* of the control point (point 3 in this example) and set its *value* to match the *current* value of the spinlock (2 in this example).

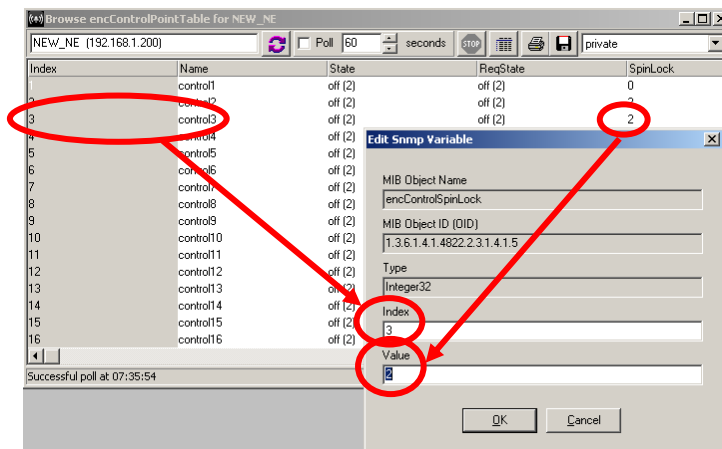


Figure 28. Setting Spinlock Variable

Do the same for the requested control point state by selecting the `encControlReqState` node (OID: 1.3.6.1.4.1.4822.2.3.1.4.1.4) and configuring this variable. Enter the same *index* of the

control point used for the spinlock above. Enter the requested control point state *value* as either on(1) or off(2), as appropriate (on(1) in this example).

Now the completed Set Request (see Figure 29) contains the two variables entered above (encControlSpinLock.3:2 and encControlReqState.3:on(1)) and is ready to be sent. Push the Send button to initiate the set command.

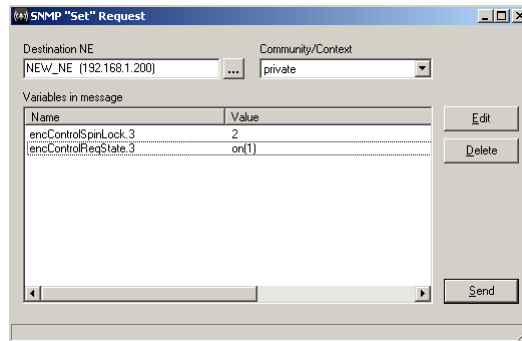


Figure 29. Set Request with Spinlock and Control Point State Variables

Sending this Set Request will cause the 2314/2316 SNMP Alarm Encoder to execute the control and change the on/off state of the control output relay to match the requested state (ON in this example). The 2314/2316 then automatically increments the spinlock value for this control point.

6 Notes

Web page provisioning caution

If two users are editing the configuration of an SNMP Alarm Encoder at the same time, the two users will not see the changes 'submitted' by each other. A separate 'changes' buffer is created for each user. The first user to Save & Reboot will have their changes applied. Any changes made by the second user will be lost, and the second user will have to log in again and start over.

Remote Web or Telnet provisioning caution

If remotely provisioning the device, be careful not to enter an **incorrect IP address, netmask or gateway value**. When you save and reboot, the device may become inaccessible to you. Be wary of changing IP addresses, netmasks or gateway settings remotely. **When you upload and 'submit' a config file, the IP address, netmask, gateway, serial number and MAC address are not changed.** This allows you to import a configuration from another unit without losing the current IP address, netmask, gateway, serial number and MAC address settings unique to each unit. All other settings in the config file will take effect after you Save & Reboot.

The Craft interface can always be used to correct the IP address, netmask or gateway setting. You may also change the administrator login name and password there. HyperTerminal is generally used with a laptop computer to connect to the craft interface (On Unix/Linux, use minicom or equivalent). The Craft interface parameters are: 9600-baud 8N1. Be sure that Flow Control is set to 'none,' in other words, no handshaking. The craft terminal connections are on pins 4, 5 and 8 of the front panel Ethernet RJ45 . The pin designations are in Table 8-2 At 9600 baud, the RS-232 cable should not be over 50 feet long.

Each telecommunications site generally has a specific range of IP addresses available, along with a netmask and gateway (router) IP address suitable for the site. You may need to get that information from your network administrator. No two devices at a site can have the same IP address. If this happens, one or both devices will be inaccessible.

If you configure the SNMP encoder in your office, it may be best to leave the IP address, netmask and gateway settings for last, after you have configured the device and verified your configuration. Set the final-destination IP address, netmask and gateway as a last step, then Submit and Save & Reboot. The device is now ready for installation at the remote site.

Hostname

The Hostname entry on the IP Settings screen allows device tracking by name instead of IP address. Enter the hostname only, not the domain. The hostname must be a valid Internet hostname, for example:

Only a to z, A to A, 0 to 9 and hyphen are allowed.

Underscore is not allowed. Case is ignored.

