Illuminator

Floodlight Control and Facility Monitoring System

USER MANUAL

halytech

Illuminator User Manual Version 2.26
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Warning

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

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Introduction

Halytech Illuminator is an integrated floodlight control and facility monitoring system.

It can control floodlights, monitor various sensors, generate alarms and log. The Illuminator is a complete system. It includes all software, hardware and a cellular phone module. Setting up and interrogating an Illuminator is a simple matter of viewing pages with any standard web browser. An Illuminator can be accessed either locally via a direct cable connection or remotely via a modem or by sending and receiving SMS messages.

Typical Applications

- Sports Fields
- Parks
- Tennis Courts
- Community Halls
- Clubhouses
- Public Toilets

System Overview

Each Illuminator incorporates an industrial controller, input/output interface, a logger and a 3G cellular phone interface.

Illuminator is capable of:
1. Controlling up to eight (8) controls – floodlight contactors, sprinkler solenoids etc.
2. Monitoring up to six (8) status signals
3. Generating up to eight (8) alarms
4. Receiving SMS commands
5. Sending SMS messages
6. Logging status, control and alarm activity
7. Being configured by the user through any standard web browser

Overview of Floodlight Control

The Illuminator recognises two different types of users: an administrator and a number of "normal users".

The administrator has complete control over all floodlights. He can turn on and turn off any light at any time. Furthermore, the administrator can override any command issued by a "normal user".

The administrator first decides during what period during the day "normal users" will be allowed to control the lights. Each field can have its own separate period.

The administrator can allow up to 49 "normal users" to control the lights. Each user is given a different 4-digit PIN and the authority to control specific lights.

The PINs and the access rights can be changed by the administrator as often as desired.

Lights are normally turned on and off by either:
1. sending an SMS command to the Illuminator, or
2. typing the same command into the numeric keypad

Administrators can also control the lights by accessing the Illuminator with a computer.

The SMS/keypad commands have the following format:

PPPPAF#   where: PPPP is the four digit PIN
                                   A is action, either 1 for ON, or 0 for OFF
                                   F is one or more field numbers
                                   # terminates the command

Example 1: user PIN is 2345, authority to control field 6

234516#   - turn on lights on field 6
234506#   - turn off lights on field 6

Example 2: user PIN is 7777 and they have the authority to control fields 2 and 3, the commands are:

7777123#   - turn on lights on fields 2 and 3
7777023#   - turn off lights on fields 2 and 3
777703#   - turn off lights on field 3

Note: # is optional in SMS commands.

All valid SMS commands are acknowledged with a return SMS confirming action taken.

Invalid SMS commands generate an appropriate response, advising the user of the problem. The administrator can set up a help contact such as 'John Smith on (0414)222-333'. These contact details are added to the end of an invalid response SMS.

Once a user activates the lights, only he (or the administrator) can turn them off. This stops practical jokes by other users.

If an authorised user "A" tries to activate the lights that are on and controlled by a user "B", the user "A" will take over the control of the lights. The Illuminator will stop charging the user "B" and start charging the user "A". This feature allows a new user to take control of the lights without having to wait for the old user to turn them off first. It also prevents the old user who forgets to turn off the lights at the end of his session turning them off later during the new user's session.

If an authorised user "A" tries to deactivate lights controlled by a user "B" via SMS, the user "A" will receive a message advising that the lights are controlled by the user "B", and the lights will not turn off.

The keypad will always accept a command from an authorized user to turn off the lights, however if the user does not currently have control of the lights they will not be turned off. This is to confirm that they are no longer being charged for the lights in the case where they are unaware the next user has already started their session.

If a user is allowed to turn the lights off, the command is accepted but the lights can be made to continue stay on for a user configurable "Turn-off delay" in minutes. This is particularly useful for older (non-LED) type of lights to give a chance to a new user to turn the lights back on without having to wait for the warm-up period.

The "Turn-off delay" is not applied if the administrator turns the lights off outside the period of control for normal users.

The lights turned on by normal users are automatically turned off at the end of the allowed control period. Lights turned on by the administrator remain on until turned off by the administrator.

All activations, deactivations and the means of control (automatic, keypad, computer or SMS from a mobile telephone) are logged by the Illuminator. The Illuminator stores the most recent 1000 events in its memory. This information is available to administrators in the form of a usage report. The report can span a number of days and can be used to prepare customer bills.

The section titled "Normal Operation" details the procedure on defining users, their PINs, access rights etc.

Automatic e-mail reports

An Illuminator can be set up to send daily e-mail reports. At 3:00 AM, an e-mail will be sent to up to three recipients. Each e-mail has a spreadsheet file attachment containing data logged over the recent day(s).

The advantage of daily e-mail reports is in the Illuminator ability to automatically deliver or "push" data without any user intervention.

Controls

The Illuminator provides 8 controls on two multi-pole connectors for controlling the floodlights. Controls are labelled CN1 to CN8 respectively. Each is provided with two screw terminals internally connected to a relay. In inactive state the two terminals are open-circuit. Upon activation, the relay switches and the terminals are shorted together. Controls can be activated in several different ways:

1. With a computer by accessing the "Lights" page with a browser and clicking on the Manual Override ON/OFF buttons
2. By sending control SMS messages to the unit. All SMS commands are authorised with 4 digit PINs.
3. By typing a message into the optional keypad. The keypad message format is identical to the SMS message format.

Status Signals

The Illuminator can monitor up to eight status signals via two multi-pole connectors. Each multi-pole connector accepts four inputs. They are labelled IN1 to IN8 and each is provided with two screw terminals. Wire sizes up to 1.5 mm^2 may be used. Each input can be configured by the user for operating in one of the following five modes:

1. "SWITCH" – switch closure or voltage free contact.
   Switch inputs detect either an active (or "ON") state or an inactive (or "OFF") state. The active state is indicated by shorting the two terminals together, while the inactive state is indicated by the terminals staying open. A switch state must be stable for a minimum of 3 seconds to be recognised.

   NOTE: There is no galvanic isolation between different inputs or the Illuminator internal circuitry.

2. "ANALOGUE"
   Analogue inputs are used to monitor industrial sensors such as voltage, current, temperature, pressure, light level etc.
   Most common sensor types are supported, including:

   > 4 - 20 mA sensors
   > 0 – 5V sensors

   NOTE: All analogue signals share a common ground

3. "COUNTER"
   Count will increment each time the terminals are shorted. Frequencies up to 10Hz are supported. The counter will roll-over from 99,999 to 0.

4. "EVENT"
   Event inputs are used to record occurrences of pulses. A pulse is generated by temporarily shorting the input terminals together. Minimum acceptable pulse width is 100 ms. Event inputs are suitable for monitoring pulses that occur less frequently than once every 30 seconds. Each time an event occurs, the Illuminator logs the time its occurrence as well as the total number of events. The total will roll-over from 99,999 to 0.

   NOTE: Battery life will be dramatically reduced if a higher frequency signal is connected to an event input.

5. "DISABLED"
   This mode disables the input. The input is removed from all reports and menus.

The user can tailor the system by assigning application specific input names. So for example Input 1 may be called "PUMP 3 OK" etc.

All status signal types may be logged and/or used to trigger alarms.

Alarms

The Illuminator can generate up to 8 alarms.

Upon activation, an alarm will send SMS messages

Each alarm can be programmed with a name, trigger source, 3 separate telephone numbers and the text of a message. When the trigger becomes active, the alarm is triggered and the alarm sequence starts.

Alarms are completely independent from status signals. So for example, a status signal can trigger more than one alarm, each of which will send its own special SMS to its own special telephone numbers.

Alarm SMS sending

If SMS sending is enabled for an alarm, an SMS with the programmed text is sent to each telephone number starting with the first. If sending is successful, the unit waits for 30 minutes for the user to reset the alarm sequence. Resetting the sequence stops the sending of SMS messages.
If sending is not successful, due to network congestion for example, the SMS is sent to the same number after 1 minute. Up to three attempts are made to each number before proceeding to the next number.
After the 3rd attempt to the 3rd number (if applicable) the unit will stop sending SMS and wait indefinitely for the alarm to be reset. This limits the number of SMS transmissions per alarm to 9.

Active alarms can be reset in two different ways:
1. By accessing the "Alarms" page with a browser and clicking on the active alarm
2. By sending an SMS message to the Illuminator

(Please see "Resetting Alarms" section for more details).

If an alarm is reset but its trigger source is still in the active state, a new alarm sequence will NOT commence. Rather, the Illuminator will wait for the trigger source to first go inactive.

Logger

The Illuminator incorporates a high capacity solid-state data logger. The logger stores data into non-volatile memory, maintaining its contents in the event of power supply failure.
All records are date/time stamped to a resolution of one second.

The Illuminator logs
1. Status signal changes
2. Control changes
3. Alarm activations and resets
4. SMS transmissions and their outcomes
5. SMS command reception
6. Numeric keypad activity
7. E-mail transmissions and their outcomes (if e-mail option installed)
8. System messages

Digital status inputs are logged automatically whenever a change occurs.

Web Server

A sophisticated web server is built into every Illuminator.

It allows users to communicate with the Illuminator using the familiar "Internet surfing" approach. You can use any computer regardless of type and operating system to connect to an Illuminator. NO SPECIAL SOFTWARE is required.

The web server is used for:

1. Setting up an Illuminator for the first time
2. Setting up field users
3. Controlling floodlights
4. Monitoring Status Inputs
5. Monitoring and resetting alarms
6. Downloading reports and logged data
7. Software upgrades

All operations are performed by accessing simple web pages.

Physical Connections

Antenna

Each Illuminator is supplied with a panel-mount "whip" antenna suitable for most applications. Directional antennas with higher gains are available for fringe areas.

Attach the antenna to the antenna connector located on the top of the Illuminator case. **Hand tighten only.** Using tools to tighten antenna connectors may damage them, voiding the warranty.

Power

Illuminator does not have an ON / OFF switch. The unit starts operating as soon as power is applied.

The unit is fitted with two power connectors:
- Charger – for connection of an external mains power supply / charger
- Battery – for connection of an external (rechargeable) battery
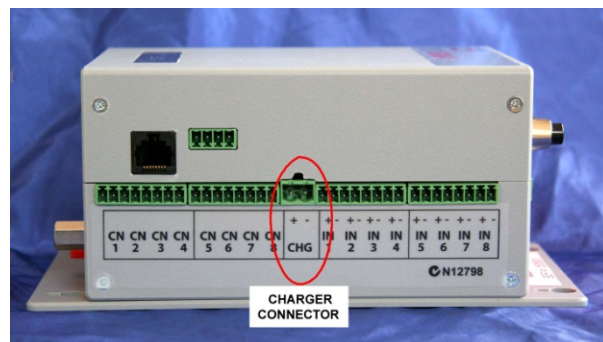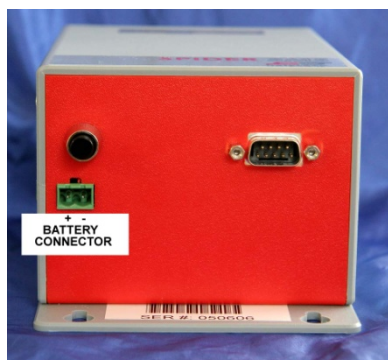
An Illuminator is normally powered by the supplied mains powered power supply ("plugpack"). An external re-chargeable battery can be also connected to provide back-up power in case of mains power failures.
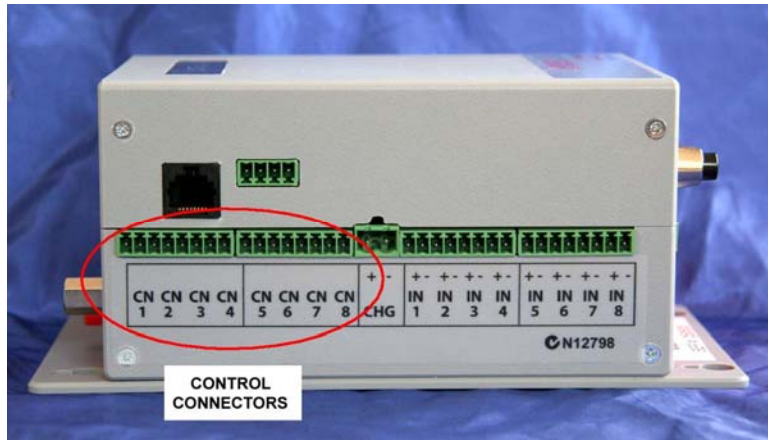
Simply connect the mains power supply to the "CHG" connector and the battery to the unmarked battery connector socket – please refer to the illustrations above.

