EDAC Electronics Ltd

EDAC 320-NG, EDAC 321-NG
User Manual

Document Version 1.3

For Hardware v6 and above

For Firmware v3.20.7, v3.21.7 and above

1. Table of Contents

2. Overview

2.1 About the EDAC 320/1-NG

The EDAC 320/1-NG is a cost effective, cellular based remote monitoring control and logging system. Based on the tried and true EDAC SMS 300 series product the EDAC 320-NG integrates all of the features of the SMS 300 as well as adding some new ones.

The EDAC 320/1-NG connects to approved GSM (2G) and UMTS (3G) cellular networks using this connection to deliver critical information. The EDAC 320-NG employs SMS (Short Messaging Service), email via PSD (Packet Switch Data) and CSD (Circuit Switched Data) technologies to report and deliver this information. For more information on network technologies see section 11. Glossary.

The EDAC 320/1-NG has the ability to monitor up to eight inputs and send out messages via SMS or email when a predefined alarm or reset condition occurs. The EDAC 320-NG's eight inputs can be configured to accept digital, 4-20mA analogue or 0-5V analogue inputs. The EDAC 321-NG has five configurable inputs and two that accept pulse frequency signals.

The EDAC 320/1-NG also has four integrated relay outputs which can be used to control various pieces of equipment. Any of the outputs can be switched either remotely via a user sending an SMS to the unit with the command, or automatically depending on the state of an input (i.e. low temperature detected, turn heating on). Notification of outputs switching can be sent to any of the EDAC 320/1-NG's sixteen different programmable contact slots. The outputs also have a momentary feature, meaning they can be configured to automatically turn off after a pre-defined period when activated, effectively simulating push buttons commonly found on pump soft starters, irrigation equipment, and industrial process control systems.

Information from any of the EDAC 320/1-NG's inputs can be recorded to an onboard flash memory card, where it can be retrieved and viewed either locally or remotely via email at any time. This information can be useful for monitoring the performance of systems and equipment, recording/reporting of system faults as well as recording/logging of information for compliance in processing or resource allocation.

Like its brother the SMS 300, the EDAC 320 is sturdily constructed and enclosed in an extruded aluminium case ensuring maximum ruggedness and reliability.

From this point forward the EDAC 320-NG / EDAC 321-NG will be referred to simply as the EDAC 320 / EDAC 321.

2.2 Model Variations

The EDAC 320 product comes in several different models each with different I/O interfaces and cellular network connection technologies. Below is a table describing the differences between each model in the EDAC 300 series range.

Model	Description
300-G	• Quad-band GSM 850 MHz, 900 MHz, 1800MHz, 1900 MHz using Wavecom Q24Plus cellular chipset • Eight standard I/O (Configurable as Digital, 4-20mA and 0-5V) • Optional DC power supply monitor • Four relay outputs • SMS text message alarming
315-NG	• Quad-band GSM/GPRS/EDGE 850 MHz, 900 MHz, 1800MHz, 1900 MHz **Penta-band WCDMA/HSPA 800 MHz, 850 MHz, 900 MHz, 1900MHz, 2100 MHz** using Sierra Wireless MC8795V cellular chipset • Eight standard I/O (Configurable as Digital, 4-20mA and 0-5V) • Optional DC power supply monitor • Four relay outputs • **Data logging to flash memory card** • SMS text message alarming
320-NG	• Quad-band GSM/GPRS/EDGE 850 MHz, 900 MHz, 1800MHz, 1900 MHz Penta-band WCDMA/HSPA 800 MHz, 850 MHz, 900 MHz, 1900MHz, 2100 MHz using Sierra Wireless MC8795V cellular chipset • Eight standard I/O (Configurable as Digital, 4-20mA and 0-5V) • Optional DC power supply monitor • Four relay outputs • Data logging to flash memory card and **retrieval via email** • SMS text message and **email alarming**
321-NG	• Quad-band GSM/GPRS/EDGE 850 MHz, 900 MHz, 1800MHz, 1900 MHz Penta-band WCDMA/HSPA 800 MHz, 850 MHz, 900 MHz, 1900MHz, 2100 MHz using Sierra Wireless MC8795V cellular chipset • **Five** standard I/O (Configurable as digital or analogue 4-20mA and 0-5V) • **Dedicated** DC power supply monitoring input • **Two pulse frequency counting inputs** • Four relay outputs • Data logging to flash memory card and retrieval via email • SMS text message and email alarming

2.3 Specifications

Power Supply	12-28V AC/DC supply When in idle mode the EDAC 320 draws less than 100mA. **The PSU must be able to supply a peak current of up to 1A at 12VDC and 500mA at 24VDC**	
Fuse	1A Internal Fixed Re-settable Fuse.	
Telephone Network Connection	GSM/GPRS/EDGE 850 MHz, 900 MHz, 1800MHz, 1900 MHz UMTS – WCDMA/HSPA 800 MHz, 850 MHz, 900 MHz, 1900MHz, 2100 MHz Approved Networks: Telstra (Australia), Vodafone (New Zealand), 2degrees (New Zealand), Telecom XT (New Zealand) * SMS and PSD functionality. CSD not available on all networks	
Contact List capacity	16 entries consisting of either cell phone numbers (for SMS alarm messages), or email addresses (for email messages). Each alarm can be sent to any combination of these contacts. SMS messages can be delivered to any cellular network in the world that is interlinked with the host network	
Alarm Delivery Method	SMS and/or email (email requires PSD)	
Input Types	320:	8 user selectable 10bit Analogue or Digital inputs. Sensor out of range warnings. Optional DC power supply monitoring (requires user calibration)

	321:	5 user selectable 10bit Analogue or Digital inputs, dedicated power supply monitoring input (requires user calibration), 2 frequency counting pulse input available on EDAC 321-xx models
Input scan rate	< 0.5 second	
De-bouncing / Delay Before Alarm/Reset	Configurable between 0 and 10,000 seconds	
Analogue Input type	Individually configurable 0-5V or 4-20mA	
Analogue Input Units	Engineering units can be specified to match the sensor type	
Analogue Scaling	Scaling and zero offset parameters for each input	
Analogue Alarming	Hi-Alarm, Low-Alarm, Hi-Reset and Low-Reset parameters configurable in the specified engineering units for each input	
Pulse Input Type **(321 only)**	Frequency counting, pulse totaliser inputs. Internal pull-up to 5VDC via 470Ω resistor.	
Maximum Pulse Frequency **(321 only)**	100Hz (or 100 pulses per second) max	
Pulse Width Minimum **(321 only)**	5 millisecond minimum for reliable detection	
Pulse Scaling Options	Pulse totaliser count can be scaled with engineering units included (i.e. 1000L of water per pulse). Pulse inputs can also be scaled into a Pulse Rate reading, with time period configurable as seconds, minutes of hours (i.e. L/s)	
Digital Logging Options	Any combination of Instantaneous State, Alarm Events or Duty Cycle (ratio of time input closed to time input open for the global log period) can be logged to the onboard SD card	
Analogue Logging Options	Any combination of instantaneous, average, minimum or maximum readings can be logged from each input for the global log period, and stored to the onboard SD card with a system time/date stamp	
Pulse Data Logging Options **(321 only)**	Pulse inputs can be logged as totalised count for global log period, or as Instantaneous, Average, Minimum or Maximum readings of the Pulse Rate for the global log period.	
Control	Outputs can be controlled manually via SMS. Outputs can also be activated by being linked to alarm conditions, either internally or on another EDAC 320 unit configured in the phone book.	
Outputs	Normally open relays. 2A max, 50V AC/DC, configurable as timed self-resetting (momentary) (0-255 seconds) or latching type	
Data Logging Rates	Globally configurable between 5 and 86,400 seconds (5 second resolution)	
Data Card Type	SD or MMC data cards up to 2 GB. Not compatible with SDHC memory cards.	
Data Retrieval Methods	Locally:	Insert card into a PC
	Remotely via email:	SMS request for email of data files (PSD required)
	Remotely via dial up connection:	Using remote management tool (CSD required)
Other Interfaces	RS-232 Serial and USB	
Diagnostic interface	Real time diagnostic interface showing condition of all I/O as well as signal strength and network status	
Configuration Interfaces	Using the supplied windows configuration application via RS-232, USB or remote dial up connection (limited to contacts list only, CSD required)	
Site Message	20 characters (max) which is attached to every alarm message	
Alarm and Reset messages	40 characters (max) for each alarm.	
Output Name	20 characters (max) for each output name. This can be used to control switching of the output using an SMS.	
Modem Through-mode **(CSD Required)**	The internal GSM modem can be used in through mode to provide a wireless serial link to an external device (e.g. PLC) or the EDAC 320	
SMS Command Mode	The EDAC 320 can forward SMS messages received via the serial port	

3. Getting Started

3.1 Network Connection

The network connection is the first and most important part of setting up your new EDAC 320. It is also important that once set up, the network connection is **properly maintained**. If the account lapses or the credit is used up, the device will not be able to send any notification messages meaning that **critical alarm events may be missed**.

Below, detailed in table 3.1, are the networks for which the various EDAC 320 models are currently approved for connection, the EDAC 320 should only be used on approved networks. Correct and reliable operation cannot be guaranteed when connected to non-approved networks. **Note that some features of the EDAC 320 are unavailable if the carrier does not support the required network technology.**

EDAC 320 Approved Networks and Available Technologies		
Carrier	**Country**	**Available Technologies**
Telstra	Australia	CSD*, PSD
2degrees	New Zealand	PSD
Telecom XT	New Zealand	PSD
Vodafone	New Zealand	CSD*, PSD

Table 3.1 Approved Networks

* requires CSD account with dedicated data number, see section 3.1.2.

To start using the EDAC 320 it must be registered on an approved cellular network. To do this the unit must be fitted with a **SIM** (***S***ubscriber ***I***dentity ***M***odule) card. This small card-like microchip contains information about the account the unit is connected to. The EDAC 320 can work with pre-pay or contract SIM cards. A SIM can be obtained from the network provider (Note the phone number listed on the SIM packaging as this will become the phone number of the EDAC 320 device). If the unit is to be connected to the EDAC APN then a SIM is provided with the unit.

Most SIM cards have a 'SIM PIN' feature. This is a PIN code that must be entered each time the SIM is powered up. Normally this feature is disabled on new SIM cards. If the 'SIM PIN' is enabled this pin **MUST** be the same as the EDAC 320's 'Unit PIN' (see section 6.3.1 for more information on changing the 'Unit PIN'). Failure to ensure the two PIN's match will result in the SIM being locked. If this occurs contact you local service provider for information on unlocking SIM cards.

The SIM must be fitted into the unit before the EDAC 320 will operate. To do this the unit must be powered down and end plate must be removed to expose the SIM connector. Remove the connector blocks from the end plate (the end the aerial connects to) and remove the screws securing the end plate as detailed in Fig 3.1a.

Fig 3.1a Removing terminal blocks and end plate

Relocate the endplate to allow access to the SIM connector. The case lid may also be removed to allow easier access to the SIM holder as shown in Fig 3.1b

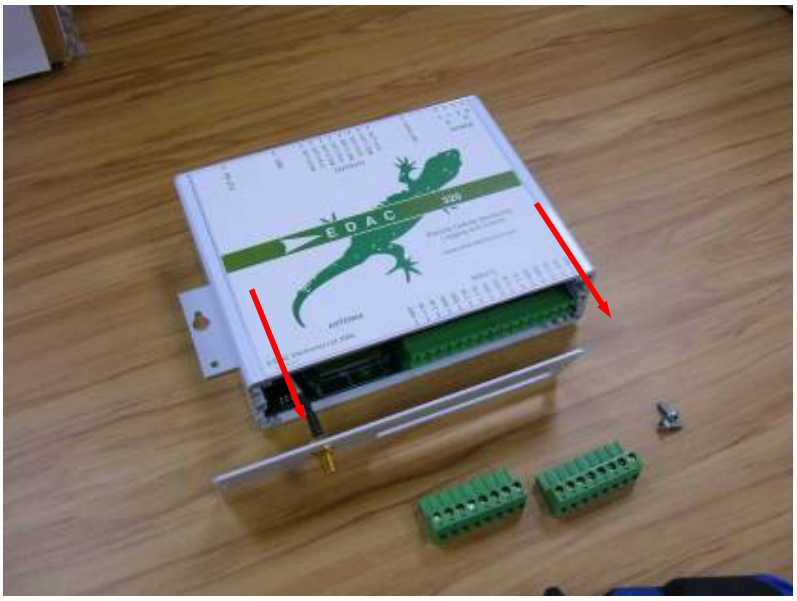

Fig 3.1b Removing the Case Lid

The end plate will still be attached to the circuit board by the aerial cable, be careful not to stress or break the aerial cable.