Valid: 6Westlake-9 (host name can not start with a number)

Invalid: west_lake (underscore not allowed)

Invalid: west.lake (dot not allowed in host name)

Invalid: west-lake#95 (pound-sign not allowed)

It is desirable to enter the assigned hostname and IP address into your network's DNS server, so that users and SNMP managers can refer to the SNMP Alarm Encoder by hostname.domain instead of using IP address. If you use DHCP for all address assignments, then create a permanent lease for the IP address assigned to the SNMP encoder. You will need to know the SNMP Encoder's MAC address to create a permanent lease. The unit's MAC address is shown on the web page IP Settings screen, and looks something like this: 00:06:3B:00:27:8C

Once your DNS is set up properly, if your domain name is something like 'yourDomain.com' and your hostname is something like 'pikespeak', you can then enter 'telnet pikespeak.yourDomain.com' or 'http://pikespeak.yourDomain.com' instead of remembering IP addresses for each unit.

Note that there is no 'www' in this URL (web address).

IP Address restrictions

The first and last IP address in the range defined by the netmask cannot and must not be used. Netmasks are used to divide the 4 billion possible IP addresses into smaller groups or "zones." This is called sub-netting.

For example: Given a netmask of 255.255.255.0, IP address n.n.n.0 and n.n.n.255 cannot be used. The first is the network address, and the last is the network broadcast address. Commonly used netmasks, for Class-C and smaller zones, are shown in the following table.

Table 4. Table of Netmasks and Addresses

Netmask	Number of Useable Addresses	Number of networks	Useable addresses per network	Addresses That Are Not Useable
255.255.255.0	254	1	254	n.n.n.0 n.n.n.255
255.255.255.128	126	2	126	n.n.n.0 n.n.n.127 n.n.n.128 n.n.n.255
255.255.255.192	62	4	62	n.n.n.0 n.n.n.63 n.n.n.64 n.n.n.127 n.n.n.128 n.n.n.191 n.n.n.192 n.n.n.255
255.255.255.224* *see example below	30	8	30	n.n.n.0 n.n.n.31 n.n.n.32 n.n.n.63 n.n.n.64 n.n.n.95 n.n.n.96 n.n.n.127 n.n.n.128 n.n.n.159 n.n.n.160 n.n.n.191 n.n.n.192 n.n.n.223 n.n.n.224 n.n.n.255
255.255.255.240	14	16	14	n.n.n.0 n.n.n.15 n.n.n.16 n.n.n.31 n.n.n.32 n.n.n.47 etc.
255.255.255.248	6	32	6	n.n.n.0 n.n.n.7 n.n.n.8 n.n.n.15 n.n.n.16 n.n.n.23 etc.
255.255.255.252	2	64	2	n.n.n.0 n.n.n.3 n.n.n.4 n.n.n.7 n.n.n.8 n.n.n.11 etc.

For example: If the IP address zone starts at **192.168.0.64**, and the netmask is 255.255.255.**224**, then **32** addresses exist in the zone, from **192.168.0.64** to **192.168.0.95**. However, the address ending in 64 is never used for a host device, since it is the network address. Also, the address ending in 95 cannot be used since it is the broadcast address for the zone. So, only the 30 addresses from 192.168.0.65 to 192.168.0.94 may be used. Most networks use the first or the last **useable** IP address in a zone (.65 or .94 in this example) for the gateway (router). If the destination IP address of an IP packet is not in a device's IP address zone, then the packet is sent to the gateway. The gateway (router) 'knows' how to reach the other addresses on the LAN or Internet. While it is common practice to assign the first or last useable address in an IP address zone to the gateway device, this is not required.

Login & Password

A login (**admin**) and password (**remote**) is present in each SNMP Alarm Encoder shipped from the factory. Remember that **both the login name and password are case sensitive**. The administrator login and password will allow you to have access to the Craft port or telnet and web page configuration screens. For security purposes, it is recommended that you change the login names and passwords of each device installed to values known only to you or other administrators and trusted users.

If you forget the new administrator login name and password, the administrator login name and password can be reset to the factory default. To do this, hold in the lamp test button after power-up or reset, until the power-on function completes. This will take about 40 seconds. This will not change the IP address.

If the login/password page rejects your login, it is possible that someone has changed the login name and/or password; or possibly your Caps Lock key is activated. Enter the correct user login name and password, or see the directions above for restoring the factory default values.

Remember: Both login names and passwords are case sensitive.

Save & Reboot

For detailed information on Save & Reboot versus Submit, refer to the section **Save & Reboot** on page 36.

Web & UNIX Compatible Browsers

The web configuration pages use JavaScript and Cascading Style Sheets. Microsoft Internet Explorer (IE) version 6.0 or later is recommended. Firefox also works well. Netscape browsers must have JavaScript enabled. This is not the same as Sun corporations 'Java' language. The Netscape 7.1 UNIX version does not show the currently active login names for the control user and the view user. However, the proper login names/passwords are submitted.

Replacing the RTC Battery

The design lifetime for the RTC battery is 10 years. The battery is held in a holder and is easily replaceable. Battery type **BR2330** is used. Substituting a CR2330 will only last about 5 years due to higher seal leakage.

Trivial File Transfer Protocol (firmware upgrade)

The 2314/2316 firmware upgrade consists of two files, and checksum file and a main file.