IMPORTANT NOTE:

You must observe the correct polarity when connecting the power supply and the battery.

Controls

Controls are connected to terminals marked CN1 to CN8.

Each control provides normally open relay contacts rated to 30V, 1A resistive loads.

To drive your floodlight contactors you will need to install external isolation relays. These relays serve a dual purpose:

- They isolate the Illuminator from potentially dangerous 240V circuits
- They provide a suitable contact rating for driving the floodlight contactors.

The Illuminator provides voltage free relay contacts. Consequently you will also need a separate power supply to drive the isolation relay coils.

NOTE: External **protection diodes must be installed** across all external isolation relay coils. A set of protection diodes is provided with each Illuminator.

The circuit diagram below shows how to interface the Illuminator to the isolation relays. (Only a single control is shown for clarity.)
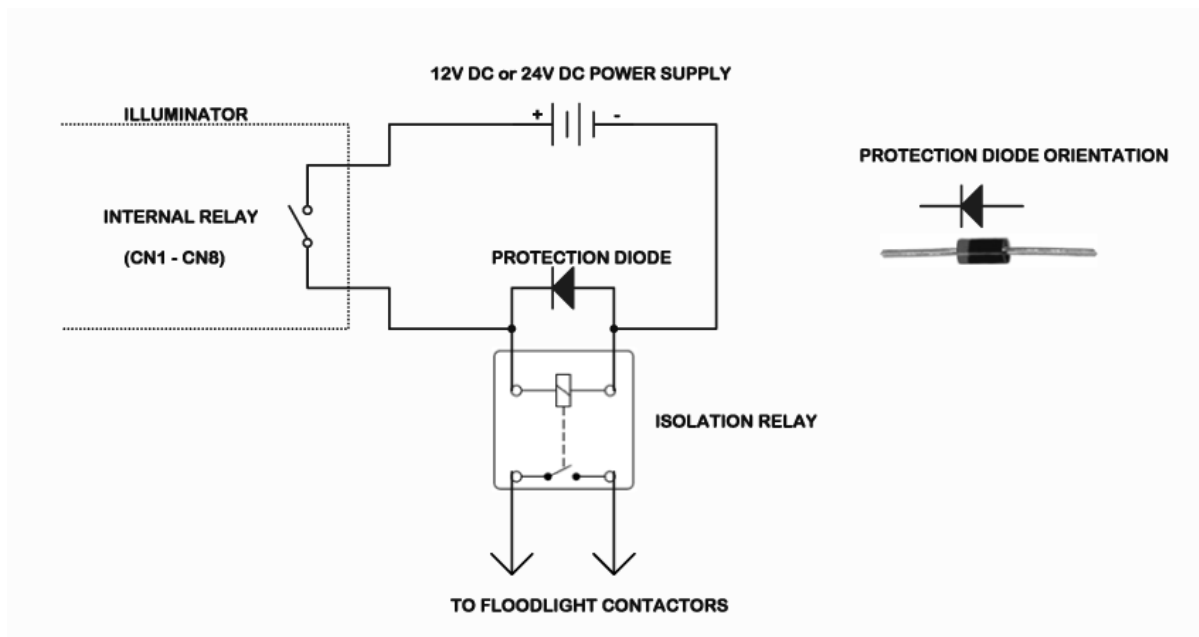
An example of the external isolation relay setup is shown below in the picture. This particular setup is configured for driving 4 sets of floodlights – hence there are 4 isolation relays. Your electrician will be able supply the isolation relays as a part of the Illuminator installation.
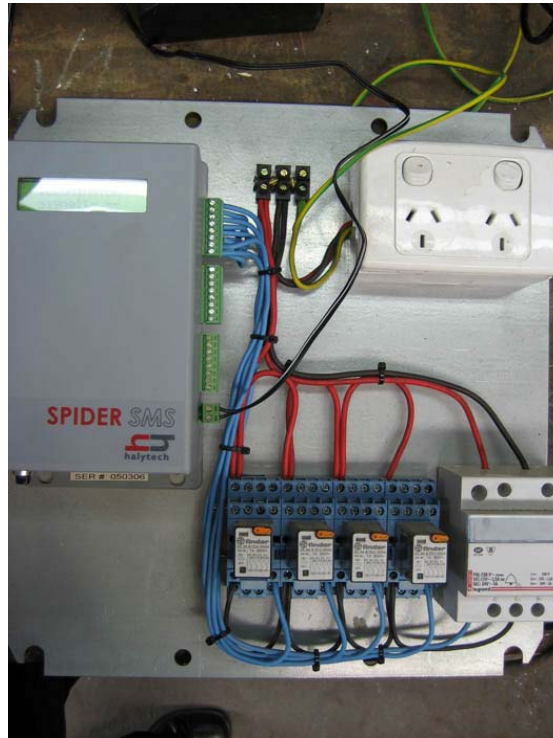
Status Signals

Status signals (inputs) are connected to terminals marked IN1 to IN8.

1. "SWITCH", "COUNTER" and "EVENT" type:
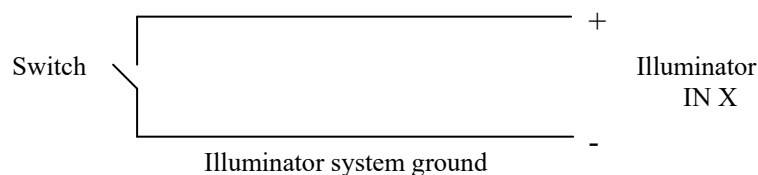
2. "ANALOGUE" type accepts an analogue voltage from 0 – 2.5V. The following diagrams show wiring details for most common sensor types.

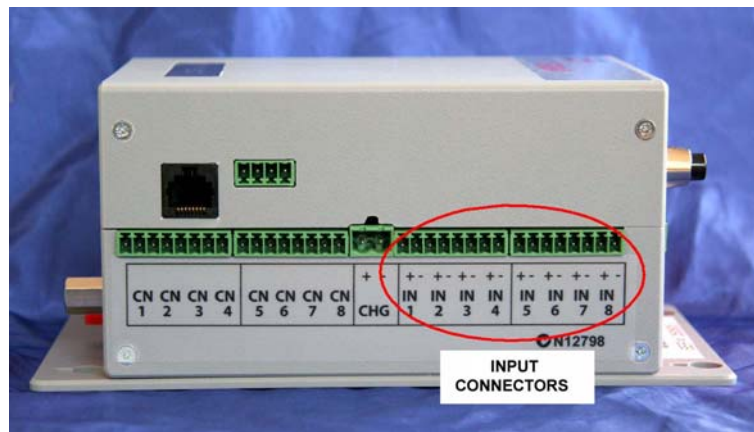(i) **2-WIRE 0 - 20 mA and 4 – 20 mA** current loop sensors require an external 120 Ohm, ¼ W   resistor (supplied):
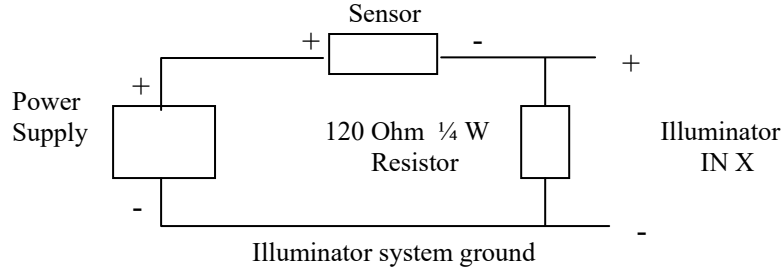
Sensor

+ ▭ -

Power Supply

+

120 Ohm ¼ W Resistor

+

Illuminator IN X

-

-

Illuminator system ground

(ii) **4-WIRE 0 - 20 mA and 4 – 20 mA** current loop sensors require an external 120 Ohm, ¼ W   resistor:

120 Ohm ¼ W Resistor

Sensor

Power Supply

+   +   +   +

Illuminator SMS LC

-          -   -   -

Illuminator system ground
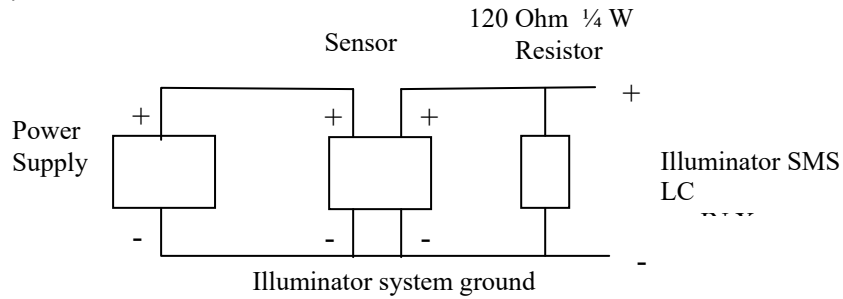
(ii) **Voltage inputs** may require up to two external resistors:

Rx

+

Sensor

Ry

+

Illuminator IN X

-

-

Illuminator system ground
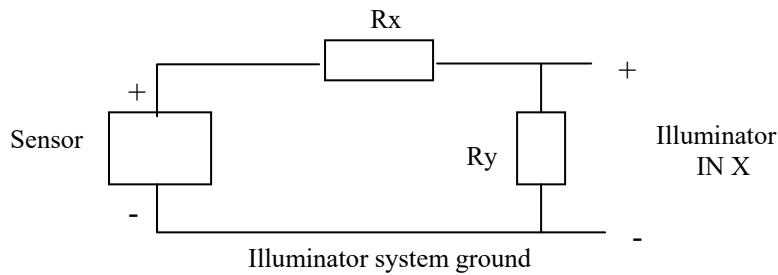
SENSOR RANGE	VALUE OF Rx	VALUE OF Ry
0 – 2.5V	None required	Leave out
0 – 5V	1 Kohm ¼ W metal film	1 Kohm ¼ W metal film
0 – 10V	3.3 Kohm ¼ W metal film	1 Kohm ¼ W metal film

Auxiliary Connectors

ILLUMINATOR AUXILIARY CONNECTORS

Local Area Network (LAN) connector is used for connections to a PC or to a LAN.

AUX1 connector is not used in a standard Illuminator. It is reserved for future enhancements and special applications.

The optional keypad plugs into AUX2 connector.

Numeric Keypad

An optional numeric keypad can be used to control floodlights. It is provided for users who do not have access to mobile phones. The keypad can be added at any time. The Illuminator will automatically recognise the keypad and start acting on its commands.

Please refer to "Numeric Keypad" for details on how to use the keypad.

Each keypad is supplied with 10m of cable. One end of the cable is terminated in a DB9 connector at the factory. The DB9 connector plugs into Illuminator AUX2 connector. The Illuminator provides all power and communications signals to the keypad.

The other end of the cable is attached to the numeric keypad screw terminal block as shown in the diagram below.

NOTES:

1. The keypad is not weatherproof. It must be installed in a suitable location protected from the elements.
2. Keep the cable as short as possible and route it away from other wiring. This will minimise any problems that may occur in electrically noisy environments. Do not roll up excess cable. Instead, cut the unterminated end to size.
3. Some cables may have a blue wire instead of a green one.
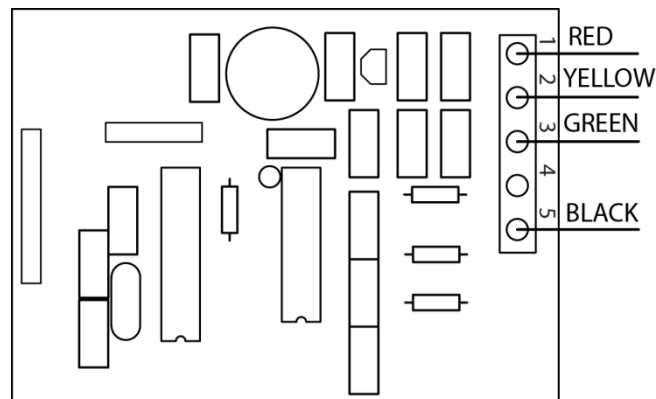
NUMERIC KEYPAD CONNECTION DIAGRAM

Setting up an Illuminator for the first time

A new Illuminator must be connected to a mobile telephone network by inserting a valid SIM card. Please refer to Appendix C for details.