Slide the SIM connector back and lift to allow the SIM to be inserted as shown in Fig 3.1c

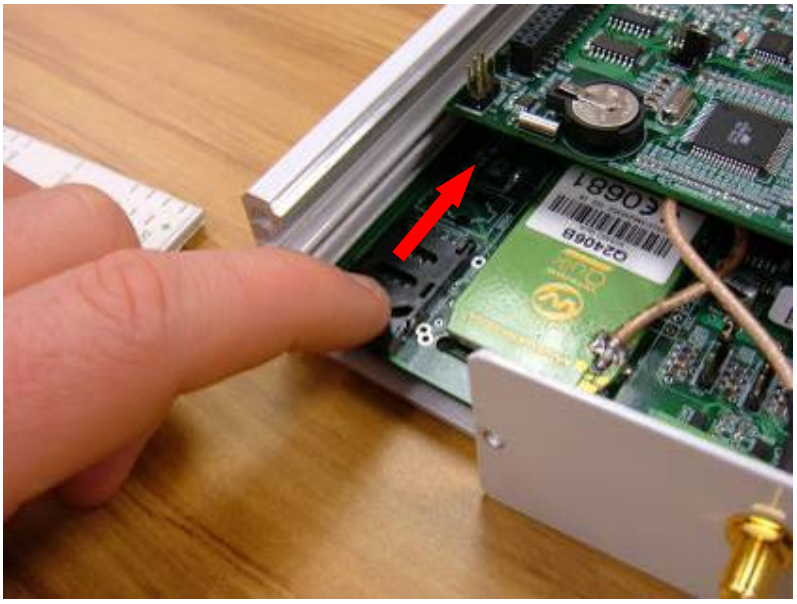

Fig 3.1c Unlocking SIM card holder

Insert the SIM into the holder as shown below in Fig 3.1d. Due to the shape of the SIM card itself it should not be possible to insert the card in an incorrect manner.

Fig 3.1d Fitting SIM card

Place the SIM holder down flat and slide forward to lock into place as shown in Fig. 3.1e. Refit the lid, end plate and connector blocks.

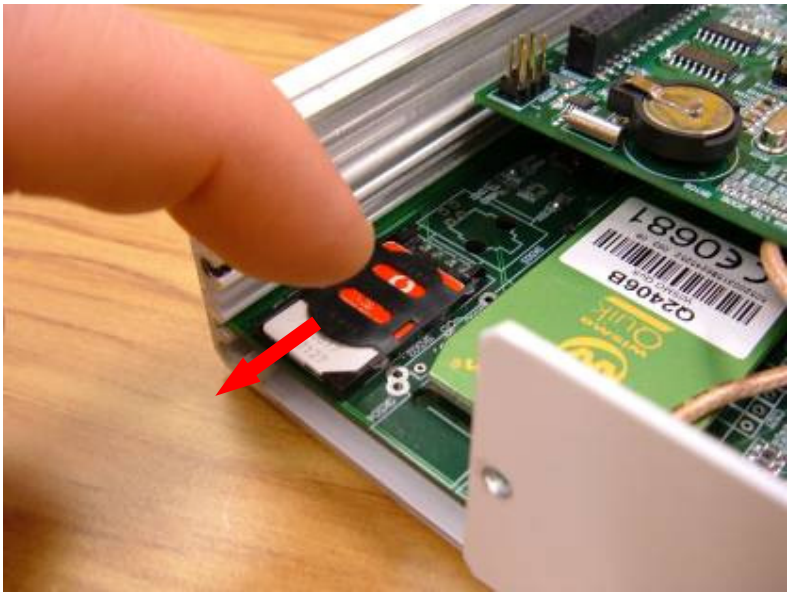

Fig 3.1e Locking SIM card in place

The unit is now ready for use.

3.1.1 Packet Switch Data (PSD)

Some features of the EDAC 320 require packet switch data (PSD) to be available to function correctly. Put simply having a PSD connection enabled allows the SIM to connect to the internet through the cellular connection and enables the sending of email.

The following features/settings require a PSD connection to function correctly:

Connection Settings	(see section 6.3.2)
Email Settings	(see section 6.3.3)
Email Log File Updates	(see section 6.3.4)
Email Addresses as Unit Contacts	(see section 6.3.1)

Most network providers enable PSD by default on all new SIM cards, as this is the framework behind premium mobile services such as mobile internet technologies. A monthly data allowance is often included in contract accounts and data packages can be bought for most pre paid plans.

3.1.2 Circuit Switched Data Number (CSD)

Some features of the EDAC 320 require a Circuit Switched Data (or CSD) number to be enabled on the SIM to function correctly.

Having a data number enabled means that the SIM card will have two different phone numbers associated with it, one for voice/SMS and another for CSD communications. Dialling the CSD number ensures that modem calls are routed through the network in the most appropriate and reliable way.

The following features require a data number on order to function correctly:

Through Mode Data Connection	(see section 10.3)
Downloading Log Files using the Remote Management Tool	(see section 7.2)
Downloading/Uploading Contacts List	(see section 7.3)
Remote Configuration	(see section 6.1.2)
Remote Management	(see section 7)

Contact your network provider to have a circuit switched data number enabled on your SIM card. Most network providers will only enable a data number on post paid or contract accounts. Ensure the data number is recorded and kept safe.

3.2 LED's

The status of the EDAC 320 is indicated externally by three green LED lights. Each of these lights, 'Power', 'Active' and 'Status' indicates the condition of different parts of the 320's functionality.

3.2.1 Power

The power LED indicates if the EDAC 320 is powered up, and if it is the status of the SD/MMC data card.

On	Powered up, data card inserted and accessible
Flashing Rapidly	Powered up but unable to access data card
Off	Not Powered
Off Momentarily	Writing information to data card

Warning do not remove the data card while the 'Power' LED is off momentarily, this means the 320 is writing information to the data card. Doing so may result in corruption of the file system on the data card rendering the information stored unusable

3.2.2 Active

The active LED indicates that the EDAC 320 is actively processing incoming and outgoing messages or reading/writing to the flash memory card.

On	EDAC 320 is actively processing incoming/outgoing communications or reading/writing to the flash memory card
Off	EDAC 320 is idle

3.2.3 Status

The Status LED indicates the status of the EDAC 320's connection to the cellular network

On	The cellular and data connections are active
Flashing Rapidly	The cellular connection is active, but the data connection is inactive or currently connecting
Off	No cellular or data connection is available

See section 3.1.1 for more information on PSD connections and its importance to the functionality of the EDAC 320.

4. Hardware Installation

4.1 Power Supply

The EDAC 320 has a universal input power supply. The unit can accept AC or DC input power between 12 and 28 volts.

The EDAC 320's idle current draw is quite low, however because of the nature of cellular radio communications, peak current draw can be quite high. The average current draw also varies slightly depending on the input voltage. Table 4.1 details the EDAC 320's approximate current draw figures, when the unit is in different states.

All figures listed below are based on a supply voltage of +12VDC and an RSSI reading of 25 (very good signal). These figures will vary depending on supply voltage and cellular signal strength.

State	Approx current draw (mA)
Idle (no outputs active)	30-40 mA
Idle (all outputs active)	90-100 mA
Initialisation	60-100 mA
Sending	80-120 mA
Receiving	60-100 mA
Max	1000 mA

Table 4.1 EDAC 320 Current Draw

4.1.1 Power Supply Selection Jumper

The EDAC 320 has an internal power supply selection 'jumper' which designates which type of supply the 320 is set up to run from, either AC or DC. It is very important that the power supply selection jumper is set correctly for the type of supply that is to be used.

A jumper consists of a group of metal pins, protruding vertically from the circuit board, and a piece of plastic coated metal that shorts one or more of these pins together, the position of the jumper on these pins designates the type of power supply to be used.

Ensure the power supply selection Jumper is set correctly. Failure to do so may result in undesired operation or irreversible damage to the product.

To set the power supply selection jumper the case end plate and the case lid must be removed from the product. The diagram in Fig. 4.1.1a and 4.1.1b shows the location and configuration of the jumper.

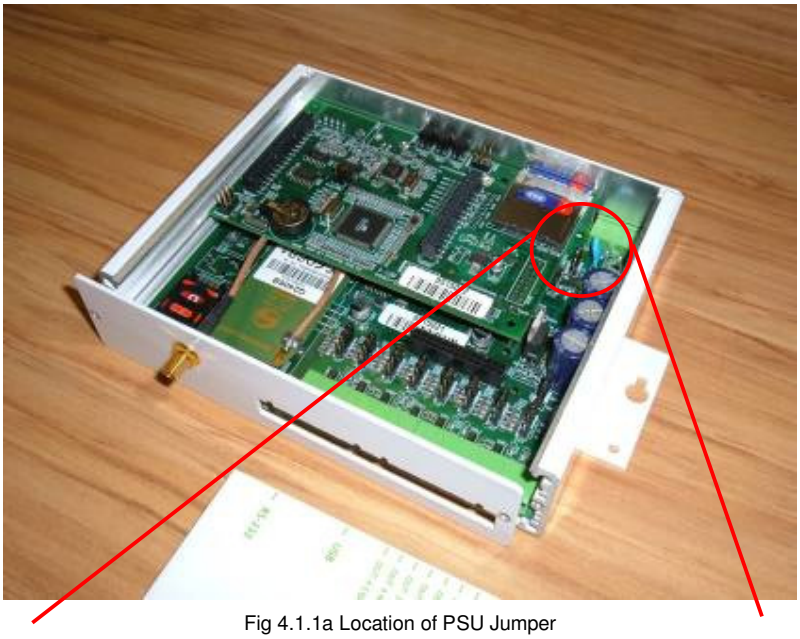

Fig 4.1.1a Location of PSU Jumper

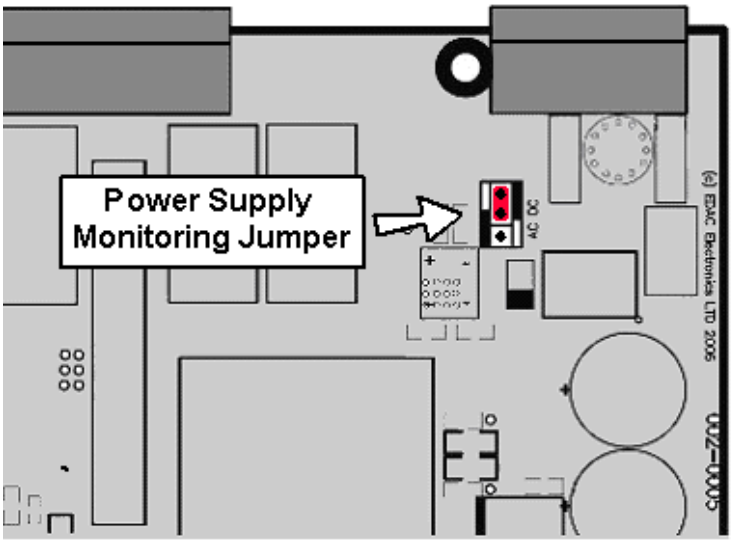

Fig 4.1.1b Configuration of PSU Jumper

Position the jumper either in the DC position (closest to the power supply terminal block) or the AC position (closest to the centre of the circuit board).