The checksum file is named: **cksum_fial2314n.n.n.cramfs or cksum_fial2316n.n.n.cramfs**

The main file is named: **fial2314n.n.n.cramfs or fial2316n.n.n.cramfs**

Where **n.n.n** is the firmware revision number. The current revision is **1.1.2**, so the web page entry to start a download of that file must be either: **fial23141.1.2.cramfs or fial23161.1.2.cramfs**.

The TFTP server (TFTPd32) must be downloaded and unzipped into its own directory. Put the two firmware upgrade files in that same directory. Start the TFTP32.exe program. You will see a screen like that shown below. Click on the settings button and un-check the DHCP server box, so it does not interfere with other DHCP servers on your network. Then stop and restart TFTPd32.exe.

Be careful and double check the IP address and the filename you enter into the SNMP Alarm Encoder's firmware update screen. Make sure the TFTP server program is running at that IP address and that it contains the **cksum_fialXXXXn.n.n.cramfs** and **fialXXXXn.n.n.cramfs** files in the TFTPd32 program directory. The unit will restart with the old firmware if it cannot contact the TFTP server or if the TFTP server says it does not have the filename(s) requested by the 2314/2316. The craft interface (9600 8N1) reports the progress of the TFTP transfers and any errors that occur.

When commanded to perform a firmware upgrade, the 2314/2316 resets and after 18 seconds it restarts and begins the TFTP transfer of the **cksum_fialXXXXn.n.n.cramfs** file. That is a small file, so about one second later the 2314/2316 asks for the **fialXXXXn.n.n.cramfs** file, which is about 1.6 Megabytes long.

Here are actual test results of upgrades over the Internet with a 256 kilobit/second connection at the 2314/2316 site and a 768 kilobit/second at the TFTP server, with 18 routers in between. The ping turnaround time was 26 milliseconds. With little or no other traffic, the transfer took about 2 minutes, averaging about 14,000 bytes per second. The 2314/2316 then takes an additional 45 seconds to flash the new firmware and restart.

The slowest transfer seen was 36 minutes over the same Internet connection (256k to 768k connection), with a very large TCP download on the 768 kilobit side at the same time. This caused encoder-to-TFTP-server ping-return times of 850 milliseconds and an average transfer rate of only 750 bytes per second. The result of this slow 6000 bits per second firmware upgrade transfer took 36 minutes to complete, but the new firmware was loaded successfully. In this situation though, timeouts and retries caused the TFTP server to show messages like the following in its activity screen:

```
Ack block 521 ignored (received twice)(06/05 17:19:14.896  
Ack block 543 ignored (received twice)(06/05 17:19:30.268
```

When the firmware update starts, the TFTP client makes two attempts to contact the server with an interval of 4 seconds. If the server does not respond, the 2314/2316 will stop until it is physically reset. Since the download requests are UDP packets, there is a chance that they may both be lost in a very busy network or in a degraded network. If the network is very poor, it may be necessary to visit the site of the 2314/2316 to do the firmware update. A laptop should be loaded and tested with the TFTPd32 server program before leaving for the remote site. We have had no problems with the TFTPd32 server running on Windows 2000/2003. TFTPd32 is recommended by Cisco, HP and other major companies.

TFTP Server (TFTPd32 by Ph. Jounin) main screen after successful download. This is a model 2311 download, the model 2314/2316 will be similar:

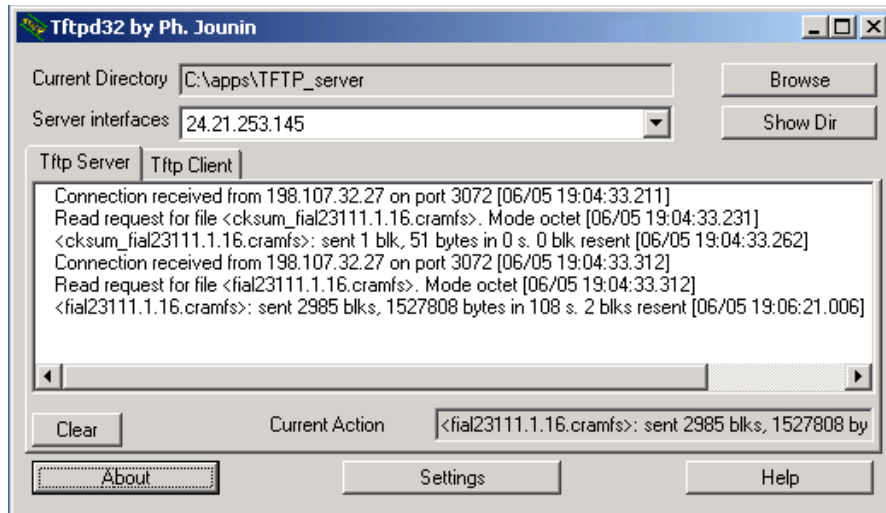


Figure 30. TFTP Server Window

TFTP Server directory (Show Dir button), including the two fial2311 firmware files for firmware version 1.1.16:

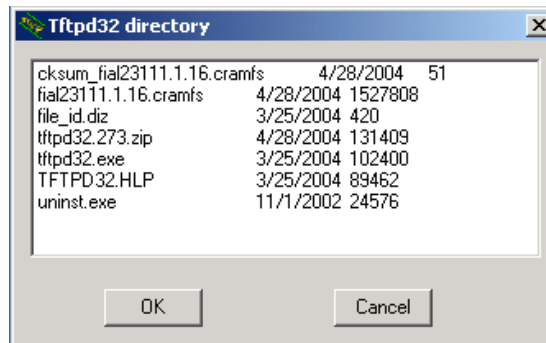


Figure 31. TFTP Server Directory Window

7 Creating Boolean Alarm Points and Expressions

Boolean Alarms

Point	Name	State	Severity	Service Affecting	Expression
1	All Tower Lights Out	False	CR	No	AL3 AND AL4
2	Battery Discharge 1	False	MJ	No	AL6 AND (NOT AL1)
3	Major AC Power Fail	False	MJ	No	
4	Battery Discharge 2	False	CR	No	(NOT AL1) AND (AL6 OR AL8)
5	boolean5	True	ST	No	AL1 AND NOT AL2 AND NOT AL3
6	boolean6	False	ST	No	AL6 AND NOT AL1
7	boolean7	False	ST	No	
8	boolean8	False	ST	No	
9	boolean9	False	ST	No	
10	boolean10	False	ST	No	
11	boolean11	False	ST	No	
12	boolean12	False	ST	No	
13	boolean13	False	ST	No	
14	boolean14	False	ST	No	
15	boolean15	False	ST	No	
16	delayed test	False	CR	Yes	AL32 AND (NOT AL31)

The Boolean Alarms will appear as rows 33 to 48 in the SNMP alarm table

Figure 32. Boolean Alarms Screen

To provision a Boolean Alarm point, edit the following fields in the edit dialog at the bottom of the Boolean Alarms screen:

Edit Boolean Point: Use this drop-down box to select the Boolean point you wish to edit.

Name: Enter a name for this selected Boolean point. Any characters are allowed in this field. Two Boolean points can have the same name; however, this is not recommended for obvious reasons.

Severity: Select the Severity level for the selected Boolean point. The possible Severity levels are: CR, MJ, MN, and ST.

Service Affecting: Select *Yes* if the selected Boolean point is Service Affecting, or *No* if the selected alarm point is Not Service Affecting.

Expression: Use the list box and buttons along the bottom to build a Boolean expression. Entering an expression creates a new alarm point whose state depends on specified combinations of other alarms. You create expressions using the true/false state of any alarm point, status point, control point or analog point, combined in various ways with the true/false state of one or more additional alarm, status, control or analog points. A built-in Boolean expression checker helps enforce the correct syntax.

Note: An analog point is 'true' (asserted) only if the current value exceeds the high or low threshold setting for that point.

Alarm and control point names can be quite long. The maximum length of an expression is 128 characters. A pop-up box will warn you when reaching that limit. Therefore, abbreviations are automatically used within the Boolean expression when the expression is created. The appropriate point number is appended to the abbreviation. Alarms are signified by the abbreviation "AL" (AL1 to AL8), Controls are signified by the abbreviation "C" (C1 to 4) and Analog alarms by the abbreviation "AN" (AN1 to AN4).

The simplest example of a Boolean Alarm is one that depends on the combined state of *two* points. If you want a Boolean Alarm to be asserted when both hardware points are *asserted*, just **AND** them together. For example, suppose there are two predefined *alarm* points, named "Tower Beacon" (AL3) and "Tower Side Light" (AL4). You want to create a new Boolean Alarm point (#1) that is asserted when both AL3 and AL4 are asserted.

Start by selecting the desired point number from the Edit Boolean Point drop-down list (select #1 for this example). This will typically be an unused point number. Enter a descriptive name for the new point, something like "All Tower Lights Out." Note: Only alphanumeric and space characters are allowed. Enter the correct Severity level and Service Affecting state for the new Boolean Alarm point in the corresponding boxes. In this example change the Severity to "CR" and leave the Service Affecting state at "No."

Next, build the expression. Select the first point for the expression from the scrollable point list box (see Figure 33). You may need to use the thumb-bar to get to the desired point. In this example select "AL3 Tower Beacon." Notice that the point abbreviation is listed for alarm point #3 before the point name. With the correct point selected, click on the **AddPoint** button at the bottom of the dialog screen. Notice that the point abbreviation (AL3) has been added to the expression field (gray area at the bottom of the dialog) as shown in Figure 33. Only function and operator buttons that are appropriate for the next entry in the expression are enabled after each entry is made (light gray and able to be highlighted). Notice that you can now only select from the AND, OR, XOR,) and UNDO buttons for the next entry.