A new Illuminator is shipped from the factory with a default, generic setup. You may wish to change this setup and customise the Illuminator for your application.

Setting up an Illuminator involves one or more of the following steps:

1. Setting Illuminator date and time
2. Setting your username and password
3. Setting Illuminator location and lighting setup
4. Setting network and e-mail settings

(Setting up field users, their PINs and access rights is covered in the section "Normal Operation".)

Connect locally to the Illuminator as described in Appendix A.

The "Field Lights" page will be displayed.
Click on "SETTINGS" in the blue menu pane on the left. The following page will be displayed:
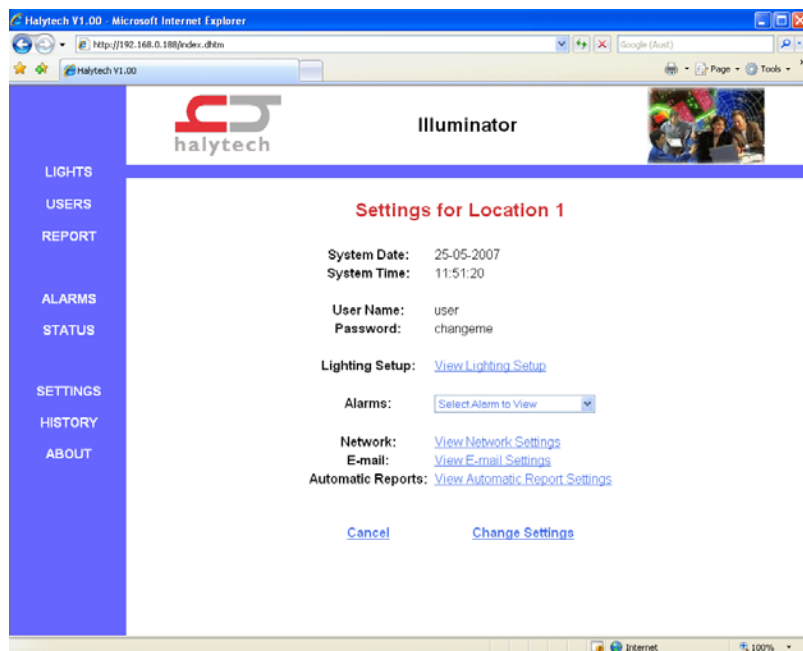
This page allows inspection of most Illuminator programmable parameters, without making any changes.

To actually make changes, click on "Change Settings" on the bottom right of the white centre pane. The following page will be displayed:
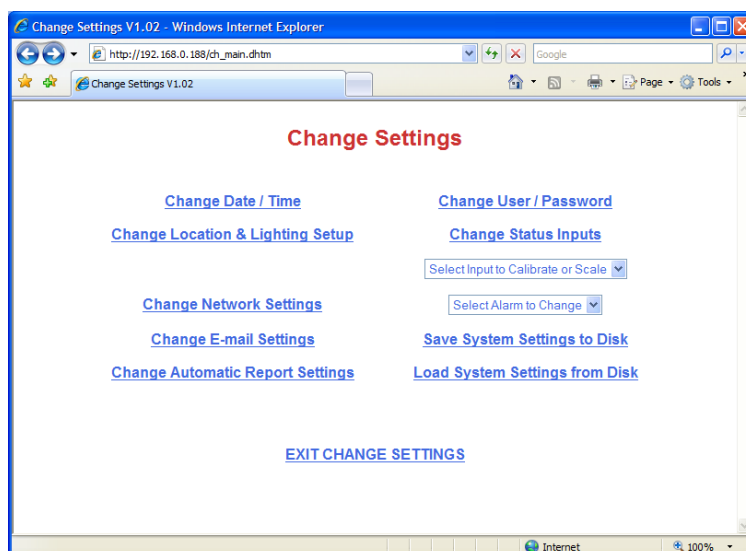
NOTE: Accessing the "Change Settings" page automatically disables logging and alarm generation and also resets all active alarms.

Setting Date and Time

If not already displayed, access the "Change Settings" page as described in "Setting up an Illuminator for the first time".

Click "Change Date/Time".
Confirm that the displayed date and time are correct. If you wish to change the date and/or time simply enter the new values.
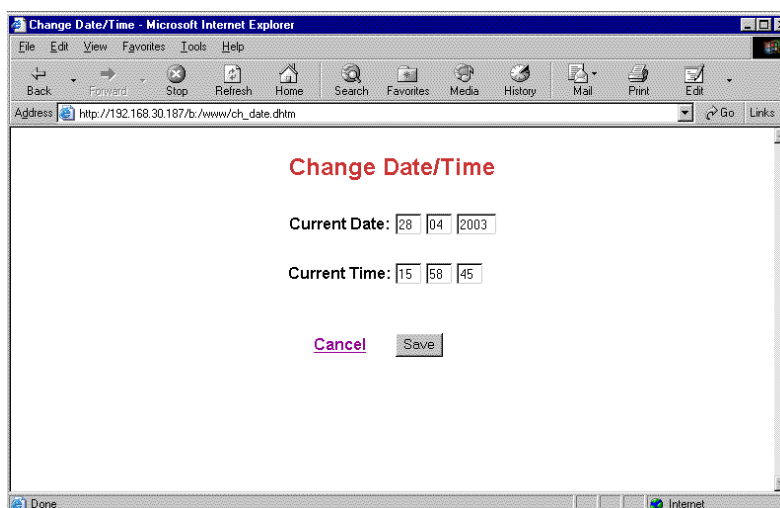
You can exit at any time without making changes by clicking the "Cancel" link.
Save the new values by clicking on the "Save" button.

Setting Username and Password

Only authorised personnel may access an Illuminator. To connect to an Illuminator you must enter a valid username and password. Failing to enter them, disables all access to the Illuminator. Similarly, if a valid sequence is entered, but no activity takes place for 10 minutes, the access is revoked and the user must again log in.

Both the username and the password are programmable by the user. Factory defaults are "**user**" and "**changeme**" respectively. It is strongly advised that these be changed as soon as possible to prevent unauthorised access.

In the event that you forget your new username or password, you will no longer be able to connect to an Illuminator. Please contact Halytech or its agent for assistance.

To change the username and/or password access the "Change Settings" page as described in "Setting up an Illuminator for the first time" earlier in this section.

Click "Change Username / Password".
Enter the new name and password.

You can exit at any time without making changes by clicking the "Cancel" link.
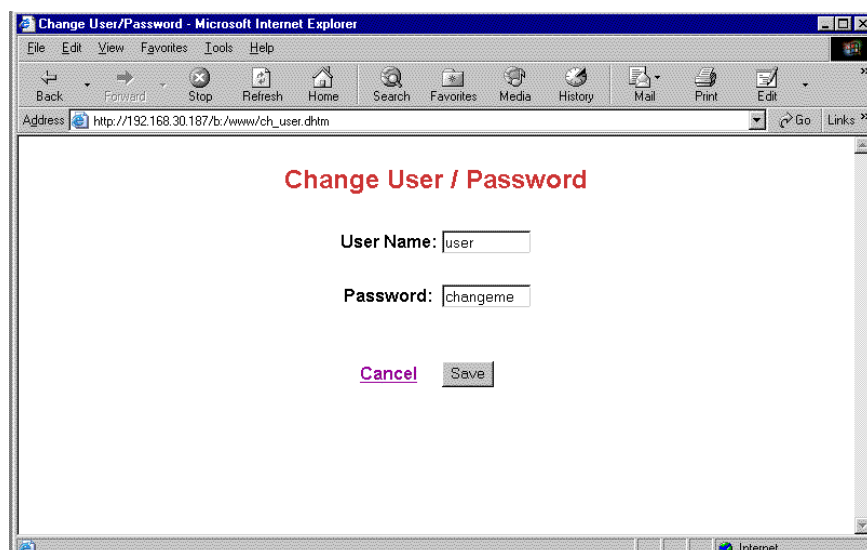Save the new values by clicking on the "Save" button.

Setting Location and Lighting Setup

It is important to choose a unique location name for every Illuminator. This location name is sent at the beginning of each SMS transmission to identify the particular Illuminator device.

If not already displayed, access the "Change Settings" page as described in "Setting up an Illuminator for the first time" above.

Click "Change Location & Lighting Setup".
Enter a unique location name for this particular Illuminator. The name can be up to 16 characters long. For this example, let's use "Wingham Field" as the name. Simply type this into the space provided.

Invalid SMS commands generate an appropriate response, advising the user of the problem. 'Help contact person' contains the name and the telephone number that users can call if they have problems with SMS commands. These contact details are added to the end of the SMS sent in response to an invalid command.

'Maximum on time (minutes)' sets the maximum time that lights can be left on. For normal users this works in conjunction with the periods during the day in which they are allowed to control lights.

'Turn off delay (minutes)' is useful for classic (non-LED) lights.
If a user commands the Illuminator to turn the lights off, the command is accepted but the lights are kept on for the number of minutes entered here. This gives a chance to a new user to turn the lights back on without having to wait for the warm-up period.

This screen is also used to define the cost of lighting that the users will be charged. The cost is entered in $ per hour. Each field has its own cost. As an example let's enter $10.50, $20.50, $30.50, $40.50, $50.50, $60.50, $70.50 and $80.50 for fields 1 to 8 respectively.

You can exit at any time without making changes by clicking the "Cancel" link.
Save the new value by clicking on the "Save" button.

Setting up Network Parameters

Illuminators can connect to local area networks (LAN) and wide area networks (WAN). LAN connections are primarily used for communications with local computers – typically for initial setup.

The Illuminator uses WAN connections to access the Internet in order to send e-mails reports and for communications with remote computers.

LAN settings

Please refer to Appendix A for more information about initial connection of an Illuminator to a Local Area Network (LAN).

To set up Network parameters, access the "Change Settings" page as described in "Setting up an Illuminator for the first time" earlier in this section.

Click on "Change Network Settings".

Fill in the form with details appropriate for your network.

NOTE:In most cases you do not need to change any of the factory settings.

Easy Connect settings:
- Select "ENABLED" for stand-alone Illuminators (Illuminators not connected to a local area network (LAN)
- The "DISABLED" setting is not normally used.

NOTE: New settings will take effect after the device is powered down and then powered up.

WAN settings

WAN parameters need to be entered only if you wish to send automatic e-mails reports.

Illuminators can connect to the Internet using one the following three methods:
1. GPRS
2. Local Area Network (LAN)
3. Dial-up Internet

Illuminators normally use the first method - GPRS.

(Other methods are available for special applications. Please contact Halytech for instructions on their use.)

Select the GPRS connection method. You will be able to select GPRS only if you have a valid SIM card installed in the Illuminator and if the antenna is connected. Please refer to Appendix C for information on how to source and install a SIM card.

<u>GPRS:</u>
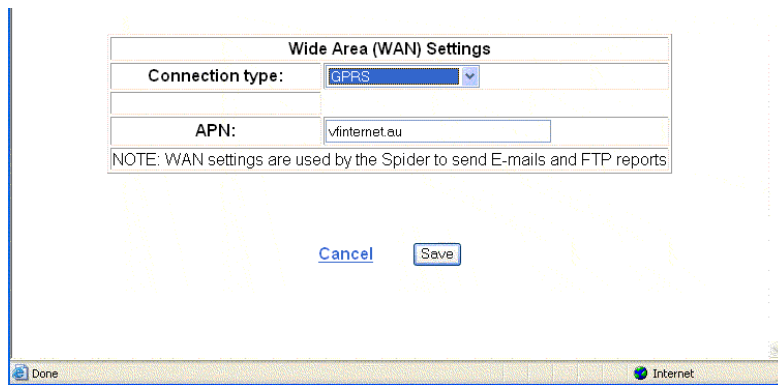
Access Point Name (APN) is provided by the mobile phone company which supplied your SIM card. At the time this manual was issued, the correct settings for common Australian networks were:

Telstra APN *:   telstra.extranet **or** telstra.internet
Optus APN: internet
Vodafone APN: vfinternet.au

IMPORTANT NOTES:

1. telstra.extranet is the preferred setting. It provides the simplest means of remotely connecting to an Illuminator to make changes, add users etc. Please refer to "Appendix B" for details.