Extreme caution should be taken not to touch any of the internal components of the EDAC 320. Touching the components may cause a static discharge which could severely damage the unit and void the warranty.

4.1.2 DC Power Input

The DC power supply input will accept voltage between 12 and 28V, and has reverse polarity protection up to 30VDC. The product is DC over current protected by an internal 1 Amp, self resetting fuse. The fuse will disconnect the product if over current is detected, but will reset if voltage is removed and re-applied.

4.1.3 AC Power Input

The AC supply input will accept voltage between 12 and 28V.

If an AC Power supply is used it MUST be fully isolated (floating). Use of a non-isolated AC power supply may result in severe damage to the unit. If there is any doubt about the type of AC power supply you intend to use, contact your supplier for more information.

It is required for warranty purposes that external fusing is fitted to the EDAC 320 when powered from AC supplies. This prevents damage from ground loops and surges. Below Fig 4.1.3 details how the external fusing should be connected.

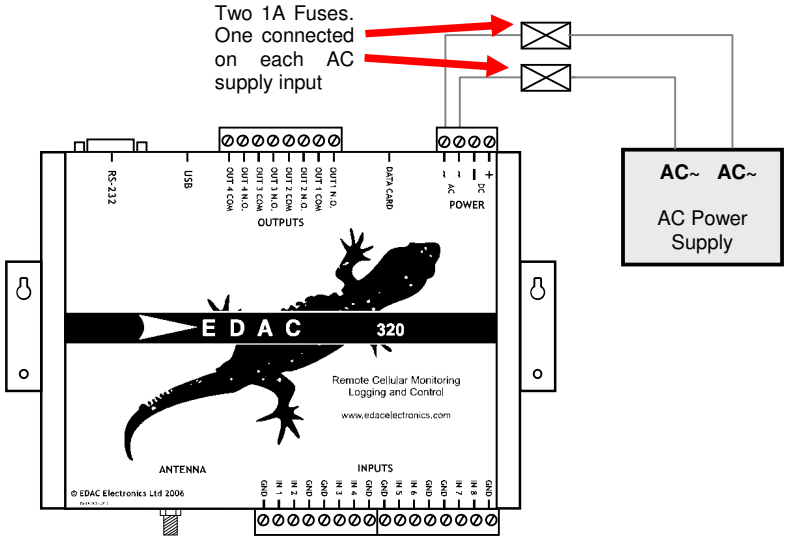

Fig 4.1.3 Fitting external fuses to AC powered device

4.2 Inputs

The EDAC 320 has eight fully configurable inputs, capable of accepting three different types of input signals, Digital (N.O. or N.C.), 4-20mA analogue and 0-5V analogue. The following sections detail common configurations for these types of inputs.

4.2.1 Jumper configuration

The unit has a series of 'hardware jumpers' which configure the internal sensing circuitry for the type of input being used. The jumper for each input must be set correctly for the input to operate properly. A jumper consists of a group of metal pins, protruding vertically from the circuit board; and a piece of plastic coated metal that shorts one or more of these pins together.

By default all jumpers are set to 'digital'. The following process need only be performed if the setting needs to be changed from default, or to check the configuration of a particular input.

To configure the jumpers first of all the case end plate and lid need to be removed. Remove the two input terminal blocks from the unit, then the two screws securing the endplate as shown in Fig. 4.2.1a. Carefully move the end plate aside.

Fig 4.2.1a Removing the input terminal blocks

The end plate will still be attached to the circuit board by the aerial cable, be careful not to stress or break the aerial cable.

Slide the lid out from the extrusion and place to one side as shown in Fig 4.2.1b. The circuit board and configuration jumpers should now be exposed.

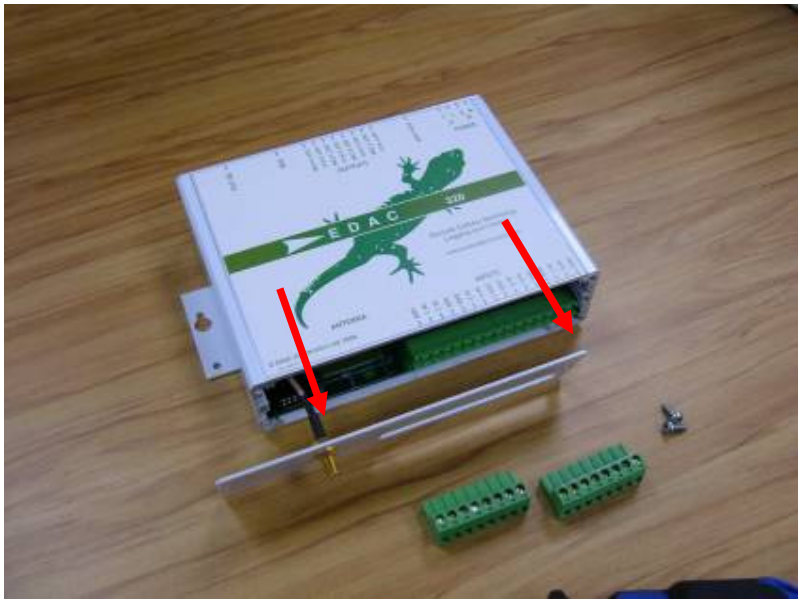

Fig. 4.2.1b Removing the case lid

Extreme caution should be taken not to touch any of the internal components of the EDAC 320. Touching the components may cause a static discharge which could severely damage the unit and void the warranty.

Fig 4.2.1c below details the jumper configuration setup. Note that there is one jumper for each input channel and that there are three possible configurations: up for 'Digital', centre for '0-5V' and down for '4-20mA'.

Also note that there is a 'Power Supply Monitor' jumper. Ensure this is set to 'OFF' if power supply monitoring is not to be used. See section 10.6 for more information on Power Supply Monitoring.

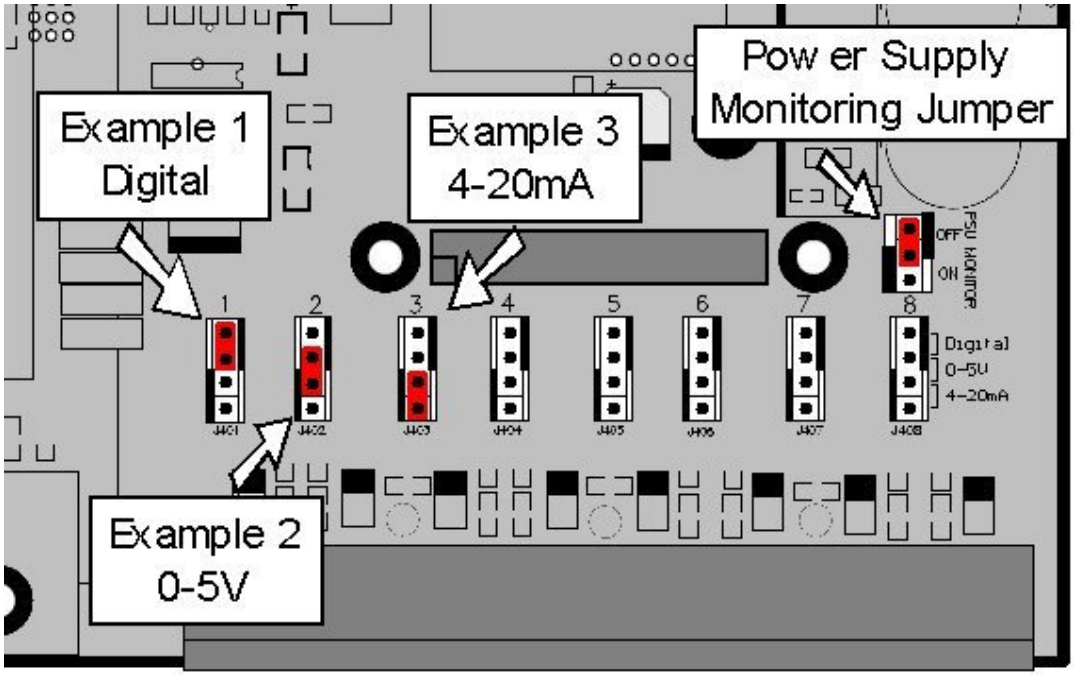

Fig 4.2.1c Input Jumper Configuration

4.2.2 Digital Input Configuration

The EDAC 320 requires a 'clean contact, voltage free' digital input. Basically what this means is that the input needs to be shorted to ground (for N.O.), or disconnected from ground (for N.C.) to indicate an alarm condition.

When configured as digital the input has an internal pull-up. This means that when the input is not connected to anything (or floating) it sits at approximately +3.3VDC. When the input is shorted to ground a small amount of current (around 10 micro amps) is allowed to flow, which pulls the input voltage down to 0VDC. The microprocessor in the EDAC 320 constantly monitors the voltage on the inputs checking if the input is shorted to ground or not.

No external voltage should be presented to the input terminals of the EDAC 320 when configured as digital. If the device to be monitored has voltage driven digital or TTL outputs, use a relay to interface them.

Normally the inputs are driven from a relay, micro switch, reed switch or contact output from another control product (i.e. PLC or data logger). Fig 4.2.2 shows a typical wiring schematic.

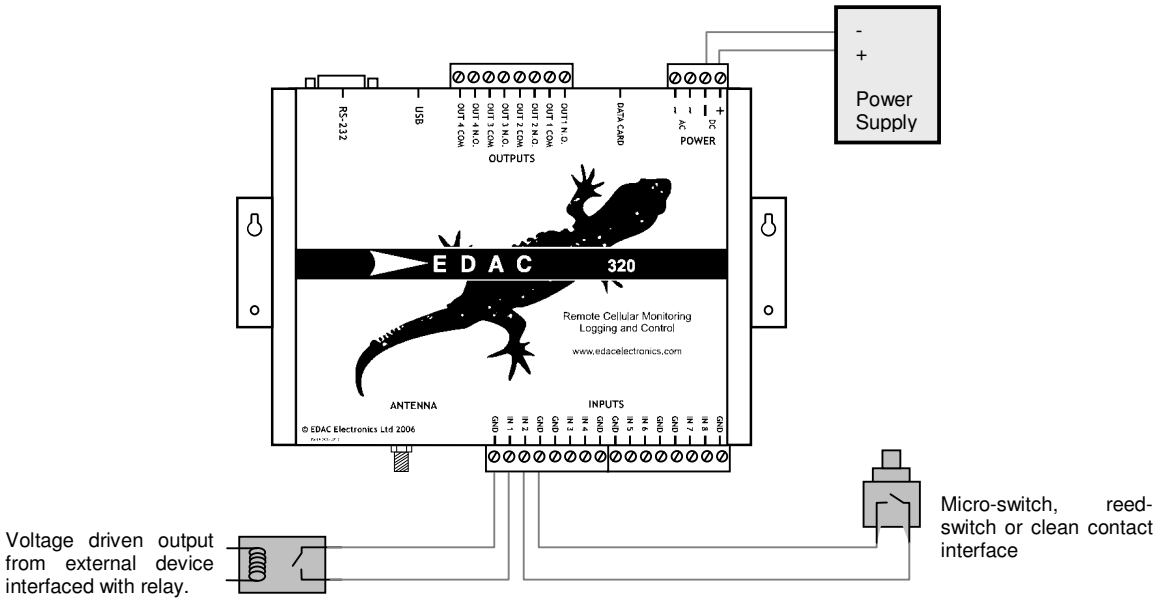

Fig 4.2.2 Typical Digital Wiring

Note that if an AC power supply is being used the GND terminals on the input side must be used for input signals, NOT the supply ground.

4.2.3 4-20mA Analogue Input Configuration

Generally speaking there are two different types of 4-20mA sensors that are commonly used in industry. 'Loop powered' and 'Sensor powered'

Loop powered transmitters are often referred to as 'parasitic powered' sensors as the sensor transmitter draws its power from the signal current loop. Fig. 4.2.3 shows a typical wiring diagram for a loop powered transmitter.