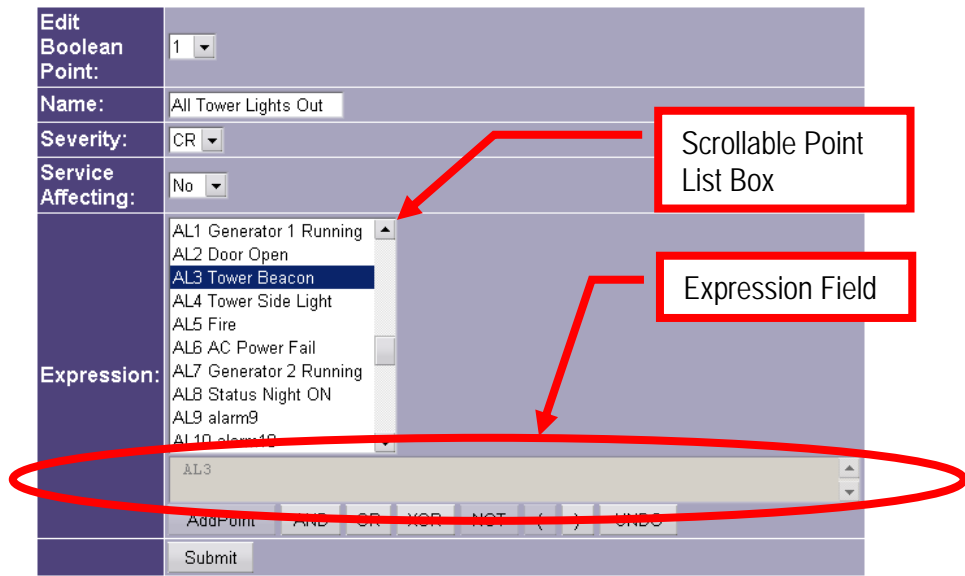


Figure 33. First point in Boolean Expression

Since we want to combine two asserted points, we need to click on the **AND** button next. This adds the AND operator to the expression (see Figure 34).



Figure 34. Partial Simple AND Expression

Now add the final point to the expression by going back to the scrollable point list box and selecting "**AL4 Tower Side Light.**" Press the **AddPoint** button to add the final point to the expression. The expression now should read: "AL3 AND AL4" (see Figure 35).

Edit Boolean Point:	1
Name:	All Tower Lights Out
Severity:	CR
Service Affecting:	No
Expression:	<div style="border: 1px solid gray; padding: 5px;"> <ul style="list-style-type: none"> C1 Generator 1 Start C2 Generator 1 Stop C3 Generator 2 Start C4 Generator 2 Stop C5 control5 C6 control6 C7 control7 C8 control8 C9 control9 C10 control10 </div> <div style="border: 1px solid gray; padding: 5px; margin-top: 5px;"> AL3 AND AL4 </div> <div style="margin-top: 5px;"> <input type="button" value="AddPoint"/> <input type="button" value="AND"/> <input type="button" value="OR"/> <input type="button" value="XOR"/> <input type="button" value="NOT"/> <input type="button" value("("=""/> <input type="button" value=")"/> <input type="button" value="UNDO"/> </div>
	<input type="button" value="Submit"/>

Figure 35. Completed Simple AND Expression

After all changes have been made, press the **Submit** button at the very bottom of the Boolean Alarms page. The Submit button must be pressed to register any changes made on this screen. To actually *install* the changes, you must click the Save & Reboot link on the left side and confirm the request by entering the administrator name and password.

The next example is a Boolean Alarm that depends on the state of two alarm input points, but with one that is in its *unasserted* (NOT asserted) state. The **NOT** operator inverts the true/false asserted state of the selected point. Suppose that there are two predefined alarm points. One is named "AC Power Fail" (**AL6**) and the other is named "Generator 1 Running" (**AL1**). "AC Power Fail" is asserted whenever AC power is lost, while "Generator 1 Running" is asserted whenever the generator is running. You want to create a new Boolean Alarm point (#2) that is asserted when AC power is lost (AL6 asserted = true), but *only* if the generator is *not* running (AL1 unasserted = false).

Start by selecting the desired point number from the Edit Boolean Point drop-down list (#2 for this example). Enter a descriptive name for the new point, something like "**Battery Discharge 1.**" Enter the correct Severity level and Service Affecting state for the new Boolean Alarm point in the corresponding boxes. In this example, change the Severity to "**MJ**" and leave the Service Affecting state at "**No.**"