2. Above settings are given in good faith. Halytech or its agents accept no responsibility for their accuracy.

Setting up E-mail Parameters

E-mail parameters need to be entered only if you wish to send automatic e-mail reports.

To set up E-mail parameters, access the "Change Settings" page as described in "Setting up an Illuminator for the first time" earlier in this section.

Click on "Change E-mail settings".

Fill in the form with details appropriate for your network.
You will need to obtain this information from your network administrator or your mobile service provider.

At the time this manual was issued, the correct settings for common Australian mobile networks were:

Telstra SMTP mail server:	mail.bigpond.com
Optus SMTP mail server for GSM (GPRS):	mail.optusnet.com.au
Vodafone SMTP mail server for GSM (GPRS):	smtp.vodafone.net.au

My e-mail address: In the process of sending an e-mail, the Illuminator must identify itself to the mail host computer with a valid e-mail address. Set this parameter to a known valid address, acceptable to your mail host. This address is shown in the e-mail as the "From" address.

NOTE: if the e-mail is accepted by the host but cannot be delivered, the failure notice will be sent to this address. (Perhaps if you set this to your own e-mail address, you can monitor e-mails that can't be delivered!!)

Test e-mail address: Test e-mails are sent to this address.
This is a special feature of the Illuminator allowing a rapid and user friendly way of setting up and verifying Illuminator e-mail connectivity. Please refer to Appendix D for details.

IMPORTANT: It is strongly advised that you confirm that all settings are correct. This done by sending a test e-mail as described in Appendix D.

Network Glossary

The Network and E-mail sections used several networking terms. All of these are standard network parameters as used in IT. Detailed explanations are beyond the scope of this document. However, here is a brief explanation of each parameter noting any special relevance to the Illuminator implementation:

My IP Address (*): current IP address of Illuminator. This is the same as the value shown on the LCD display.

Network Mask (*): Network mask. This is the same as the value shown on the LCD display.

Gateway (*): IP address of a computer allowing access beyond the local network.

Primary DNS (*): IP address of the primary domain name server. The server performs translation from domain names such as "halytech.com.au" to 'dotted ip' format such as "192.168.0.188".

Secondary DNS (*): IP address of the secondary domain name server. The server performs the same function as the Primary DNS. It is contacted only if there is no reply from the Primary DNS.

My e-mail address: In the process of sending an e-mail, the Illuminator must identify itself to the mail host computer with a valid e-mail address. Set this parameter to a known valid address, acceptable to your mail host. This address is shown in the e-mail as the "From" address.
 NOTE: if the e-mail is accepted by the host but cannot be delivered, the failure notice will be sent to this address. (Perhaps if you set this to your own e-mail address, you can monitor e-mails that can't be delivered!!)

SMTP mail server: address of a computer serving as a mail host. Illuminator will contact this computer to send the actual e-mail. The address may be given as a name e.g. "mail.somewhere.com.au" or as a 'dotted IP' address e.g. "203.16.222.34".

Test e-mail address: Test e-mails are sent to this address.
This is a special feature of the Illuminator allowing a rapid and user friendly way of setting up and verifying Illuminator e-mail connectivity. Please refer to Appendix D for details.

NOTE: You must power down and then power up the Illuminator before the new values marked with (*) take effect.

Save Settings to Disk

Once you have configured an Illuminator for your application you can save all the settings on your computer. This is useful as a backup or if you have multiple Illuminators and you wish to save a "template" that can be uploaded to other Illuminators with very similar settings. Then, instead of entering all parameters from scratch you can simply edit the ones that need to be changed.

To save the settings simply click on the "Save Settings to Disk" link. The computer will prompt you whether to open or save the configuration. Choose "Save" and when prompted enter the name of a file which will hold your settings.

Load Settings from Disk

Once you have saved system settings as described above, you can upload them to any other Illuminator.

To load the settings click on the "Load Settings from Disk" link. The computer will prompt you to enter the name of a file containing the settings. Enter the name of the file or select a file anywhere on your computer by clicking on "Browse".

NOTE: Loading settings from disk will overwrite your current settings.

Exiting Change Settings Mode

Logging, alarm activation, timers and timer overrides are all disabled while in the change settings mode.

To exit change settings mode click "EXIT CHANGE SETTINGS" link on the bottom of "Change Settings" page.

This will immediately restart logging and alarm generation.

Setup change mode is automatically exited after 10 minutes of inactivity.

Normal Operation

Communicating with a PC

The Illuminator uses an intuitive, user-friendly, web-browser system. You can use any standard browser on any computer to communicate with the Illuminator. No special software is required.

Communicating with the Illuminator is identical to "Surfing the Internet". Information is displayed by clicking links and buttons.

You can connect to an Illuminator either locally via a cable or remotely via internet or a dial-up modem. Once connected, operation is identical regardless of connection. The only difference you may notice with a remote connection is a slightly slower response.

Connect locally to the Illuminator as described in Appendix A.
A successful log-on will automatically display the "Field Lights" screen.

Field Lights
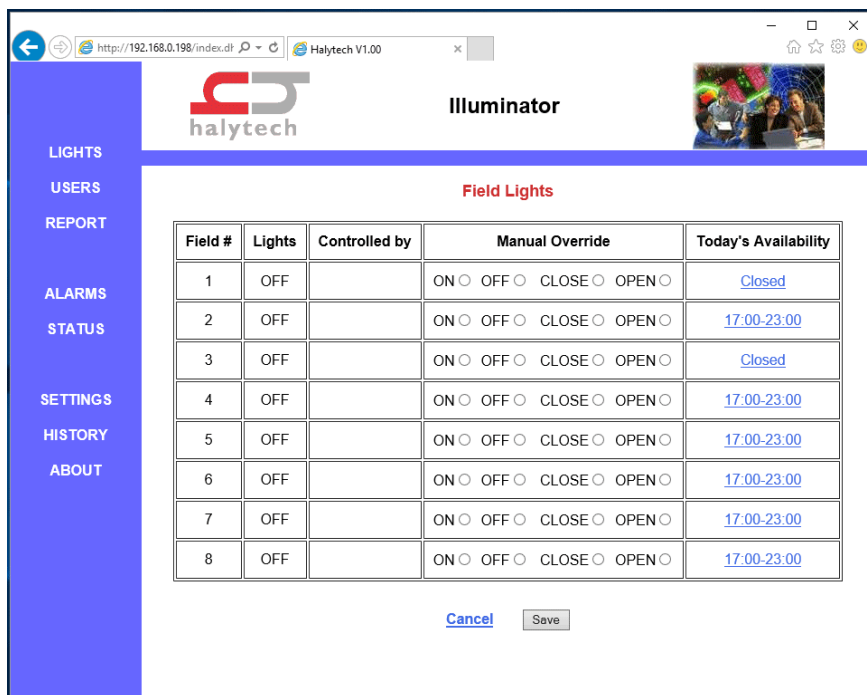
This screen shows the current state of all the lights, their availability and the users controlling them. The administrator can override any user and turn the lights on or off by simply selecting "ON" or "OFF" and clicking the "Save" button.

The Illuminator provides a convenient "Black-out" feature. Any field can be temporarily closed by selecting CLOSE and clicking the "Save" button. No user (except the administrator) can control the lights on closed fields. Use this feature for field closures due to wet surface, civil works, grass re-generation etc. To re-open a field, simply select OPEN and click the "Save" button.

NOTE: Opening and Closing fields does not change user PINs, user access rights or field access times.

The last column in the table shows Today's Availability for each field as set by the administrator. To change a field availability simply click on any field's displayed time (or the "Closed" message in case the field is closed). This will bring up a new window allowing you to set times for each weekday during which lights can be controlled by users.
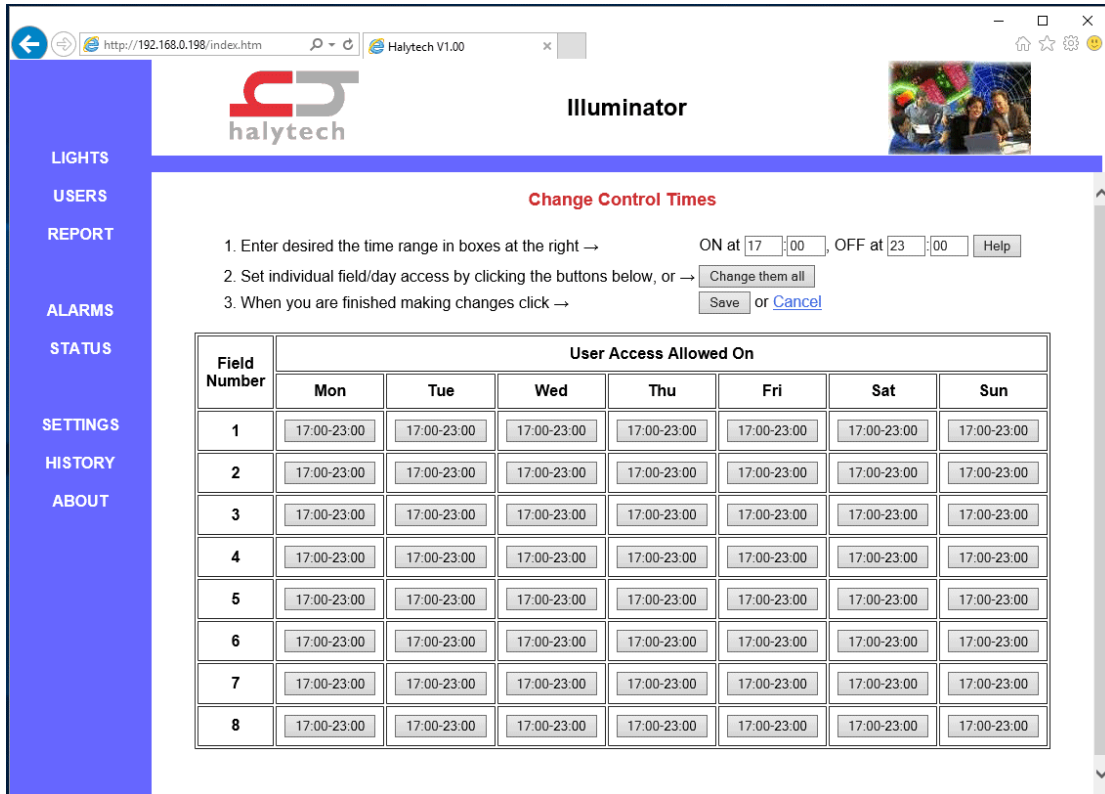
You can change the period in a day during which users can control lights using any combination of the following two methods:

- set a **common** period for **all** fields and **all** days to the same period, and
- set a **particular** period for a **particular** field on a **particular** day

To set the same access period for all fields and all days follow steps 1. to 3. at top of the displayed web page:

1. Enter the desired ON and OFF times

2. Click on "Change them all" button

3. Click the "Save" button

To set a particular access period for a particular field on a particular day, do the following:

1. Enter the desired ON and OFF times at the top of the page

2. Inside the table on the web page click the button corresponding to the desired field and the desired day. Once clicked, the time period displayed on the button will change to show the newly selected period

3. Repeat steps 1. and 2. as required

4. Click the "Save" button

NOTES:

- You can quickly fill in the table by using a combination of the above two methods
- 0:00 - 0:00 means no access
- 0:00 - 24:00 means allow access for the whole day
- an OFF time smaller than an ON time signifies the next day, e.g. 19:00 - 3:00 means 7PM to 3AM the next day
- Changing user access periods does not change fields' OPEN or CLOSED status