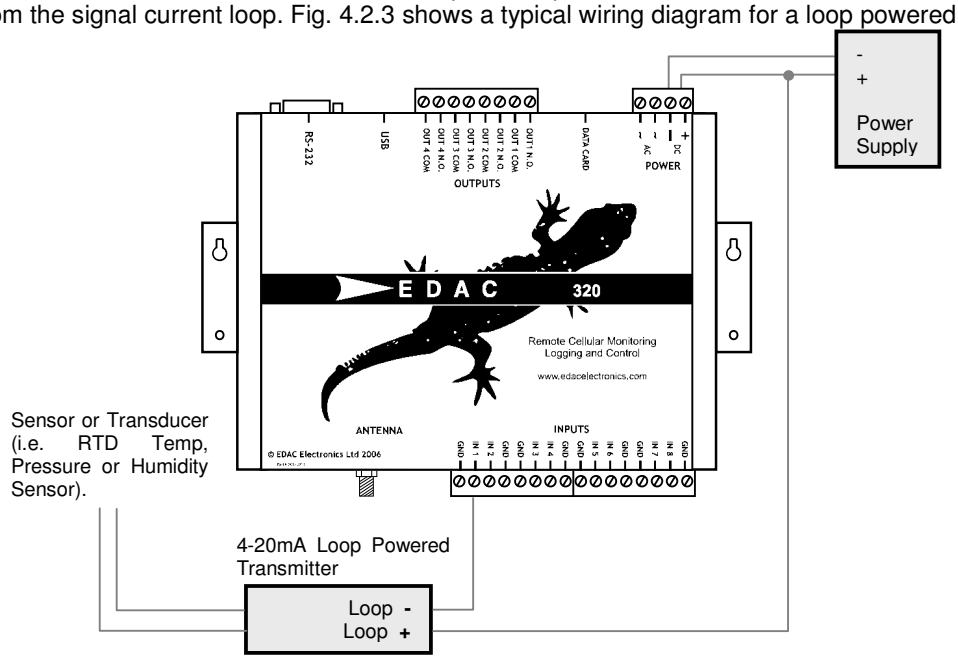

Fig. 4.2.3 Typical 4-20mA Loop Wiring

Note that the power supply used should match the supply requirements of the loop powered transmitter. Loop powered transmitters should generally only be used with D.C. power supplies. Also note that the 'INP 1' terminal is internally connected to DC- which completes the loop circuit.

Sensor powered or four wire transmitters draw their power from an external power source. Fig. 4.2.3a shows a typical wiring diagram.

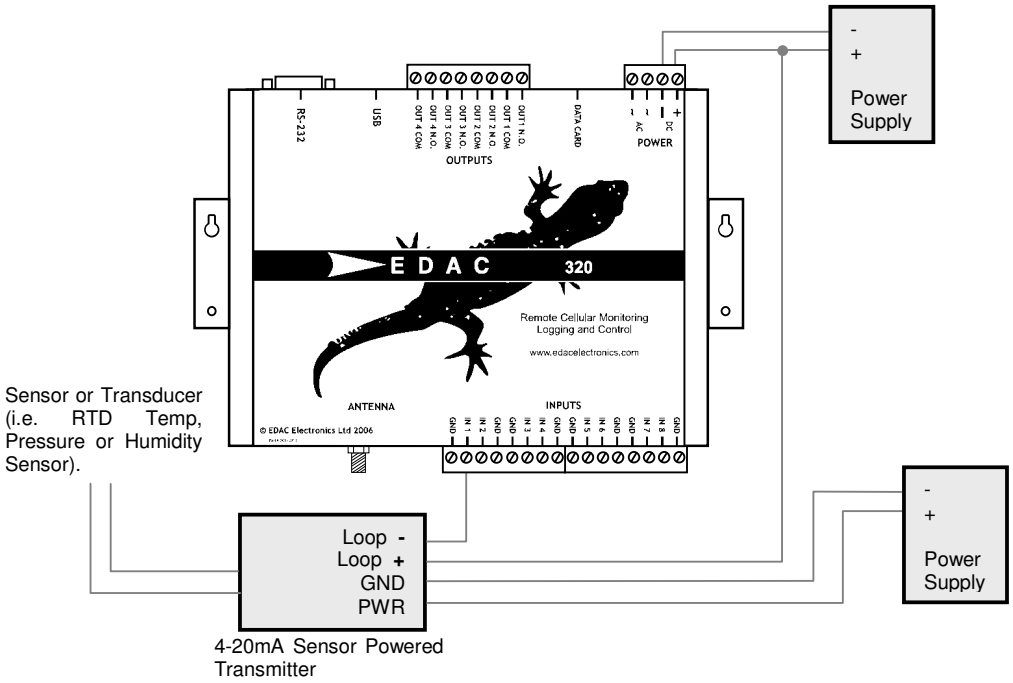

Fig 4.2.3a Typical 4-20mA Sensor Wiring

Note again that the power supply used should match the requirements of the sensor transmitter. Also note that the 'IN' terminals are internally connected to DC – which completes the loop circuit.

4.2.4 0-5V Analogue Input Configuration

0-5V sensors are probably the least commonly used of the three types or sensors. This is due to the fact that part of the signal voltage can be lost across long cable runs. A typical wiring schematic is shown in Fig 4.2.4.

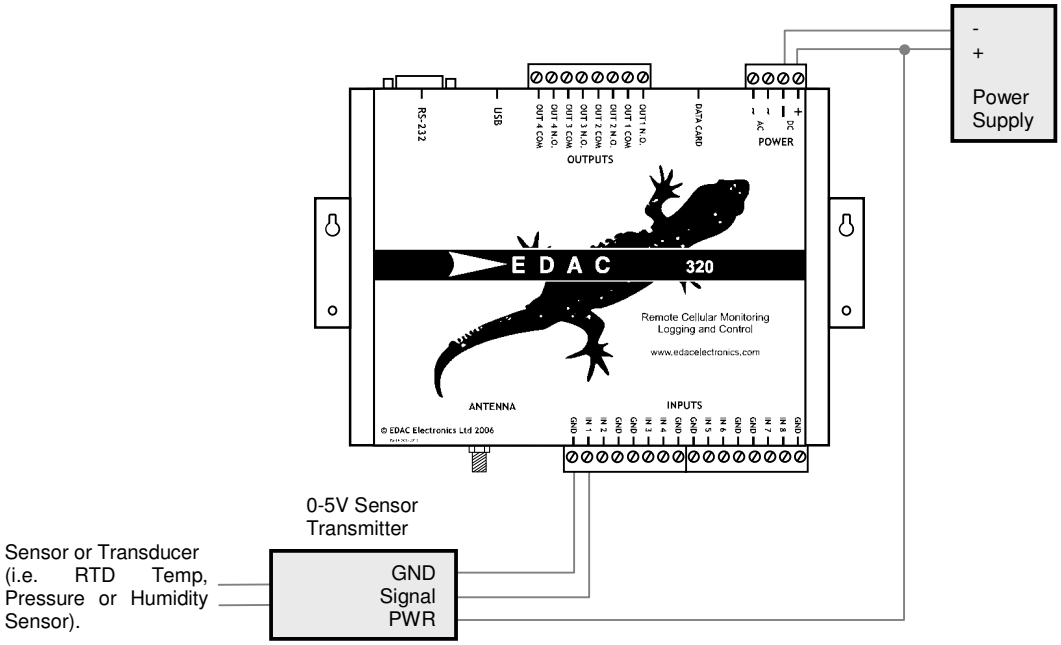

Fig 4.2.4 Typical 0-5V Wiring

Note that the power supply should match the requirements of the transmitter. One 0-5V transmitter can also provide signal to multiple devices, such as PLCs or display units at the same time, this is the advantage of 0-5V type sensors.

4.2.5 Pulse Input Configuration (EDAC 321-xx only)

The EDAC 321 product has two pulse frequency counting inputs setup on inputs 7 and 8. These inputs are fixed as pulse counters and cannot be changed to other types such as digital, 4-20mA or 0-5V.

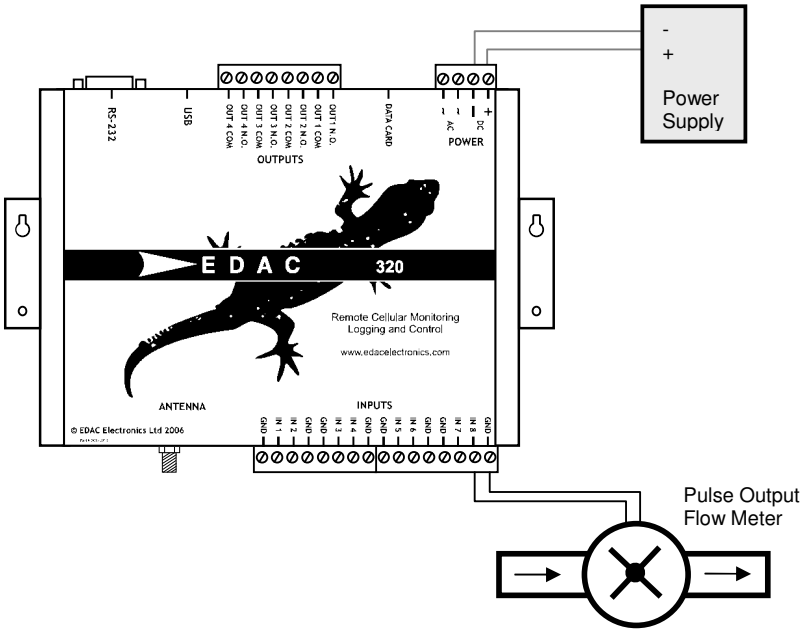

Fig 4.2.5 Typical Pulse Input Wiring

4.3 Outputs

The outputs on the EDAC 320 are of a relay type, meaning that they can switch small to medium voltages and currents (Below 50V and 2A AC or DC). Where higher power is required the relays can be used to drive larger relays.

Below are typical wiring diagrams for both 'Direct Load Switching' (Fig. 4.3.1) and 'Relay Switching' (Fig. 4.3.2) applications.

4.3.1 Direct Load Switching

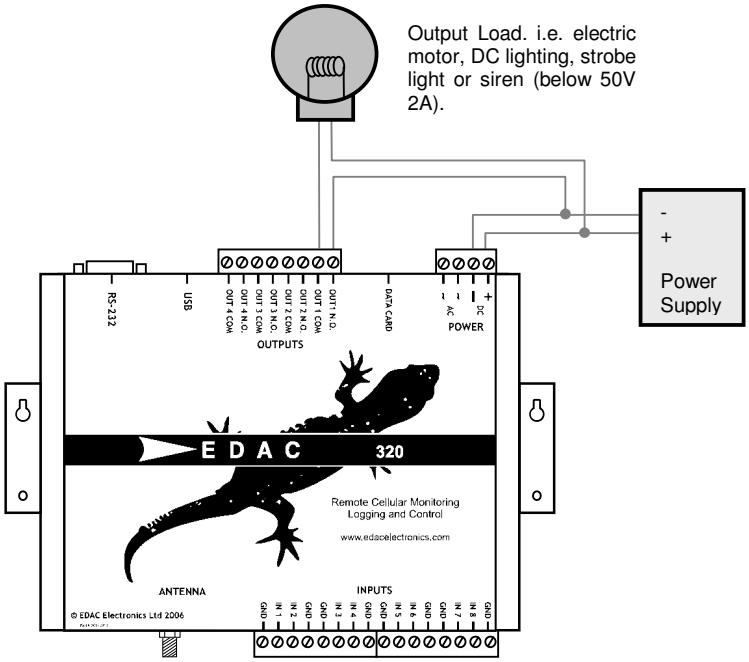

Fig 4.3.1 Direct Load Switching

Note that the load can be powered from the same power supply as the EDAC 320, however the supply will need to match the voltage requirements of the load and will need to be able to supply enough current to power both the EDAC 320 and the load. An additional external power supply can be used for the output load if required.