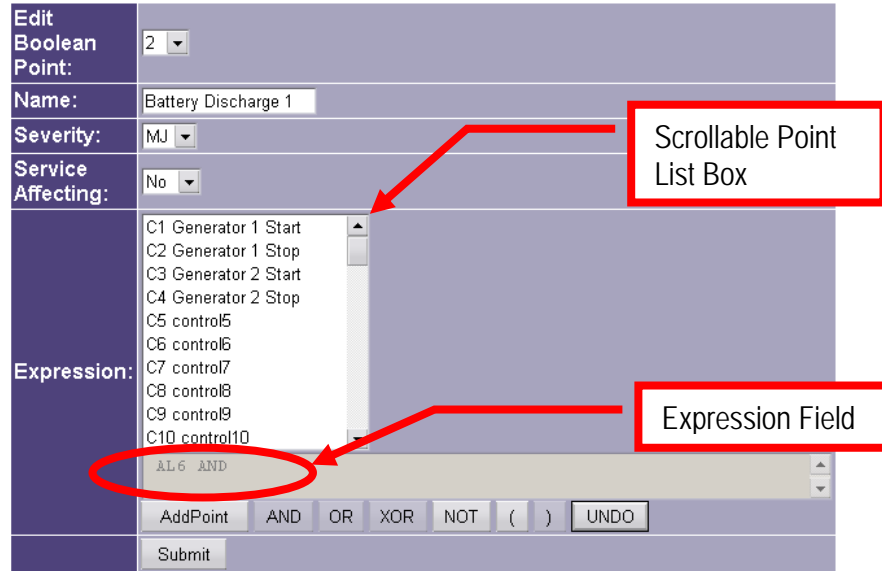


Figure 36. Second Boolean Example

In the scrollable point list box, select the first point for the expression. In this example, select “AL6 AC Power Fail.” Remember that you may have to use the thumb-bar to access the desired point. With the correct point selected, click on the **AddPoint** button at the bottom of the dialog screen. Click on the **AND** button next. Notice that the point abbreviation (AL6) and the AND operator have been added to the expression field (see Figure 36).

Now, to add an unasserted point (unasserted = false) to the expression we need to use the NOT operator. It is always a good idea to enclose various parts of an expression within parentheses to make sure they are evaluated in the correct order and for easier understanding of the expression. To do this, click on the open-parenthesis (button, then click on the **NOT** operator button. The expression field should now read: “AL6 AND (NOT.” Add the second point in the expression for this example by selecting “AL1 Generator 1 Running” from the point list box and clicking on the **AddPoint** button. Finish the expression by clicking on the close-parenthesis) button (see Figure 37).



Figure 37. Completed Unasserted Condition Expression

After all changes have been made, press the **Submit** button to register the settings and click the Save & Reboot link on the left side to save the changes if you are done with creating and editing Boolean Alarms.

Use the **OR** operator to combine two points such that the true/false state of *either* one causes the expression to evaluate to TRUE. For example, suppose you want a Boolean Alarm to be

generated if either one of two point states are true (in this case asserted). Assume there is another alarm point named **“AL8 AC Power Fail 2”** for this example. Perform the point creation and main settings as done for the previous examples, but this time use the OR operator to combine the two points. Name the Boolean point **“Major AC Power Fail”** with a Severity level of **MJ**. Select **“AL6 AC Power Fail”** and **“AL8 AC Power Fail 2”** as the two points to be OR'd together. The expression should simply read **“AL6 OR AL8”** when finished.

Figure 38. Simple OR'd Expression

We can also change the order of evaluation of an expression by using parentheses. Multiple points and conditions almost always need parentheses to make sure the expression is evaluated as intended. In this example, suppose you want to create a fourth Boolean Point that is asserted only if the station battery is discharging because a generator is not running and either one of two AC power sources have failed. To insure the proper order of evaluation of the points, use the parentheses to logically group the points together.

For this example, create a new point by selecting point #4 from the Edit Boolean Point drop-down list. Enter a point name of **“Battery Discharge 2,”** a Severity of **“CR”** and **“No”** for the Service Affecting state in the corresponding boxes. Since we want the unasserted state for this first point, start by clicking on the open parenthesis (button, then the **NOT** operator button. The expression should read: **“(NOT.”** Next, select **“AL1 Generator 1 Running”** from the scrollable point list box, press the **AddPoint** button, then click on the close parenthesis) button. The expression should now read: **“(NOT AL1).”** We need to add another condition to the expression, so press the **AND** button. The expression now reads: **“(NOT AL1) AND.”**

The next part of the expression combines two alarm points. This is done with the **OR** operator and enclosing this part of the expression within parentheses. We want to create a true condition if either one of these two points is asserted (true). Start by clicking on the open

parenthesis (button to enclose the OR condition of the two points. Select alarm point “**AL6 AC Power Fail**” from the list box, then press the **AddPoint** button. Next, click on the **OR** operator button. Select the second alarm point “**AL8 AC Power Fail 2**” from the point list box and again press the **AddPoint** button. Finally, press the close parenthesis) button to finish the expression (see Figure 39).

Edit Boolean Point:	4
Name:	Battery Discharge 2
Severity:	CR
Service Affecting:	No
Expression:	<div style="border: 1px solid gray; padding: 5px;"> <ul style="list-style-type: none"> AL1 Generator 1 Running AL2 Door Open AL3 Tower Beacon AL4 Tower Side Light AL5 Fire AL6 AC Power Fail AL7 Generator 2 Running AL8 AC Power Fail 2 AL9 alarm9 AL10 alarm10 </div> <div style="border: 1px solid gray; padding: 5px; margin-top: 5px;"> (NOT AL1) AND (AL6 OR AL8) </div> <div style="margin-top: 5px;"> AddPoint AND OR XOR NOT () UNDO </div>
	Submit

Figure 39. Creating a Complex Boolean expression

This expression will assert the Boolean Alarm point only if alarm point 1 is unasserted (false) and either alarm point 2 or alarm point 3 are asserted (true).