Users

This screen is used to view all users, their PINs and field access rights.
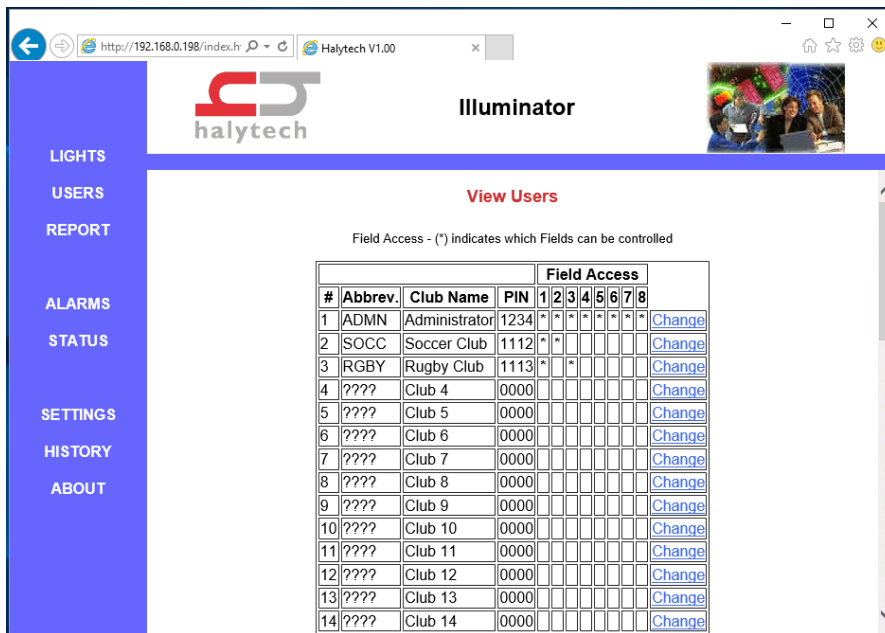
To change any of the details, click on the corresponding "Change" on the same row. Another screen will be presented allowing you to enter new details. New details are saved by clicking "Save". Old details are retained by clicking "Cancel".

Let's add a new user in position # 4:

Abbreviation – LSOC
Club Name – Ladies Soccer Club
PIN – 1119
Authorised to control fields 3 and 4

Click on "Change" in row 4. Using the details above fill in the displayed form:
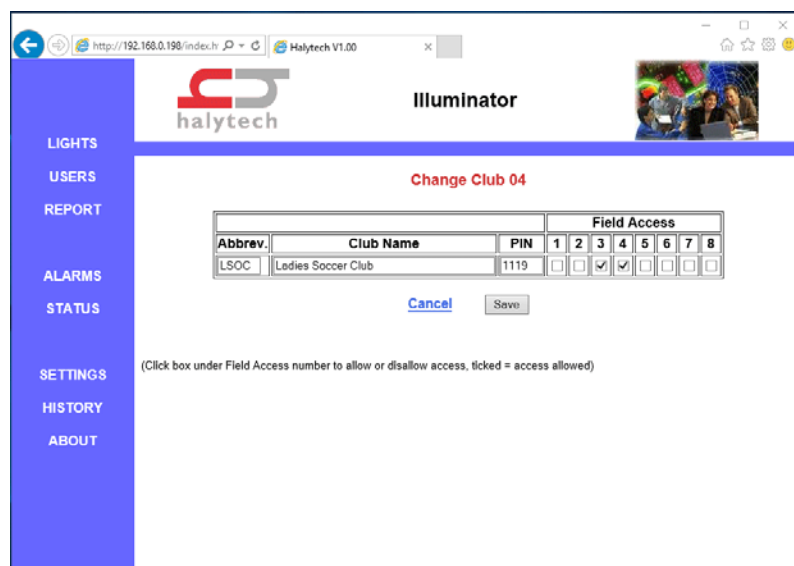
To change a user's PIN or access rights follow the same procedure but only change the PIN or field access, as required.

To delete a user, set their PIN to 0000.

NOTES:
- User #1 is the administrator. His access to all fields cannot be disabled.
- The club abbreviation is used to identify the club to other users in SMS response messages as well as in the "Lights" screen discussed previously.

Report

You can request a light usage report at any time. To obtain the report click "REPORT" on the blue pane on the left. The following screen will be displayed:
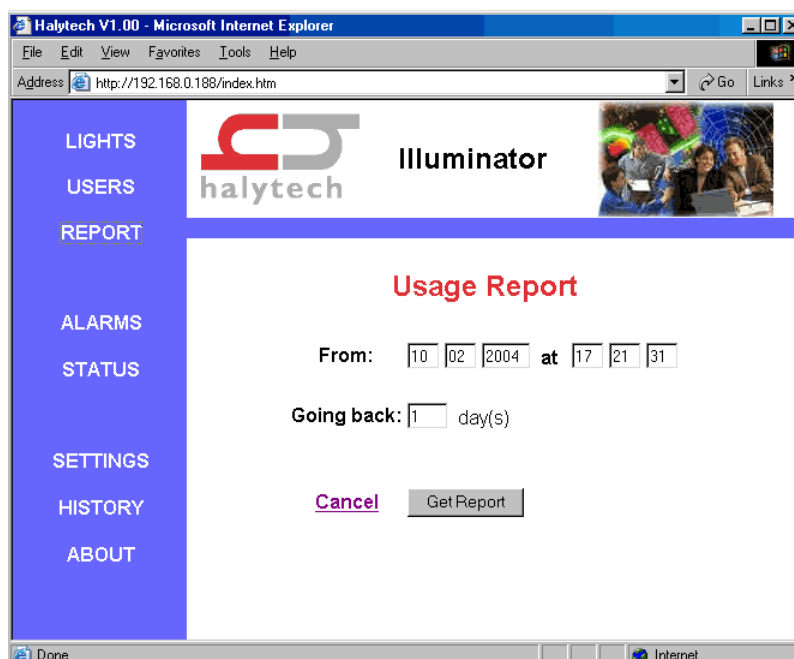
The Illuminator stores the most recent 1000 events in its memory

Data is downloaded "backwards" in time. In other words, the most recent records are downloaded first. In order to minimise the amount of data being transferred, you can specify the date and the time of the first record and the number of days the report should span.

The report is an Excel compatible file. If you have Excel installed on your computer, clicking on "Get Report" you will be given the option to "Open" or "Save" the report file. Selecting "Open" will automatically start Excel. A sample report is shown below:

Most fields are self-explanatory. "DURATION" is the total lights on time in <u>minutes</u>.

Once the report is in Excel, you can edit, copy, paste, sort or combine data with previous reports in the normal manner.

NOTES:
- An Illuminator can be set up to automatically email reports to multiple recipients. Please refer to Advanced Operation - Automatic Daily E-mail Reports for details.

- It is possible to connect an Illuminator to electricity meters to measure exactly how much electricity is used by lights at each field. Once this is set up, the report will have an additional column showing electricity use. Please refer to Advanced Operation - Monitoring Electricity Use for details.

Advanced Operation

Automatic Daily E-mail Reports

Illuminator can be set up to automatically send daily e-mail reports. Each e-mail has a spreadsheet file attached to it. The file contains all data logged over the previous day(s). Reports can be sent to up to three different recipients. Up to three attempts will be made to send a daily e-mail report. Unsuccessful attempts are logged. Successful attempts are not logged.

You can also choose the maximum period between daily reports. The period is settable between 0 and 15 days. "0" will cause a report to be sent every day, regardless of how much data has been logged. A non – zero setting will cause e-mail report to be sent only if the floodlights have been used in the previous day.

However, even if there is no significant data logged, a report will be sent when the maximum number of days between reports is reached.

To configure the reports, access the "Change Settings" page as described in "Setting up an Illuminator for the first time" earlier in this document. Click "Change Automatic Report Settings".
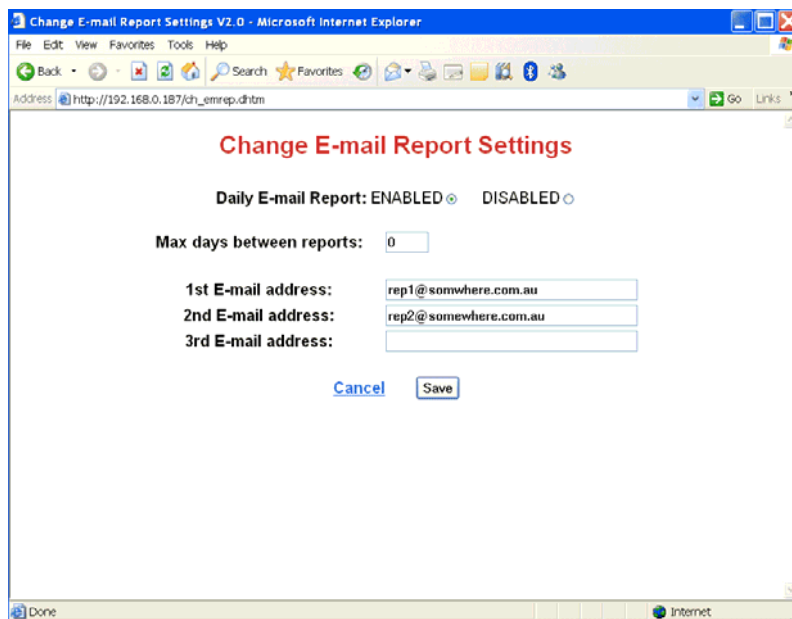
NOTES:

1. Automatic report function requires that both Network and E-mail option be configured correctly. Please refer to "Setting Up Network Parameters" and "Setting Up E-mail Parameters" earlier in this document for additional instructions.

2. Automatic report files are named as follows:

   (first 8 characters of Location)_(date).csv

   Example: Wingham-Field_291205.csv

   Blanks in the Location part of the filename will be replaced by '-' characters

Status Settings

Decide how your inputs will connect to the Illuminator.

As described earlier in "Status Signals" every Illuminator input can be configured in one of the following five modes: switch closure (digital), counter(digital), event (digital), analogue and disabled.

Digital inputs accept simple ON/OFF sensors. Analogue inputs accept a variety of transducers such as temperature sensors, water level sensors etc.

For example, you may want to monitor only 3 Inputs.
The first will be counter (digital) type, recording electricity consumption and connected to an electricity meter with a pulse output.
The second will be an analogue 4-20mA input monitoring a light level sensor which can be used to verify the lights are working properly.
The third will be a switch connected to a door switch.

Let's assume that "Electricity Meter" will connect to Input 1 and "Light level" to Input 2 and "Door switch" to input 3.
The remaining 6 inputs will be disabled.

If not already displayed, access the "Change Settings" page as described in "Setting up an Illuminator for the first time" earlier in this section.

Click "Change Status Inputs".
Select "Counter" Input Type for the first input and "Analog" for the second one. Select "Disabled" for the remaining six inputs.
Enter "Electricity Meter" as the Input 1 Name and "Light Level" as the Input 2 Name.

Switch (digital) and Even (digital) inputs are logged automatically when their state changes. A switch/event input must be stable for a minimum of 3 seconds for a new state to be recognised.

Counter and Analogue inputs allow you to set their measurement units, whether you wish to log them and if so, the minimum change required to be logged.
The minimum change for each input works in conjunction with the "Scan period" which is common to all inputs and is also settable from this page.

In the example above, "Light Level" is measured in "lux". It is checked for change every 5 minutes and logged if it changes by more than 3 lux. (If you want to log the level every 5 minutes regardless of by how much it changes, simply set the minimum change to 0.)

The same page also determines the logging of the 3 System Monitors. These are 3 additional system inputs which monitor the battery charger status, battery voltage and system temperature. System monitors logging is configured in a similar manner as described above.

You can also enable logging of the modem signal. The signal is logged when the Illuminator connects to the internet in order to email you automatic reports. This can be useful for diagnostics.

Consumption multiplier on the bottom page is useful for counter inputs connected to water and / or electricity meters. It allows you to obtain a cost in dollars by multiplying litres or kWh reading by their cost. When set to a non-zero value, it does the conversion AND includes the counter inputs in the automatic reports.
Leave this set to 0 if you do not want counter inputs to be included in automatic reports.

NOTE: this is distinct from "Calibrating Counter Inputs' discussed next. Calibration converts pulses from utility meters into in meaningful units such as litres or kWh.