4.3.2 Relay Switching

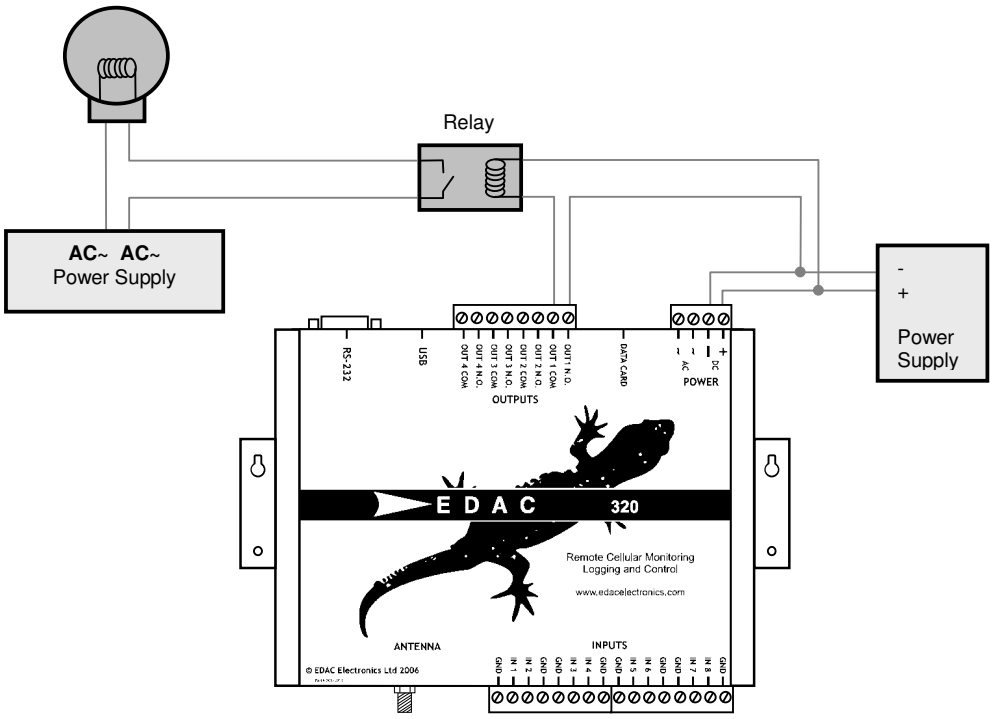

Fig 4.3.2 Relay Switching

Note the use of an external power supply, also that the coil of the relay must be matched to the voltage of the EDAC 320 power supply and the relay contacts must be matched to the voltage and current of the output load.

4.4 Aerial Installation

Aerial selection and installation needs to be carefully considered prior to commissioning. Selection and positioning of the aerial can make the difference between a system that works perfectly and one that performs poorly. The EDAC 320 has a standard SMA Female type aerial connector, allowing a wide variety of aerials to be fitted.

4.4.1 Aerial Selection

Not all aerials are created equal! Many different types of aerials are available on the market and each has its own pro's and con's. EDAC generally recommends and supplies the 'Pacific Aerials' range of cellular aerials because of their durability and performance at a budget price. Below the main type of aerials and the pro's and con's of each are listed.

Stubby
The stubby aerial is a short 'spike' type aerial suitable for use in indoor installations in metropolitan areas where good signal strength is available, or where mounting of an external aerial is not possible. This aerial is mounted directly on the SMA connector of the unit. The stubby provides around 1-2dbi of gain (depending on the type). A stubby aerial is not suitable where the unit is mounted inside a fully enclosed metal or concrete structure.

1/2 Wave
Half wave aerials are a short screw base aerial that can be mounted on external horizontal or vertical surfaces with the aid of a bracket. These aerial offer around 3-4dbi of gain, and are suited to metropolitan areas or sites where good general cell coverage is available. Because of the high dome shaped reception pattern of the ½ Wave it is quite well suited to hilly or obstructed areas also. The ½ Wave is an omni-directional aerial and will connect to the nearest available cell tower

Elevated Feed Collinear
The collinear is a larger screw base aerial at around 1m in height. The 1/4, 1/8, 1/4 element pattern provides around 6.5dbi of gain. The elevated feed aids in clearing obstructions when mounting. Because of the long flat reception pattern of the collinear it is suited to flat sites where the cell tower may be quite some distance away. The collinear is an omni-directional aerial and will connect to the nearest available cell tower and can be mounted on horizontal or vertical surfaces with the aid of a bracket

Yagi

The Yagi is a specialised aerial consisting of a number of receiving elements mounted on a horizontal feed, much like a UHF TV aerial. The Yagi can provide up to 22dbi of gain. The Yagi is mounted on a 'hockey stick' pole affixed to an external structure. The Yagi provides excellent gain for the most remote of sites HOWEVER it has an Achilles heel. The Yagi is a directional aerial, this has two major implications. The first is that when the aerial is mounted, the location of the nearest cell tower needs to be known and the aerial needs to be pointed directly at it for best performance. The second is that because it is directional it can only communicate with the cell tower it is pointed at. If this cell tower is at maximum capacity, or is non-operational when the device is trying to communicate, it is unable to roam and find another available cell tower due to the directional nature of the aerial. The Yagi is best suited to the most remote sites or where only one cell tower is within range and the signal strength is weak.

It is highly recommended that a site survey is undertaken by the installer before the aerial is selected and installed. Using a test EDAC 320, a selection of aerials and a laptop running the 'EDAC 300 Series Configuration Manager' software, the installer can determine which type of aerial will give best performance. The 'EDAC 300 Series Configuration Manager' and its diagnostics interface can be used to obtain an 'RSSI' (**R**elative **S**ignal **S**trength **I**ndication) reading. This reading works on a scale of 0 to 31 (zero being no signal, 31 being perfect). A minimum reading of 10 is recommended for reliable operation.

4.4.2 Mounting

Aerials need to be mounted in the highest possible position, clear of any obstructions, and preferably outside, on the exterior of a structure. If any aerial is mounted inside a steel shed for example, performance will be severely affected as the steel structure acts like a shield, blocking signal to and from the aerial. It is advisable to try the aerial in several different positions, obtaining an RSSI reading from the unit each time.

4.4.3 Cable Length

Cable length can play a critical part in the performance of an aerial. Basically the coaxial cable that connects the aerial to the device will 'drop' a portion of the signal that is transmitted. The longer the cable, the more signal will be 'dropped'. This is why keeping the cable as short as possible is important. RG58-AU coaxial will drop up to 35 percent of the signal across a 5 meter run at the common cellular frequencies. Generally we recommend using a cable that is 5m or less in length. This of course is not always practical as many aerials come pre-fitted with a length of cable. If there is spare cable left it is important to make sure this is not coiled or looped in any way, try to avoid the cable crossing over itself or any high voltage or signal cables wherever possible. This will help minimise cross-talk and interference and will maximise the performance of the aerial.

4.5 Other

4.5.1 RS-232

The EDAC 320 has one RS-232 (serial) port which is used primarily for configuration of the unit using the 'EDAC 300 Series Configuration Manager' software (see section 6 for more information on using '320 Configuration Manager'.

The RS-232 port can also be used for remote communications to external devices such as PLCs, data loggers and control panels (see section 10.3 for more information on using 'Through Mode Data Connection).

The RS-232 interface is provided via a standard DB9 connector and is fully configurable with speeds between 1200 and 57600 bps, 7 or 8 data bits, none, odd or even parity, and one or no stop bits. This allows flexibility in the types of external devices the EDAC 320 can connect to (see section 10.7 for instructions on changing serial port properties).

4.5.2 USB

One USB-B socket connector is provided as an alternative to the RS-232 port for programming the EDAC 320. The EDAC 320 has an onboard USB to RS-232 conversion chipset, which when connected to a Windows based PC via the USB port, emulates an RS-232 port on the PC This allows for communication between the 'EDAC 300 Series Configuration Manager' software and the EDAC 320 on computers where no RS-232 port is available.

See section 5.3 for instructions on installing the USB drivers required to connect the EDAC 320 to a PC via a USB port.

5. Software Installation

The following section details the process to install the 'EDAC 300 Series Configuration Manager' and 'EDAC 300 Series Remote Management' software which is used to setup, configure and remotely manage the EDAC 320. Also detailed is the process for correctly installing the EDAC 320 USB drivers.

For more information on using the 'EDAC 300 Series Configuration Manager' and 'EDAC 300 Series Remote Management' software see section 6 and section 7 respectively.

5.1 EDAC 300 Series Configuration Manager

To begin the installation process, execute the installation file located in the 'Configuration Manager' folder on the CD-ROM supplied with the product. The window in Fig. 5.1a should appear.

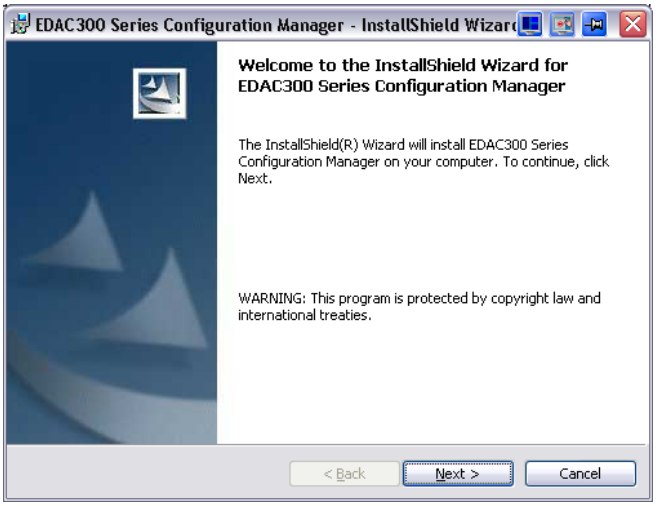

Fig 5.1a Software Installation - Starting

Click on the 'Next' button to proceed. The window shown below in Fig 5.1b will then appear.

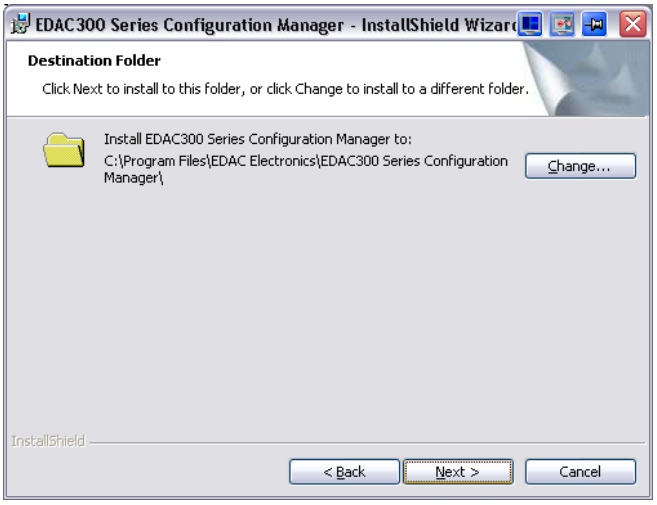

Fig. 5.1b Software Installation – Change Settings

On this window the destination directory for installation can be changed if desired. It is recommended that the default setting is used. Click 'Next' to proceed. The window in Fig 5.1c will then appear.

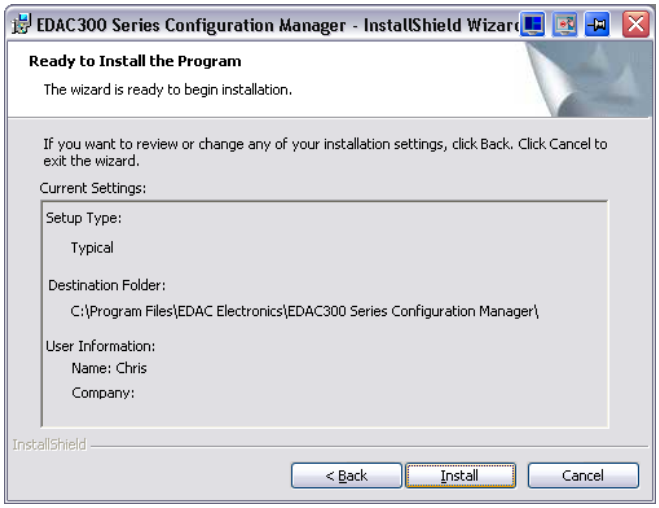

Fig 5.1c Software Installation – Check Settings

In this window the installation setting can be reviewed. Click 'Back' to go back and change any of these settings, click 'Next' to proceed. The software will now install. The following window will appear when installation is complete.