The current expression is always displayed in the gray area between the point list and the buttons. Expressions cannot be edited, other than with a simple Undo operation. Pressing the Undo button simply removes the last item in the expression. You can keep removing the last item until you get to the point in the expression you want to change, then enter the correct item and re-enter the remaining operators and points to finish the expression.

Remember to press the **Submit** button after all changes have been made. The Submit button must be pressed to register any changes made on this screen. You can submit changes from many screens before doing a final **Save & Reboot**. To actually *install* the changes, click the Save & Reboot link on the left side and confirm the request by entering the administrator name and password.

8 I/O Connector Pin Designations

Left Column: 50-pin CHAMP (AMP) front-panel connector

Right Column: 66M Block pins numbered top to bottom (not the telco pairing/numbering)

Table 5. 2314/2316 I/O Connector Pin Assignment

AMP 50-pin	Connection	66 Block#
26	Alarm Input 1	1
1	Alarm Input 2	2
27	Alarm Input 3	3
2	Alarm Input 4	4
28	Alarm Input 5	5
3	Alarm Input 6	6
29	Alarm Input 7	7
4	Alarm Input 8	8
30	Alarm Input 9 (2316)	9
5	Alarm Input 10 (2316)	10
31	Alarm Input 11 (2316)	11
6	Alarm Input 12 (2316)	12
32	Alarm Input 13 (2316)	13
7	Alarm Input 14 (2316)	14
33	Alarm Input 15 (2316)	15
8	Alarm Input 16 (2316)	16
34	Station Gnd (Alm)	17
9	Station Gnd (Alm)	18
35	Analog Input 1	19
10	Analog Input 2	20
36	Analog Input 3	21
11	Analog Input 4	22
37	Analog Input 5	23
12	Analog Input 6	24
38	Analog Input 7	25

AMP 50-pin	Connection	66 Block#
13	Analog Input 8	26
39	Analog Ground	27
14	Analog Ground	28
40	+5 Volts for sensors	29
15	Expansion 1	30
41	Expansion 2	31
16	Expansion 3	32
42	Spare	33
17	Station Ground	34
43	Relay 1 N.O.	35
18	Relay 1 Common	36
44	Relay 1 N.C.	37
19	Relay 2 N.O.	38
45	Relay 2 Common	39
20	Relay 2 N.C.	40
46	Relay 3 N.O.	41
21	Relay 3 Common	42
47	Relay 3 N.C.	43
22	Relay 4 N.O.	44
48	Relay 4 Common	45
23	Relay 4 N.C.	46
49	Summary N.O.	47
24	Summary Common	48
50	Summary N.C.	49
25	Station Ground	50

See the 66M Block cut-out sheet at the end of this manual for 50-pin to 66 block pin-outs.

NOTE: The summary relay N.O contact closes due to any alarm of CR, MJ, or MN severity. An alarm of ST (status) severity will not close this relay.









9 ETHERNET CONNECTOR (RJ-45 JACK)

Table 6. Ethernet Connector Pin Assignments

Signal Name	RJ-45 pin #	DB9 pin #
TX data +	1	
TX data -	2	
RX data +	3	
RS232 RX data Encoder to PC COM port	4	2
RS232 TX data from PC COM port to Encoder	5	3
RX data -	6	
N.C.	7	
RS232 Ground	8	5

Note: Hold the cable in your hand with the RJ-45 connector pointed away from you (with the hook/tab underneath). Looking at the cable and pins you may see the following on some clear RJ-45 connectors, from left to right. Note that one pair (green in the example below) is always split between pins 3 and 6.









Table 7. Straight-Through Ethernet Cable Wiring (T-568B Color Code)

	COLOR CODE	COLOR	
Pin 1 TX data +	White/orange		Pin 1 TX data +
Pin 2 TX data -	orange		Pin 2 TX data -
Pin 3 RX data +	white/green		Pin 3 RX data +
Pin 4	blue		Pin 4
Pin 5	white/blue		Pin 5
Pin 6 RX data -	green		Pin 6 RX data -
Pin 7	white/brown		Pin 7
Pin 8	brown		Pin 8

A regular Ethernet cable will have both ends wired as in Table 7.

A cross-over Ethernet cable will have one end wired as in Table 7 and the other end wired as in Table 8.

Table 8. Cross-Over Ethernet Cable Wiring - opposite end

	COLOR CODE	COLOR	
Pin 1 RX data +	White/green		Pin 1 TX data +
Pin 2 RX data -	green		Pin 2 TX data -
Pin 3 TX data +	white/orange		Pin 3 RX data +
Pin 4	blue		Pin 4
Pin 5	white/blue		Pin 5
Pin 6 TX data -	orange		Pin 6 RX data -
Pin 7	white/brown		Pin 7
Pin 8	brown		Pin 8

10 2314/2316 Remote Encoder Specifications

Case

1U-high 19-inch rack mount box, aluminum & steel, anodized

Connections (All connections on the front panel)