You can exit at any time without making changes by clicking the "Cancel" link.
Save the new values by clicking on the "Save" button.

Calibrating Counter Inputs (if present)

You can calibrate Counter Inputs in two ways:

1. You can scale them and
2. You can pre-set the counter to a particular reading

Scaling is useful to make the counters read engineering values. For example, your electricity meter may be producing 10 pulses per kWh of electricity (or to put it in another way, each pulse corresponds to 0.1kWh). Hence, to make the counter input register in kWh, you would set the scaler to 0.1.

NOTE: An Illuminator counts internally from 0 to 99,999 before it "wraps around" to 0. The actual range will be multiplied by the "Scaler". So, a scaler of "0.1" will produce an effective counter range of 0 to 9,999.9.

It is sometimes required to pre-set the counter to a particular value. Following our previous example, you may want to make the Illuminator counter value the same as the reading on the meter. To do that, simply enter the required reading in the "Offset" field.

If not already displayed, access the "Change Settings" page as described in "Setting up an Illuminator for the first time" earlier in this section. Select "Calibrate Electricity Meter" (or whatever your input is named) from "Select Input to Calibrate or Scale". A page giving calibration choices will be displayed.

You can exit at any time without making changes by clicking the "Cancel" link.
Save the new values by clicking on the "Save" button.

Scaling Event Inputs (if present)

You can scale Event Inputs by specifying a "Scaler". A new scaled value obtained by multiplying the raw counter reading by the "Scaler" will be used for all functions including logging, alarms etc.

If scaling is not required, simply leave it set to "1".
NOTE: Scaled inputs will no longer wrap around from 99,999 to 0. The "wrap-around" value will be affected by the "Scaler".

If not already displayed, access the "Change Settings" page as described in "Setting up an Illuminator for the first time" earlier in this section. Select "Calibrate <name of input>" from "Select Input to Calibrate or Scale". A page giving calibration choices will be displayed.

You can exit at any time without making changes by clicking the "Cancel" link.
Save the new values by clicking on the "Save" button.

Calibrating Analogue Inputs (if present)

Analogue inputs should be calibrated prior to being used.
The system offers a choice of calibration methods:
1. 2-point calibration
2. Manual calibration

2-point calibration

Let's continue with the previous example and calibrate a 4-20 mA light level transducer with a 0 – 10000 lux range connected to Input 3. We will firstly use the "2-point" calibration method.

If not already displayed, access the "Change Settings" page as described in "Setting up an Illuminator for the first time" earlier in this section. Select "Calibrate Light Level" from "Select Input to Calibrate or Scale". A page giving calibration choices will be displayed. Select "2-point calibration" and click on "Proceed".

 The following page will be displayed:

Follow the instructions step by step.

NOTE: The two calibration points can be any two values within the transducer range.
However, they must be at least a half of the transducer range apart.
For example you could cover the light sensor for the first "0" point and then use a light meter
to get the actual reading of ambient light for the second point.

You can exit at any time without making changes by clicking the "Cancel" link.
Save the new values by clicking on the "Save" button.

Manual calibration

User inputs are calculated with the following formula:

Calibrated value = Scaler x (Raw Value) + Offset

Manual calibration allows direct entry of the "Scaler" and "Offset" quantities.
(The same formula is used in the 2-point calibration. The 2-point calibration procedure
automatically calculates the "Scaler" and the "Offset".

Viewing Current Status Signals

Current Status signal states are displayed by clicking "STATUS" on the blue menu pane on
the left. All Status signals are identified by their user-programmed names.

The display shows the state of all Status signals at the time the page was displayed. The
page automatically updates every 10 seconds.

Monitoring Electricity Use

You can connect electricity meters with pulse outputs to an Illuminator. This will allow you to monitor exactly how much electricity is being used by each field and optionally include it in reports.

To enable this functionality, do the following:

1. Connect the pulse output of each electricity meter to the corresponding Illuminator status input - meter monitoring electricity for field 1 must be connected to status input 1, meter monitoring electricity for field 2 must be connected to status input 2 etc.

2. Set up Illuminator status inputs with electricity meters connected to them as Type "Counter", with Units as "kWh"

3. Find out the electricity cost per kWh and enter it into the Consumption multiplier at the bottom of the page. In this example the cost is $0.263 per kWh.
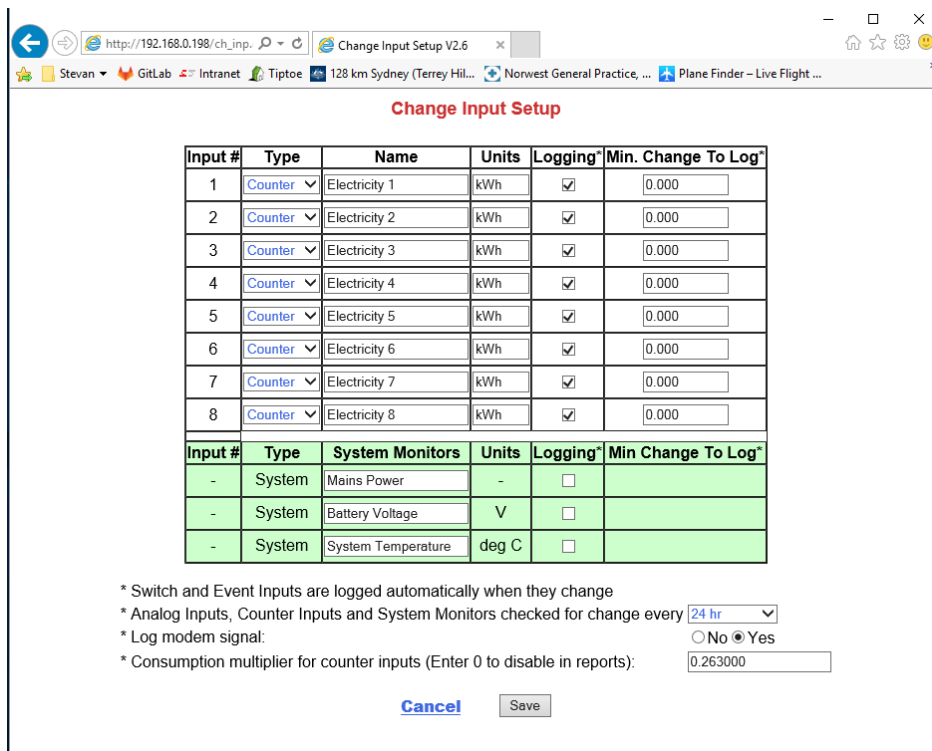
> NOTE: leaving the Consumption multiplier as 0 will remove the Electricity consumption column from all reports.

4. Calibrate you counter status inputs to the correct meter pulse rate and make the Illuminator counter reading match your meter reading.

> Please refer to "Calibrating Counter Inputs (if present)" earlier in this chapter for details on how to do this.

Setting up Alarms

Decide how many alarms will be used. Each alarm has a programmable name, trigger source, SMS text, 3 telephone numbers and the ability to activate or deactivate a control.

For example, let's set up Alarm 1 as follows, based on the Status Inputs entered in a previous example:

Alarm Name:	VANDAL
Trigger Source:	Door Switch
Trigger Level:	"ON" i.e. trigger when source is "ON" or active
1st Phone #:	0414111111
2nd Phone #:	0414222222
3rd Phone #:	0414333333
SMS text:	I am being vandalised
SMS Sending:	enabled

If not already displayed, access the "Change Settings" page as described in "Setting up an Illuminator or the first time" earlier in this section.

Click on "Change Alarm 1 Settings".
Fill in the form with the details above.

NOTE: Trigger source is selected from the drop-down list. The list will display all available inputs identified with their user-programmed names. All unused alarms should be disabled by selecting "DISABLED" from the list.

If you don't need all 3 telephone numbers, simply leave the appropriate fields blank.

You can exit at any time without making changes by clicking the "Cancel" link.
Save the new values by clicking on the "Save" button.

Viewing Current Alarms

The current alarm states are displayed by clicking "ALARMS" on the blue menu pane on the left.

All alarms are identified by their user-programmed names.
The display shows the state of all alarms at the time the page was displayed. The page automatically updates every 10 seconds.

Active alarms provide additional information about the progress of the alarm sequence by displaying a numerical code. Please refer to section "SMS Alarms" for the key to the code.
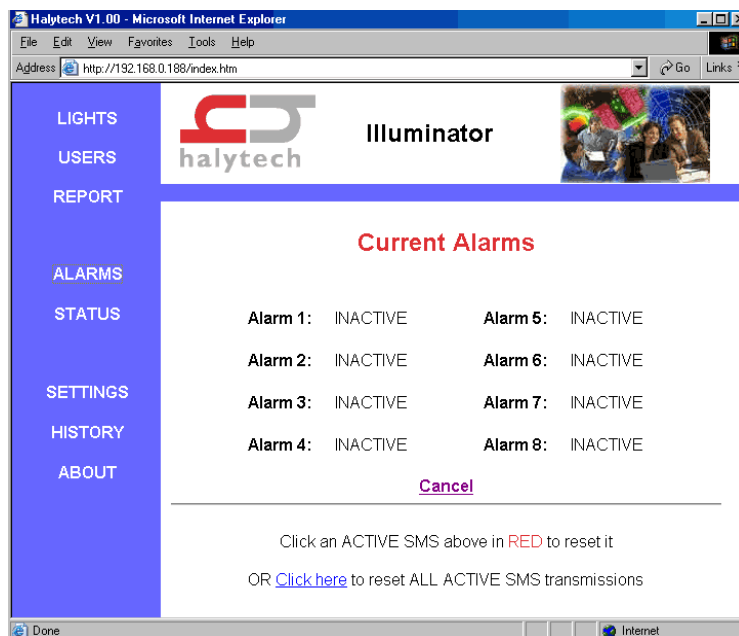
Resetting Alarms

Active alarms can be reset individually by contacting the Illuminator and clicking the particular alarm.

ALL active alarms may be reset at once by clicking on the link at the bottom of the main pane. If there are no active alarms, the command will be ignored.

Alarms may also be reset by sending an SMS the Illuminator. Please refer to the section "SMS Commands" for details.

History

In addition to Usage Reports described previously, the Illuminator also logs "raw data". This data includes all activity including:

1. Status input changes
2. Control output changes
3. Alarm activation and resets
4. SMS transmissions and their outcomes
5. SMS command reception
6. Keypad activity
7. System messages (powerups, remote access etc.)

Each log record consists of a date and time stamp to a resolution of 1 second, numeric event identifier and a short text describing the event. You can selectively download logged data.

Logged data is downloaded by first clicking "HISTORY" on the blue menu pane on the left. Next, specify the period of interest and the number of records to download by filling in the form.

Data is downloaded "backwards" in time. In other words, the most recent records are downloaded first. In order to minimise the amount of data being transferred, you can specify the date and the time of the first record and the maximum number of records to download.

The data is given in an efficient but somewhat cryptic format. You will need to use the decode table given in "Appendix E: Logged Data Format" to interpret each record.

The "raw data" is primarily used for monitoring and recording the system performance. It may be used to examine past events and clarify operational difficulties that may occur.
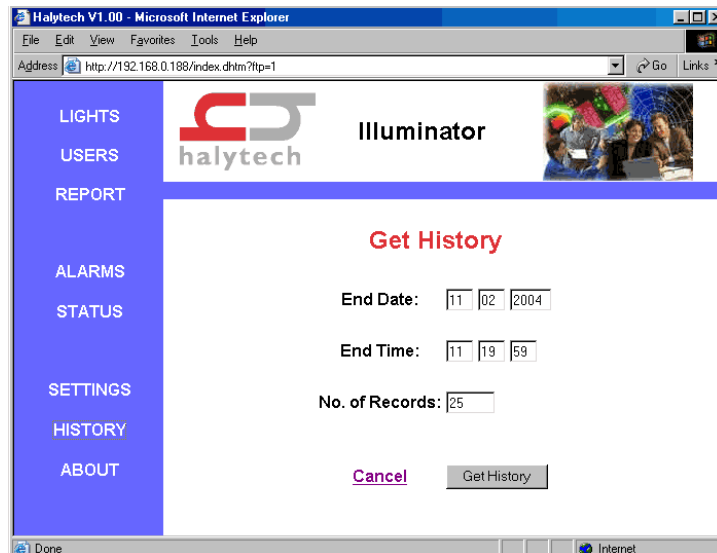
Click "Get History" button to start the download.
Data is downloaded as a "CSV" file. Download can automatically start Microsoft Excel program on your computer (if installed) to show, edit or store the data.