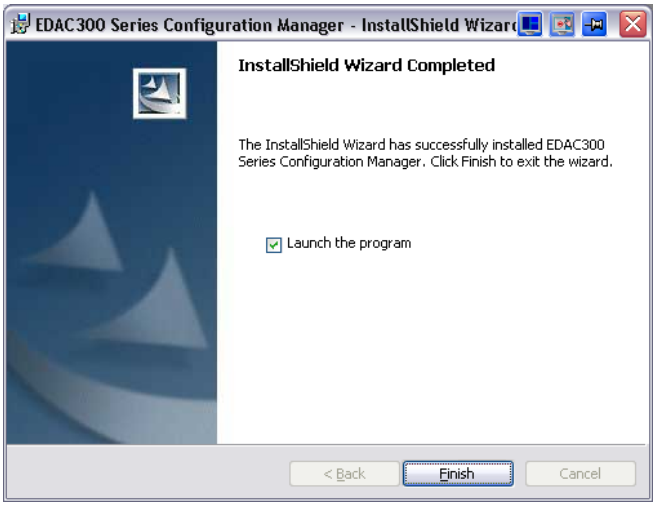

Fig. 5.1d Software Installation - Finish

Click on the 'Finish' button and the application will launch.

5.2 EDAC 300 Series Remote Management (CSD Required)

To begin the installation process for the 'EDAC 300 Series Remote Management' software, execute the *'EDAC 300 Series Remote Management Installer.exe'* file in the *'Remote Management'* Folder, located on the CD-ROM supplied with the product. The window shown in Fig 5.2a should appear. The remote management tool does not need to be installed if the cellular network does not support CSD.

Fig 5.2a Software Installation – Starting

Click on the 'Next' button to proceed. The window shown below in Fig 5.2.b will then appear.

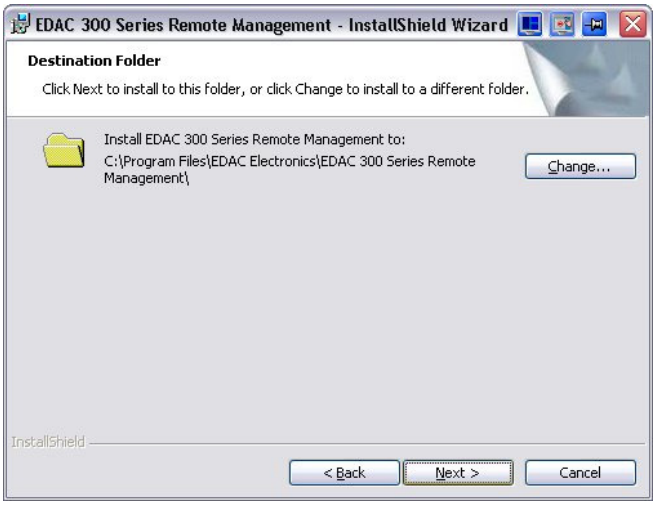

Fig 5.2b Software Installation – Change settings

In this window the destination directory for installation can be changed if desired. It is recommended that the default setting is used. Click 'Next' to proceed. The window in Fig 5.2c will then appear.

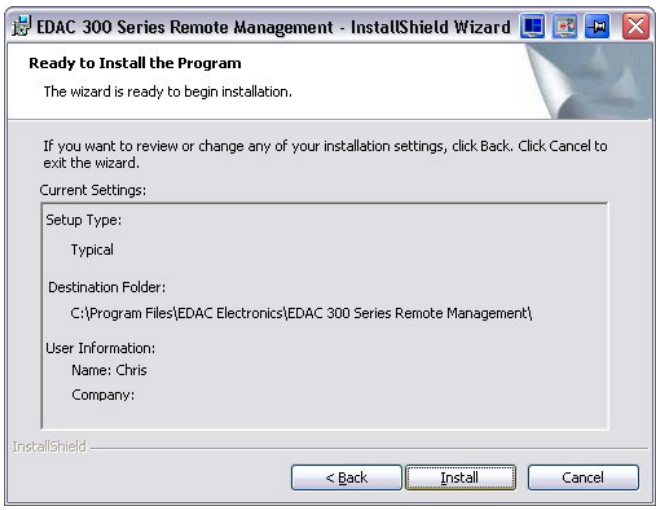

Fig 5.2c Software Installation – Check Settings

In this window the installation settings can be reviewed. Click 'Back' to go back and change any of these settings. Click 'Next' to proceed and the software will be installed. The following window will appear when installation is complete.

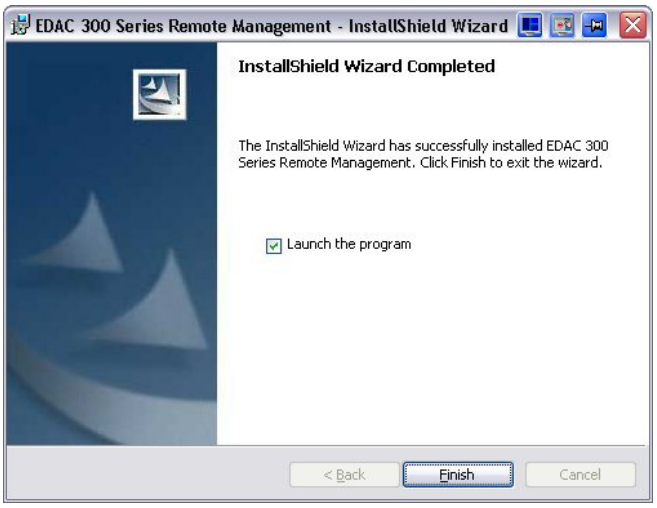

Fig 5.2d Software Installation – Finish

Click on the 'Finish' button and the installation will be complete.

5.3 USB Drivers

The EDAC 320 has one USB interface which when connected to a PC will function as a virtual COM port, allowing the EDAC 320 to communicate and be configured from PCs that do not have a genuine COM port installed.

To allow the USB interface to function correctly the USB drivers need to be installed on the PC where the EDAC 320 is to be connected. Below the instructions are detailed for installing the USB drivers on Microsoft Windows versions 98, ME, 2000, XP, XP 64bit, Server 2003 and Server 2003 64bit.

5.3.1 Windows © 98 / ME

Locate the EDAC 320 near the computer where the USB drivers are to be installed and power the unit up. Ensure the EDAC 300 Series CD-ROM included with the product is inserted into the P.C. CD-ROM drive before proceeding.

Connect the EDAC 320 to a free USB port on the PC using a USB-A to USB-B cable (not included). The PC should detect that the USB cable has been connected and show display the windows shown in Fig 5.3.1a to begin the installation process.

Fig 5.3.1a Add New Hardware Wizard

Click on the *'Next'* button to continue the process, the window shown in Fig 5.3.1b will appear prompting whether to search or specify a location.

Fig 5.3.1b – Search or specify Driver

Select the *'Search for the Best Driver for your Device (Recommended)'* option then click on the *'Next'* button to continue the process. The window shown in fig 5.3.1c will appear.

Fig 5.3.1c Specify Driver Location

In this window ensure only the *'Specify a Location'* box is ticked, click on the *'Browse'* button and locate the 'Win 98 and ME' folder on the EDAC 300 Series CD-ROM. Click on the *'Next'* button to continue., the window in Fig 5.3.1d will appear.

Fig 5.3.1d Confirm Driver installation Parameters

This window allows you to confirm the parameters for the driver installation, if any of the parameters are incorrect, press the *'Back'* button to change the settings, otherwise click *'Next'* to continue. The system will then copy the drivers from the CD-ROM onto the system. This could take several minutes depending on the speed of the PC. The window shown in Fig 5.3.1 e should then appear once the drivers have been installed.

Fig 5.3.1e Installation Complete

This window confirms the driver installation is complete, click on the *'Finish'* button to complete the installation. The operating system may ask to be restarted after the installation has finished, if so, ensure the PC is restarted before attempting to configure/use the EDAC 320.

Once installed properly the EDAC 320 functions as a virtual COM port on the PC It is necessary to check the configuration of the COM port to allow the 'EDAC 300 Series Configuration Manager' software to be programmed to access the virtual COM port (see section 6.1.2 for more information on setting up the 'EDAC 300 Series Configuration Manager' software to access COM port).

With the EDAC 320 connected to the PC via the USB cable, open the 'Control Panel' of the PC Double click on the 'System' icon. From the window that appears (shown in Fig 5.3.1f) click on the *'Device Manager'* tab.

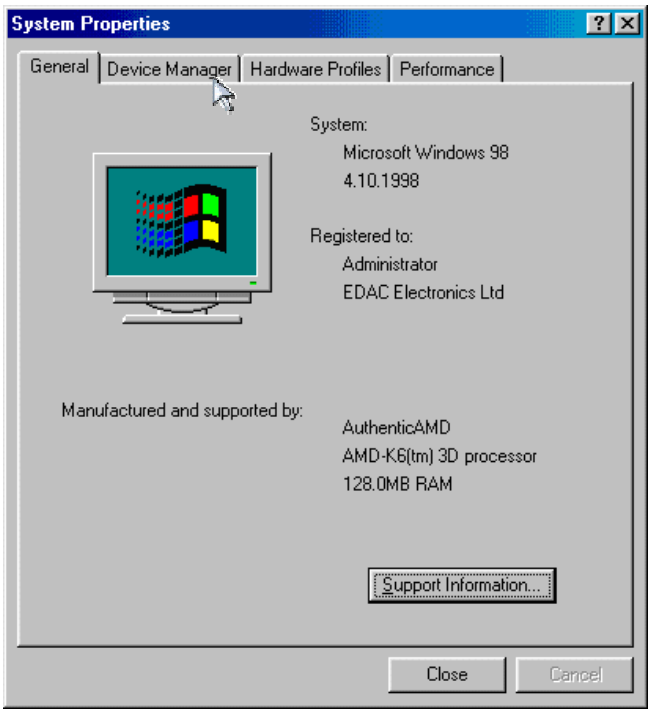

Fig 5.3.1f System Properties

The window in Fig 5.3.1g should now be shown.

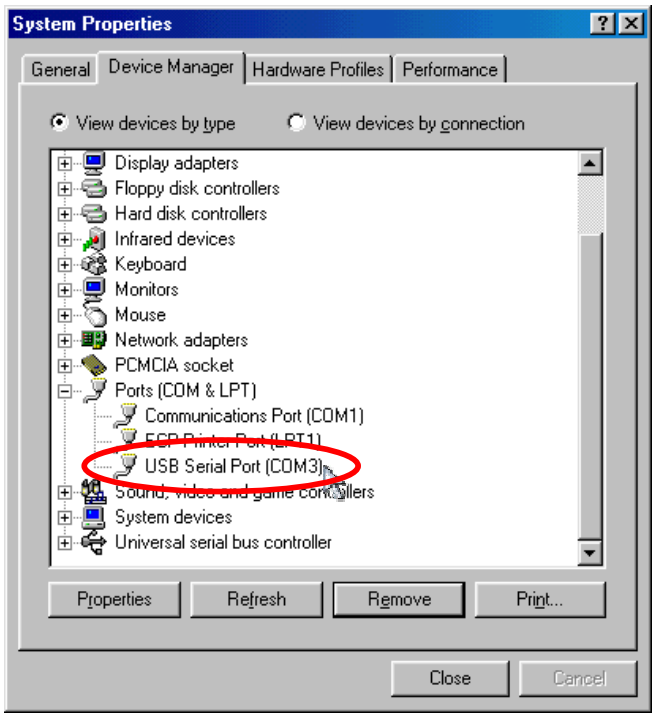

Fig 5.3.1g Device Manager

Find the *'Ports (COM & LPT)'* entry in the list and double click on it to expand. Look for the '*USB Serial Port'* heading, next to this heading as shown in Fig. 5.3.1g will be the COM port number that has been assigned to the EDAC 320 USB interface. Remember this port number, as it is required for use with the 'EDAC 320 Configuration Manager'.