24 or 48-volt Station Battery (18 to 72 volts)
RJ-45 Connector for Ethernet/IP & Craft Interface
Alarm Input, analog input & relay output connector (CHAMP 50-pin Telco Connector)
Reset switch
Lamp test switch

Indicators

Power: 1 Green LED
SUM Alarm: 1 Red LED
Alarms: 8 (2314), or 16 (2316), Red LEDs
Controls: 4 Red LEDs (top row 1-4 when lamp test button pushed over 3 seconds)
Ethernet: 1 Green link LED & 1 Amber traffic LED (on RJ-45 connector)

Features

Wide-range 18 to 72 volt input power (Isolated power supply)
8-each ON/OFF alarm-inputs (external contact to ground to assert)
SNMP V2 with Notifications and Inform Requests
Web Browser Interface for configuration with HTTP or Secure Socket Layer (SSL)
(Similar to Fial 2311 Interface)
Serial craft interface to set initial IP address/netmask/gateway
Battery backed-up real-time clock

IP configuration:

IP Address, Netmask, Gateway,
NTP Time Server (main NTP and backup NTP IP addresses)

Event Log (table of recent SNMP notifications)

Manager table: Configure up to 5 managers, each manager can receive Notifications (Traps) or Inform Requests

Alarm configuration:

Alarm name
Severity (CR, MJ, MN ST)
Normal-or-inverted input
Alarm delay (0 to 999 seconds)

DC Power Specifications

Supply Voltage: 2314/2316 RTUs

18 volts to 72 volts DC supply (04/2011, serial # 1116062 and later), positive or negative ground

36 volts to 75 volts DC supply (pre-04/2011, serial # 1116062), positive or negative ground

Supply Current: **2314** RTU:

70 ma @55 volts	no alarm LEDs	no relays activated
140 ma @55 volts	ALL8 alarm LEDs	ALL 4 relays activated
150 ma @24 volts	no alarm LEDs	no relays activated
265 ma @24 volts	ALL 8 alarm LEDs	ALL 4 relays activated

Supply Current: **2316** RTU:

60 ma @55 volts	no alarm LEDs	no relays activated
160 ma @55 volts	ALL 16 alarm LEDs	ALL 4 relays activated
135 ma @24 volts	no alarm LEDs	no relays activated
290 ma @24 volts	ALL 16 alarm LEDs	ALL 4 relays activated

(note: current draw decreases as voltage increases)

supply fuse:

internal 1 Amp 250 Volt 2AG fuse

connections:

3-contact receptacle w/screw terminal plug - front panel

Alarm 1	26
Alarm 2	1
Alarm 3	27
Alarm 4	2
Alarm 5	28
Alarm 6	3
Alarm 7	29
Alarm 8	4
Unused	30
Unused	5
Unused	31
Unused	6
Unused	32
Unused	7
Unused	33
Unused	8
Station GND	34
Station GND	9
Analog in 1	35
Analog in 2	10
Analog in 3	36
Analog in 4	11
Analog in 5	37
Analog in 6	12
Analog in 7	38
Analog in 8	13
Analog GND	39
Analog GND	14
+5 Volts for sensors	40
Expansion 1	15
Expansion 2	41
Expansion 3	16
Spare	42
Station GND	17
Relay 1 N.O.	43
Relay 1 COM	18
Relay 1 N.C.	44
Relay 2 N.O.	19
Relay 2 COM	45
Relay 2 N.C.	20
Relay 3 N.O.	46
Relay 3 COM	21
Relay 3 N.C.	47
Relay 4 N.O.	22
Relay 4 COM	48
Relay 4 N.C.	23
Summary N.O.	49
Summary COM	24
Summary N.C.	50
Station GND	25

Alarm 1	26
Alarm 2	1
Alarm 3	27
Alarm 4	2
Alarm 5	28
Alarm 6	3
Alarm 7	29
Alarm 8	4
Alarm 9	30
Alarm 10	5
Alarm 11	31
Alarm 12	6
Alarm 13	32
Alarm 14	7
Alarm 15	33
Alarm 16	8
Station GND	34
Station GND	9
Analog in 1	35
Analog in 2	10
Analog in 3	36
Analog in 4	11
Analog in 5	37
Analog in 6	12
Analog in 7	38
Analog in 8	13
Analog GND	39
Analog GND	14
+5 Volts for sensors	40
Expansion 1	15
Expansion 2	41
Expansion 3	16
Spare	42
Station GND	17
Relay 1 N.O.	43
Relay 1 COM	18
Relay 1 N.C.	44
Relay 2 N.O.	19
Relay 2 COM	45
Relay 2 N.C.	20
Relay 3 N.O.	46
Relay 3 COM	21
Relay 3 N.C.	47
Relay 4 N.O.	22
Relay 4 COM	48
Relay 4 N.C.	23
Summary N.O.	49
Summary COM	24
Summary N.C.	50
Station GND	25

Alarm, Relay and Analog input Legends for 66M block covers.

Cutout for 2314 on the left

Cutout for 2316 on the right

Cut out appropriate Legend and slit at marked positions.

Numbers in 2nd column are 50-pin Champ connector pin numbers.

FIAL 2314/2316 (66M cover cut-outs)