About

"About" screen displays system information such as software version as well as the contact details for Halytech.

Front Panel Display

The Illuminator is equipped with a two-line display and a one-key keypad. They are used for quick operational checks and basic setup. Their convenience lies in the fact that using them requires no external equipment such as laptop computers or mobile phones.

Normally, the display shows:

> **Illuminator**
> **Signal: H65%**

"Signal: G65%" indicates the current cellular phone signal strength. The higher the number, the stronger the signal. As a rough rule-of-thumb, a value of 41% and above is acceptable. Signal strength is updated every 5 seconds. The letter preceding the percentage value indicates the type of mobile network used by the particular Illuminator. A "H" represents the 3G network. (A "G" represents the GSM network and a "N" represents a NextG network.)

Value "??" indicates that there is no mobile phone coverage in the present location, there is no valid SIM card inserted, the SIM switch is not in the locked position or that the cellular phone module inside the Illuminator is not responding. (Is the antenna plugged in?) It is a normal indication during power-up and immediately following remote access. It typically lasts less than 60 seconds.
If however, this display persists, contact Halytech or its agent.

During a telephone call (remote access) the display shows:

> **Illuminator**
> **Remote Access**

Different display screens are accessed by briefly pressing the keypad key. Each key press will display a new screen. Different screens are:

1. Current state of all Field lights and who is controlling them
2. Current state of all Status signals
   An active Status is indicated by a "1" and an inactive one by a "0"
3. Current state of Alarms 1 – 4 (AL1 – AL4)
4. Current state of Alarms 5 – 8 (AL5 – AL8).
   Active alarms are indicated by "Axx" where xx is the current alarm status code –
   Please refer to section "SMS Alarms" for additional information on the status codes.
   Inactive alarms are indicated by an "I".
   Disabled alarms are indicated by a "D".
5. Current LAN IP address and IP Mask
6. Sending of test e-mail messages. (Refer to Appendix D for additional information)

SMS Commands

The Illuminator can receive and respond to specially coded SMS commands. The commands may:
1. Get the current state of all status signals
2. Get the current state of all field lights and who is controlling them
3. Reset an active alarm
4. Reset all active alarms
5. Control floodlights

The following SMS commands are recognised:

Command	Comment	Example
HELP	Get a list of valid SMS commands	HELP
GET ST	Get current state of all status signals	GET ST
GET CN	Get current state of all field lights	GET CN
RST ALx	Reset Alarm x (x is 1 – 8)	RST AL6
RST ALL	Reset all active alarms	RST ALL
PPPPAF#	Control floodlight	123402#

NOTE: the '#' at the end of the PPPPAF# command is **optional**.

The format of Floodlight Control Commands is described in "Overview of Floodlight Control".

After an Illuminator receives an SMS command it will interpret it and act on it. Valid commands will be acknowledged with a return SMS:

> **<Location>: OK SMS command**

Invalid commands will be ignored.

Valid "Control floodlight" commands that cannot be executed by the Illuminator will initiate a response SMS describing the reason why the command could not be executed..
Each SMS response is prefaced by <Location>:

SMS Responses are summarised in this table:

SMS Response	Explanation
Unauthorised access or wrong PIN, Send HELP or call <help> for assistance	Wrong PIN
Field x Too Late! Call <help > for assistance	Request to turn on lights after the latest time lights at this field can be turned on
Field x Too Early! Call <help > for assistance	Request to turn on lights before the earliest time lights at this field can be turned on
Field x No auth! Call <help > for assistance	Request to turn on lights at a field this user is not authorised to use
Field x Closed! Call <help > for assistance	Request to turn on lights at a field that is currently closed
Field x in use! Call <help > for assistance	Request to turn off lights at a field which have been turned by another user
Field x Override! Call <help> for assistance	Request to turn on lights at a field that is currently controlled by the administrator

Where:
> <Location> is the programmed Illuminator location
> <help> is the name and contact number of person programmed as the help contact

NOTES:

1. Commands may be in lower or upper case or a combination of both

2. There must be only one space between the words of a command

3. SMS commands will be ignored while in the Remote Access mode. Therefore if an SMS command is not acknowledged by a return SMS within approximately 1 minute, send the command again after a short period of time.

SMS Alarms

When a status signal triggers an alarm with SMS sending enabled, an alarm sequence will start.
Current state of an active alarm is shown on the LCD display and the ALARMS page as a code. The code has the following meaning:

ALARM CODE	MEANING
RST	Alarm has been acknowledged, but the trigger source is still active. Trigger source must go inactive before another alarm sequence can be started.
1	Illuminator is attempting to send 1st SMS to 1st phone number.
2	Illuminator is attempting to send 2nd SMS to 1st phone number.
3	Illuminator is attempting to send 3rd SMS to 1st phone number.
4	Illuminator is attempting to send 1st SMS to 2nd phone number.
5	Illuminator is attempting to send 2nd SMS to 2nd phone number.
6	Illuminator is attempting to send 3rd SMS to 2nd phone number.
7	Illuminator is attempting to send 1st SMS to 3rd phone number.
8	Illuminator is attempting to send 2nd SMS to 3rd phone number.
9	Illuminator is attempting to send 3rd SMS to 3rd phone number.
10	Illuminator has made a maximum of 9 SMS send attempts without receiving a reset command. No more send attempts are being made.

Transmitted alarm SMS messages have the following format:

Location: SMS text (Send 'RST Alx' to reset)

Where:
"Location" is the programmed Illuminator location
"SMS text" is the programmed SMS text for this particular alarm
"x" is this particular alarm number (1 – 8)

So, if we use the examples programmed in the section "Setting up an Illuminator for the first time" the first alarm SMS will be sent to 0414111111 and will be:

Wingham Field: I am being vandalised (Send 'RST AL1' to reset)

The alarm sequence may be reset simply by replying with the received message (no typing required !!), or by replying with **RST AL1** or by connecting to the Illuminator with a PC and resetting the alarm as described in "Resetting Alarms"

NOTE: Alarms will be registered while in the Remote Access mode, but SMS messages will not be sent until Remote Access mode terminates.

Software Upgrade

Illuminator operating software can be upgraded both locally and remotely. Detailed upgrade instructions are provided with new software.

Numeric Keypad Operation

An optional numeric keypad is available to enable floodlight control by users without mobile phones. Keypad commands are identical to SMS commands.

The format of Floodlight Control Commands is described in "Overview of Floodlight Control".

This section will describe the aspects of operation applicable only to the numeric keypad.

- Pressing a key starts the key input sequence. The red light turns on. Users have up to 30 s to input the next key. Failing to do it clears the keypad, turning the red light off.
- Each keypress is acknowledged with a short beep. The keypad will hold a maximum of 16 keys in its buffer. Key presses after the 16th one will be ignored and indicated with longer beeps.
- '*' is the CLEAR key. Pressing it clears the keypad and turns the red light off.
- The keypad command is sent to the Illuminator immediately following the pressing of the '#' key. A successful command is acknowledged with three short beeps. An invalid command is indicated by a single long beep.
- Invalid command response may be caused by any of the following: invalid command, wrong PIN, no field authorisation, another user holds access rights, outside allowed control time etc.

Appendix A: Connecting to an Illuminator Locally

Illuminator uses standard internet browsers for all communications. No special software needs to be installed.

This Appendix describes two most common ways of network connection.

Your computer must have a local area network (LAN) adapter installed. The following procedure assumes that the adapter is present and installed correctly. If this is not the case, install a network adapter by following its manufacturer's instructions.

Connecting a PC Directly to an Illuminator

1. Turn your computer on but do not connect it to the Illuminator yet.

2. Turn on the Illuminator by pressing and holding the button on the front panel for two seconds. (The unit must be turned on, i.e. the display must be showing something before you can establish a local connection.)

3. Use the supplied red "cross-over" network cable to connect your computer LAN port to the Illuminator LAN port.

4. Wait 30 seconds.

5. Start an Internet browser program such as "Microsoft Internet Explorer" on your PC.

6. Type **192.168.0.188** as the web address and press the return or enter key

7. The Illuminator log-on page will be displayed on your PC. Enter your username and password in the spaces provided. (Default values are "user" and "changeme" respectively.) Click on the "Log in" button.

8. Lights page will be displayed immediately following a successful log-on. You can now examine other pages.

The previous procedure will work in most cases without requiring any setting changes. It assumes that all of the following are true:

- You will be connecting your PC directly to the Illuminator using the supplied "cross-over" cable

- "EASY CONNECT" on the Illuminator is enabled. (Illuminators are shipped from the factory with EASY CONNECT enabled.) You can check the setting by pressing the front panel switch repeatedly until the EASY CONNECT page is displayed.

- Your PC is setup to automatically get an IP address from the network. (Most PC's are set up in this way by default.) You can check this setting by following the AUTOMATIC IP ADDRESS SETTING CHECKLIST later in this section.

HINT: If you are setting up multiple Illuminators immediately one after another, and connect to one successfully but cannot connect to next, either wait 5 minutes or type

        arp –d 192.168.0.188

at the Windows command prompt each time you switch (this command my require that you log in as an administrator).

AUTOMATIC IP ADDRESS SETTING CHECKLIST FOR YOUR PC

1. Click on "Start"->"All Programs"->"Accessories"->"Communications"->"Network Connections"
2. If in the newly opened window you don't have an item called "Network Bridge" go to step 3.
   If you do, right click on it and select "Properties". Go to step 4.
3. Right click on the item "Local Area Connection" and select "Properties".
4. Near the bottom of the new window click on "Internet Protocol (TCP/IP)" and then click on "Properties"
5. Select "Obtain an IP address automatically"
6. Select "Obtain DNS server address automatically"
7. Click OK
8. Click OK
9. Close the Network Connections window

In the unlikely event that you want to connect the Illuminator to a local area network (LAN), proceed as described next.

Connecting to an Existing Network (LAN)

Before connecting the Illuminator to an existing network, contact your network administrator and obtain an available static IP address and a corresponding mask.

Change the Illuminator default IP address and mask to the new values as follows:

1. Keep on briefly pressing the keypad key until the display shows
   I192.168.000.188
   M255.255.255.000

2. Press the keypad key and hold it pressed for more than 3 seconds. Release the key. The display will show
   Change IP addr ?
   192.168.000.188

3. Press the keypad key and hold it pressed for more than 3 seconds. Release the key. A flashing cursor will appear over the first digit on the second line.

4. A long key press (longer than 3 seconds) will increment the digit under the cursor, while a short press will move to the next digit.

5. After the last digit is entered, the display will again show the message in step 2.

6. Briefly press the key. The display will show
   Change net mask?
   255.255.255.000

7. If you need to change the mask enter the change mode with a long press and then change digits in the same manner as described in step 4. above.

8. After the last digit is entered, the display will again show the message in step 6.
   Briefly press the key until the display shows
   Save ?

9. A long press will save the new values of IP address and mask and return the display to normal operation.

10. If you change your mind and don't want to change the values, exit the change mode (indicated by the flashing cursor) by waiting for 20 seconds, then briefly pressing the key until the display shows
    Cancel ?
    A long press now will cancel all changes and return the display to normal operation.

11. You must power down and then power up the Illuminator for the new values to take effect.

You can connect the Illuminator to your network with a standard RJ-45 network cable. Cables of various lengths are available from Halytech and most electronics and computer retailers.

Once connected, you can connect to the Illuminator from any computer on your network as described in Appendix A –Connecting to an Illuminator Locally.

NOTE: You should also disable the EASY CONNECT network setting on the Illuminator as described in the section "Setting up an Illuminator for the First Time -> Setting Up Network Parameters".

Appendix B: Connecting to an Illuminator Remotely

Remote Connection - Method 1

Method 1 is the preferred method for remote connection as it is simpler and more cost effective than Method 2.