Note that the port number assigned to the EDAC 320 USB interface can be changed if required. To change the port number, right click on the *'USB Serial Port'* heading and select *'Properties'*. This will open the window shown in Fig 5.31h

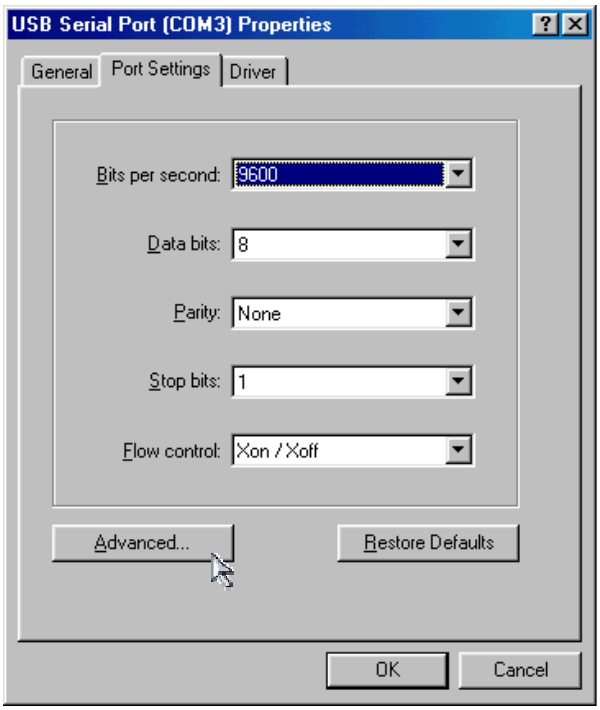

Fig 5.3.1h USB Serial Port Properties

From this window select the *'Port Settings'* tab as shown above, then click on the *'Advanced'* button. This will bring up the window shown below in Fig 5.3.1i

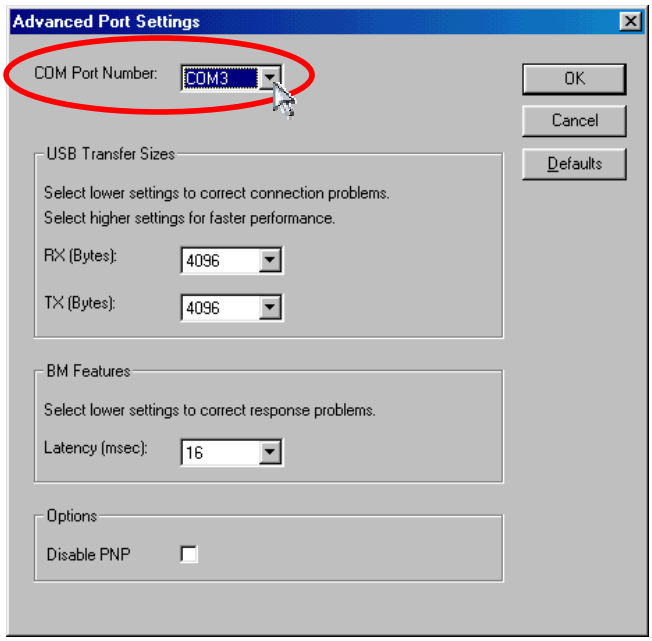

Fig 5.3.1i Advanced COM Port Properties

From this window the assigned COM port number can be changed. Ensure that if the port number is changed that a previously used port number is not assigned. Click *'O.K.'* on all properties pages to close and save settings. The system should be restarted after the port number has been changed to ensure the settings are applied properly.

5.3.2 Windows © 2000/XP/Server 2003 and Windows © XP/Server 2003 64bit edition

Locate the EDAC 320 near the computer where the USB drivers are to be installed and power the unit up. Ensure the EDAC 300 Series CD-ROM included with the product is inserted into the CD-ROM drive before proceeding.

Connect the EDAC 320 to a free USB port on the PC using a USB-A to USB-B cable (not included). The PC should detect that the USB cable has been connected and show display the windows shown in Fig 5.3.2a to begin the installation process.

Fig 5.3.2a Found New Hardware Wizard

Select the *'No, Not This Time'* button to instruct the PC not to look online for drivers, and then click *'Next'* to continue the installation process. The window in Fig 5.3.2b will then appear.

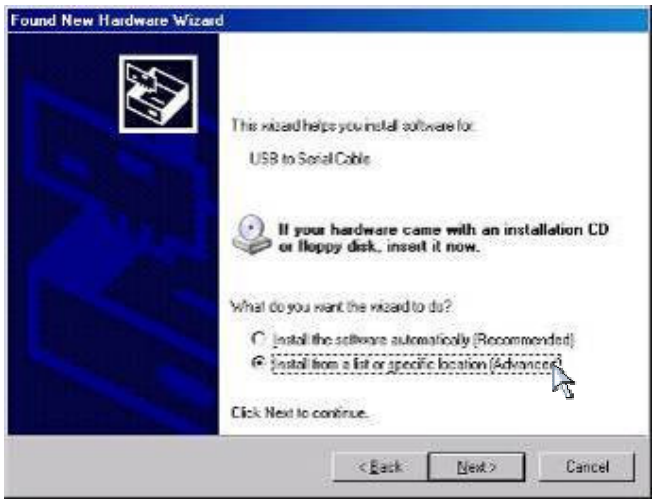

Fig 5.3.2b Search for Driver or Specify Location

In this window select the 'Install from a specific location (Advanced)' option then click 'Next'. The window shown in Fig 5.3.2c will then appear

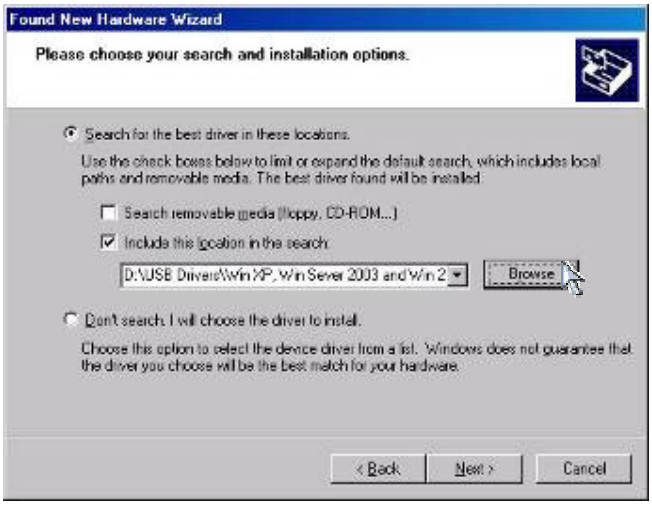

Fig 5.3.2c Locate Driver Location

In this window ensure the *'Search for the Best Driver in These Locations'* button is checked, also check the *'Include this location in the search'* tick box as shown above. Click on the *'Browse'* button and find the location of the most suited driver folder on the EDAC 300 Series CD-ROM.

Click on *'Next'* to proceed. The window shown in Fig 5.3.2d will then appear.

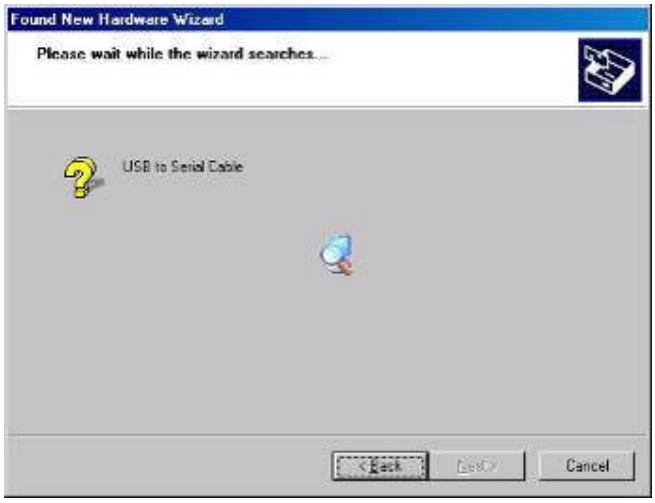

Fig 5.3.2d Searching for Best Driver

The PC will then search the PC for the best driver for the USB interface. This process could take up to 5 minutes depending on the speed of the PC Once the PC has found the driver it will copy the driver files from the CD-ROM then display the window shown in Fig 5.3.2e

Fig 5.3.2e Finished Installation

Click the *'Finish'* button to complete the installation. The operating system may ask to be restarted after the installation has finished, if so, ensure the PC is restarted before attempting to configure/use the EDAC 320.

Once installed properly the EDAC 320 functions as a virtual COM port on the PC It is necessary to check the configuration of the COM port to allow the 'EDAC 300 Series Configuration Manager' and 'EDAC 300 Series Remote Management' software to be programmed to access the virtual COM port (see section 6.1.2 for more information on configuring software to access COM port).

With the EDAC 320 connected to the PC via the USB cable, open the 'Control Panel' of the PC Double click on the 'System' icon. From the window that appears (shown in Fig 5.3.2f) click on the *'Hardware'* tab, and then click on the *'Device Manager'* button.

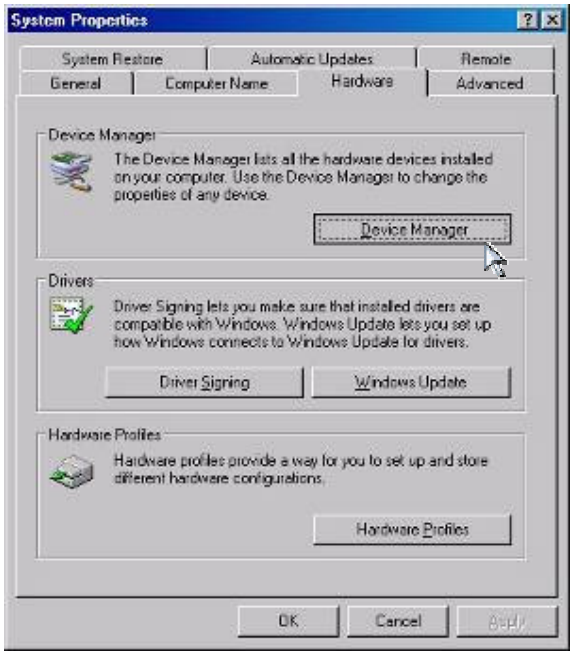

Fig 5.3.2f System Properties

A *'Device Manager'* window similar to the one shown in Fig 5.3.2g should then appear.

Fig 5.3.2g Device Manager

From the *'Device Manager'* expand the *'Ports (COM & LPT)'* heading, Look for the '*USB Serial Port'* heading, next to this heading as shown in Fig. 5.3.2h will be the COM port number that has been assigned to the EDAC 320 USB interface. Remember this port number, as it is required for use with the 'EDAC 300 Series Configuration Manager'.