To remotely connect to an Illuminator using Method 1 do the following:

1.	Send this SMS command to the Illuminator:

	pppp GPRS n,yourEmailAddress

	where:	pppp = 4 digit PIN of the 1st user (the Administrator)
		n = number of minutes the system will wait on line for you (10 is a good
			choice)
		yourEmailAddress = email address where email with link will be sent

	e.g. if the Administrator PIN is 1234, and the email address is me@here.com.au, the actual SMS would be
		1234 GPRS 10,me@here.com.au
	NOTE that there is a space between 1234 and GPRS, a space between GPRS and 10, and no spaces either before or after the comma (,).

2.	The Illuminator will respond with an SMS acknowledging your message.

3.	The Illuminator will then send an email to the email address nominated above.

4.	Open the email and click the link.

5.	Your browser will open and the log-on page will be displayed on your PC. Enter your username and password in the spaces provided. Click on the "Log in" button.

6.	"Field Lights" page will be displayed immediately following a successful log-on. You can now examine other pages as described in "Connecting to a PC".

7.	 When you finish you can log out from the "About" page.

You can use any device that is connected to the internet such PC, laptop, IPad and even your phone.

NOTE: Method 1 has three pre-requisites. If required, make the appropriate changes as suggested in each point below. Any change needs to be done only once.

1.	You are using a Telstra post-paid SIM card enabled for dynamic public IP address (Please refer to Appendix C for details on how to do this.)

2.	Illuminator WAN method must be set to "GPRS" and APN needs to be set to "telstra.extranet"
(Please refer to "Setting up Network Parameters" -> "WAN Setting" described earlier.)

3.	Illuminator E-mail settings need to be set up correctly
(Please refer to "Setting up E-mail Parameters" described earlier.)

	<u>IMPORTANT:</u> It is strongly advised that you confirm that all settings affecting e-mails are correct. This done by sending a test e-mail as described in Appendix D.

Remote Connection - Method 2

Method 2 requires a dedicated 3G dial-up modem (available separately from Halytech) and a SIM card installed in the modem.

Only one 3G dial-up modem is required regardless of the number of Illuminators you may have.

You need to install a dial-up network connection using the 3G dial-up modem on your PC. Instructions on how to do this are supplied with the modem.

To remotely connect to an Illuminator using Method 2 do the following:

1. Click the Dial-up Connection icon.

2. Enter the remote Illuminator's telephone number into the "Dial:" field.

3. Leave "User name" and "Password" blank and click "Dial".

4. Wait for the connection to be established. It may take up to 1 minute. Various messages will be displayed on the PC screen indicating progress e.g. Dialing, Verifying Username and Password, Connecting to network etc.

5. Once the connection is established, start an Internet browser program such as "Internet Explorer" on your PC

6. Type **192.168.0.188** as the web address and press the return or enter key.
    (This address <u>does not</u> change – even if you changed the default IP address as described in Appendix A.)

7. The Illuminator log-on page will be displayed on your PC. Enter your username and password in the spaces provided. Click on the "Log in" button.

8. "Field Lights" page will be displayed immediately following a successful log-on. You can now examine other pages as described in "Connecting to a PC".

9. When finished, make sure you terminate the link (hang up the call) as appropriate for your operating system.

Appendix C: Connection to Mobile Network

Illuminator units are fitted with a 3G modem. You will need to source a SIM card from a mobile telephone network provider in order to allow light control by SMS, to send automatic reports by email and to let you connect to the Illuminator remotely.

You will need a full-size SIM card with SMS and internet services enabled.

The SIM card will also let you connect to the unit remotely to add users, change PINs etc. To do that in the most economical way, obtain a SIM card on a post-paid plan from Telstra and request that a **dynamic public IP address** added to you SIM. This is provided for free. Simply advise Telstra to set the following parameters on your SIM:

> GPTEXB3
> GPCORPB3

To choose a mobile plan for the SIM, estimate how many SMS the Illuminator will send per month. The Illuminator will send a single SMS acknowledgement for each light activation and for each light deactivation. So, for example if you have 3 fields used by one lot of users, 5 days a week, the number of SMS will be 3 x 2 x 1 x 5 = 30 per week or approximately 130 SMS per month. An SMS usually costs $0.25 to send, making it $32.50 per month. Mobile networks often have cheaper plans with included SMS or add-on packs with unlimited SMS.

Insert the SIM card into your Illuminator as described next.

SIM Card Insertion and Removal

Before inserting a SIM card into an Illuminator, insert it into a standard mobile telephone that accepts full-size SIM cards. Turn the telephone on and ensure that any PIN protection is turned off and that you can make and receive normal calls.
(PIN protection can usually be turned off in the Security Menu of your phone.)

You can now remove the SIM card from the mobile phone and insert it into the Illuminator as follows:

1. Locate the modem access cover located on the top of the Illuminator case, next to the antenna connector. Using a small Phillips screwdriver, undo the single screw and gently pull out the cover. The modem inside the Illuminator will now be visible through the exposed access slot.
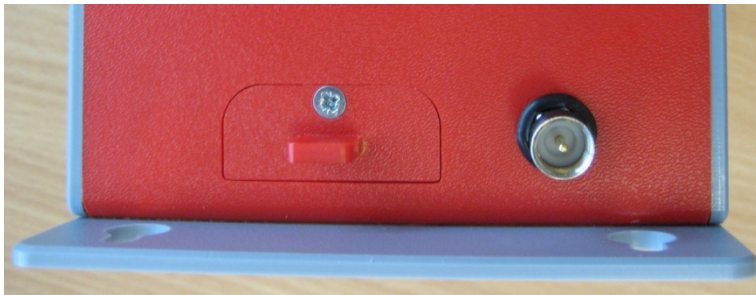
2. By looking through the slot, you will see the SIM card slot with a black locking lever to the left of it.
   Holding the SIM card <u>level with the locking lever</u>, gently push the SIM card into the exposed slot until it clicks in. The notched end should be inserted first, with the gold contacts facing up – as shown in the illustration.

IMPORTANT: You should feel slight resistance while pushing the card into the slot. If you do not or you can freely move the SIM from side to side by more than 1 mm you have missed the slot. You must remove the SIM and try again!

3. Using a small flat screwdriver, **gently** slide the black locking lever to the right – as far as it will go - it only moves a couple of mm.
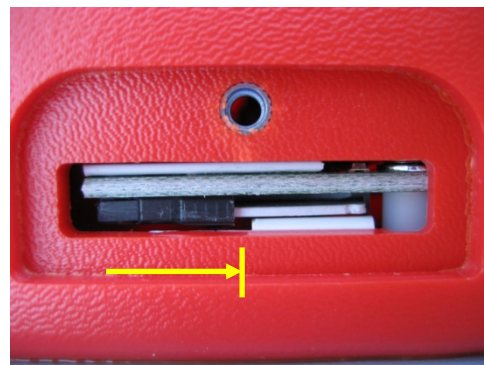
UNLOCKED POSITION   **LOCKED (WORKING) POSITION**

4. Replace the access cover.

To remove the SIM card:

1. Remove the modem access cover as previously described.

2. Using a small flat screwdriver, gently slide the SIM locking lever to the left as far as it will go.

3. Gently push the SIM card into the modem – it will unlock and partially pop out.

4. Use tweezers to pull out the SIM card completely.

Appendix D: Testing E-mail Connectivity

Illuminator units fitted with e-mail options provide a quick and simple way of confirming proper e-mail operation.

You can send test e-mails at any time by using the built in keypad and display. E-mails are sent to the "Test e-mail address" as configured in the E-mail Settings browser screen.

Sending Test e-mails

Once you set up a new Illuminator and enter all required Network / E-mail parameters ensure that it is connected to the appropriate network as selected by the E-mail sending method. Repeatedly and briefly press the keypad key until the display shows:

<div align="center">

Send test email?

</div>

Press and hold the key for longer than 3 seconds.
The unit will display:
<div align="center">

Sending email…

</div>

The keypad will not respond to key presses while the above message is displayed. After a period of time (usually less than 30 seconds) the outcome will be displayed as

<div align="center">

Email sent OK !   OR   **Email failed !**

</div>

A successful outcome verifies full e-mail connectivity. Otherwise, you may wish to Monitor Test e-mails to find the reason for the failure.

Monitoring Test e-mails

Equipment required:

1. Illuminator with e-mail option, initialised Network / E-mail settings and connected to the appropriate network (LAN or mobile network)
2. PC running a terminal program such as Hyperterminal
3. Null-modem serial cable

Procedure:

1. Set your terminal program to 9600 bps, 8 data bits, 1 stop bit and no parity
2. Connect your PC serial port to Illuminator AUX2 port (the DB-9 connector on the outside of the enclosure).
3. Send a test e-mail as described above in "Sending Test e-mails"
4. Your PC will display diagnostic messages for each step of the sending process
5. The last message will usually indicate where the problem lies

Most diagnostic messages are self-explanatory. Here are some additional tips:

- "Unable to resolve 'your smtp host address'" message when using LAN e-mail sending method – ensure that the gateway and the primary and the secondary DNS are set correctly and that there is connectivity to the internet or to your SMTP mail host computer.
- Messages starting with 3-digit numeric codes are generated by the SMTP host computer and will indicate invalid sender, recipient etc. Your network administrator or ISP can supply correct settings.

Appendix E: Logged Data Format

The Illuminator logs data internally in an efficient binary format.

The internal binary format is converted into a standard "CSV" (Comma separated values) file before each download. A CSV file is readable by most spreadsheet and database programs.

This appendix provides information about the structure of the "CSV" file.

Each record in the file consists of four fields:
1. record date e.g. 14/05/03
2. record time e.g. 12:34:15
3. record numeric identifier
4. record text description or in the case of analogue status inputs, the value of the input

The following table lists all possible values for the numeric identifier and the text fields.

Numeric Identifier	Range	Text	Comment
32768	32768	New File	New log file created
32769	32769	NORML ST	Normal program start
32770	32770	PHONE ST	Phone program start
32771	32771	MODM ON	Modem came on-line
32772	32772	MODM OFF	Modem went off-line
32773	32773	RING DTC	Incoming ring detected
0 + ST#	0 – 7	Numeric value of analogue status	Analogue status log record
50 + 2*ST# + STATE	50 – 65	STx=y	Digital status change
100 + 2*CNT# + STATE	100 – 107	CNx=y	Control change
200 + AL#	200 – 207	Alarm x	Alarm activation
280 + AL#	280 - 287	Almx RST	Alarm reset
300 + 10*AL# + SEQ	300 - 379	SMSxy OK	SMS alarm transmission OK
500 + 10*AL# + SEQ	500 - 579	SMSxy NG	SMS alarm transmission failed
700 + AL#	700 – 707	SMS ALxR	SMS command – reset an alarm
718	718	SMS ALLR	SMS command – reset all active alarms
719	719	SMS AL?R	SMS command – reset an invalid alarm #
720 + 2*CNT# + STATE	720 – 727	SMS CxOF or SMS CxON	SMS command – (de) activate a control
758	758	SMS BPIN	SMS command – (de) activate a control – invalid PIN
759	759	SMS C?OF or SMS C?ON	SMS command – (de) activate a control – invalid control #
760	760	SMS GTST	SMS command – get status
761	761	SMS GTCN	SMS command – get controls
797	797	SMS ROK	SMS command acknowledgement sent OK
798	798	SMS RNG	SMS command acknowledgement send failed
1999	1999	########	SMS received from this # (last 8 digits only)
2000+CLUB*16+FIELD	2000 - 2327	c01F02OF	Floodlight OFF command event
2500+CLUB*16+FIELD	2500 - 2827	c01F02ON	Floodlight OFF command event
2998	2998	222203#	Floodlight SMS command text
2999	2999	123411#	Floodlight keypad command text

Table decode:

ST#	-	status number (0 – 7)	
STATE	-	digital status state (0 = OFF, 1 = ON)	
CNT#	-	control number (0 – 3)	
AL#	-	alarm number (0 – 7)	
x	-	alarm number (1 – 8) (equals AL# + 1)	
SEQ	-	alarm sequence step (0 – 10)	
y	-	alarm sequence number (1 – 9) (equals SEQ + 1)	
c	-	method of floodlight control:	K = keypad
			P = phone
			C = computer
			A = automatic