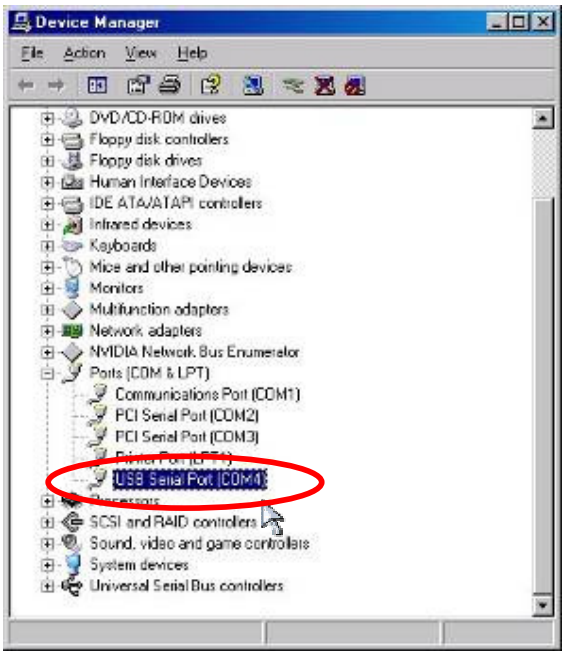

Fig 5.3.2h Device Manager - COM Ports

Note that the port number assigned to the EDAC 320 USB interface can be changed if required. To change the port number, right click on the *'USB Serial Port'* heading and select *'Properties'*. This will open the window shown in Fig 5.3.2i

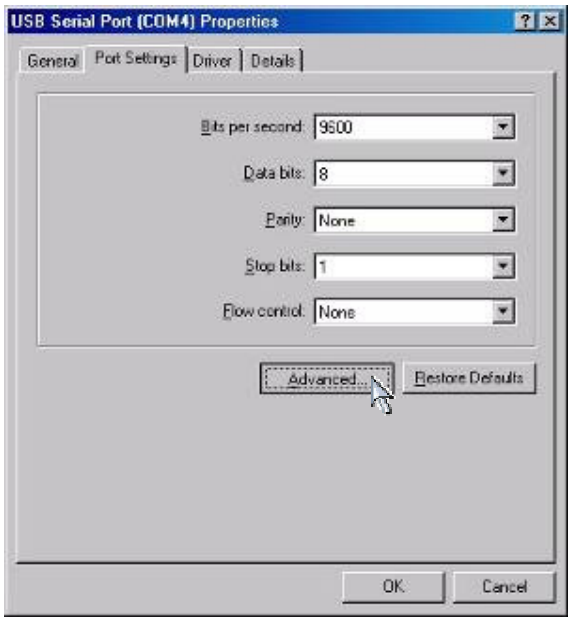

Fig 5.3.2i COM Port Properties

From this window select the *'Port Settings'* tab, then click the *'Advanced'* button. The widow in Fig 5.3.2j will appear.

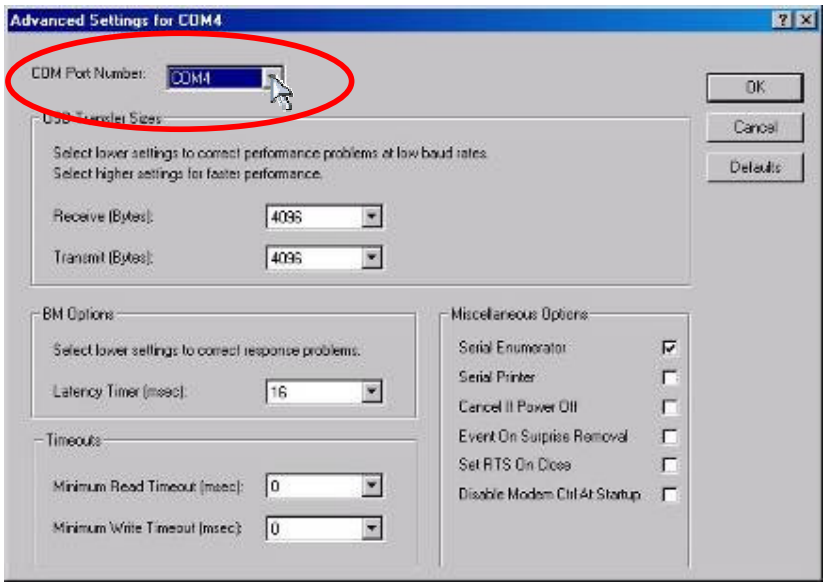

Fig 5.3.2j Advanced COM Port Settings

From this window the assigned COM port number can be changed. Ensure that if the port number is changed that a previously used port number is not assigned. Click *'O.K.'* on all properties pages to close and save settings. The system should be restarted after the port number has been changed to ensure the settings are applied properly.

6. EDAC 300 Series Configuration Manager

EDAC 300 Series products (including the EDAC 320, SMS 300 and 315) are configured using 'EDAC 300 Series Configuration Manager', a software interface custom designed for the EDAC 300 series family of products. This software runs on a Windows based P.C. and connects to the EDAC 320 via an RS-232 (Serial) or USB connection. The 'EDAC 300 Series Configuration Manager' is used to configure all aspects of the unit's functionality. 'EDAC 300 Series Configuration Manager' supports Windows © 98, 98SE, 2000 and XP Home SP2 and XP Pro SP2 operating systems.

The 'EDAC 300 Series Configuration Manager' provides the option of loading and saving configurations to file, as well as uploading and downloading configurations to and from a unit. A diagnostics interface is provided which reports the current status of all aspects of the unit. This includes input and outputs status as well as network connection status.

The 'EDAC 300 Series Configuration Manager' also supports remote configuration and diagnostics for all EDAC 300 series products running version 3.0 firmware or greater **via a dial up CSD connection** (see section 3.1.1 for more info on CSD). A Windows dial-up modem must be properly installed on the host P.C. to support this function.

Important Note: The EDAC 320 requires an SD card and SIM to be installed, and be connected to a cellular network before using the configuration manager.

6.1 Setup

Before being used the 'EDAC 300 Series Configuration Manager' software must be configured correctly for the type of product being used, and the method being used to connect to the unit.

6.1.1 Product Type

Launch the 'EDAC 300 Series Configuration Manager' software either from the shortcut on the desktop or from the 'Start' menu.

From the 'Settings' menu select the 'Product Type' option as shown in Fig 6.1.1a below.

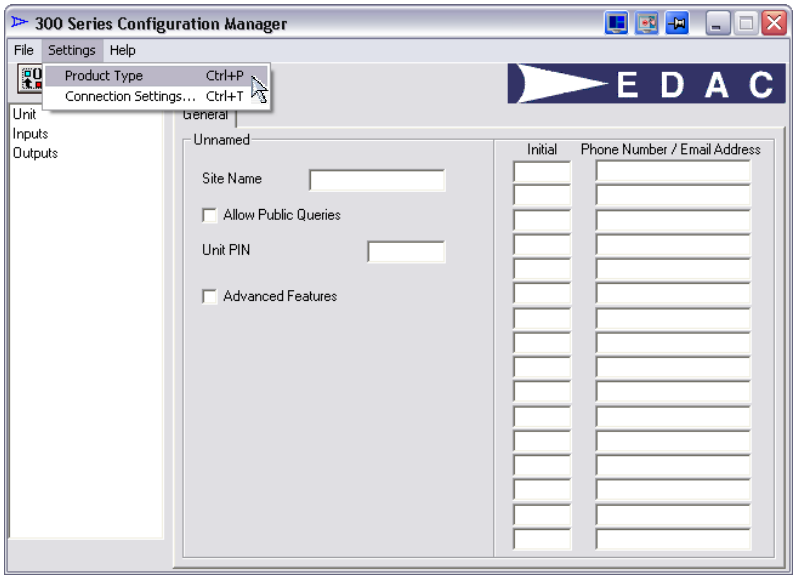

Fig 6.1.1a 300 Series Configuration Manager

This will then bring up the following 'Product Selection Form' window, from here select the '320 v3' product type (or the appropriate type for the product you wish to configure, this software will configure all types and versions of the EDAC 300 Series family) and click on 'O.K.' to save changes and close the window.

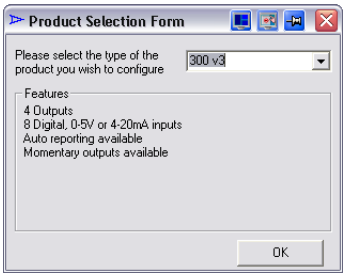

Fig 6.1.1b Product Selection Form

6.1.2 Connection Settings

The 'EDAC 300 Series Configuration Manager' must be configured for the type of connection it is going to use for communication to the EDAC 320 product. Note that the 'EDAC 300 Series Configuration Manager' software can connect using either a local RS-232 serial port, a local USB port or remotely via a dial up CSD (or **C**ircuit **S**witched **D**ata) connection (see section 3.1.1 or more information on requirements for CSD data.

Also note that for CSD connections, a properly installed Windows dial-up modem, connected to a working PSTN telephone line is required on the P.C. system where the 'EDAC 300 Series Configuration Manager' software is installed.

To set the connection type select the 'Settings -> COM Settings' menu from the top of the main window a shown in Fig 6.1.2a or use the keyboard shortcut 'CTRL+T'.

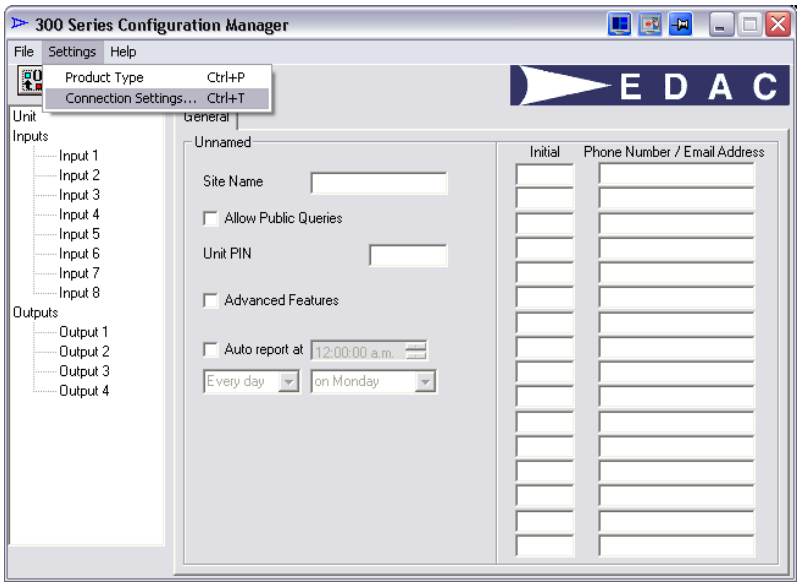

Fig 6.1.2a EDAC 300 Series Configuration Manager

The window in Fig. 6.1.2b will appear. Select the COM port, or the Windows dial-up modem to be used to connect to the EDAC 320.

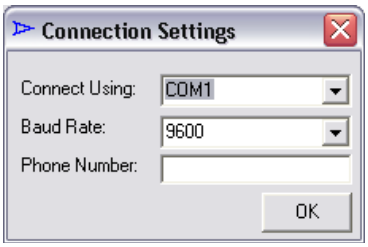

Fig 6.1.2b Connection Settings – COM Port

If a COM port is selected choose the baud rate for the connection from the 'Baud Rate' list. Note that by default the RS-232 COM port on the EDAC 320 is set to work at '9600'. This setting should not be changed unless the COM port on the EDAC 320 has been configured to work at a different speed (see section 10.7 for more information on changing the RS-232 COM port properties)

If a Windows dial-up modem is selected as shown in Fig 6.1.2c, enter the CSD number (see section 3.1.1 for more information on CSD data numbers) of the remote unit that is to be configured, in the phone number field.

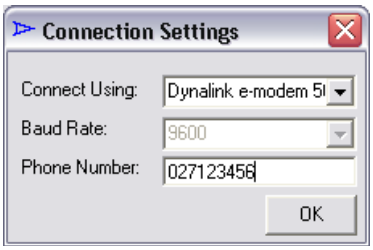

Fig 6.1.2c Connection Settings - Modem

6.2 Main Features

The 'EDAC 300 Series Configuration Manager' software has the ability to upload and download configurations to and from the EDAC 320 via a serial or USB connection to the unit. It can also load and save configuration to a file on the PC as well as displaying real time diagnostics information about the EDAC 320 unit connected to the PC.

Note that there are five buttons along the top of the main configuration manager window shown in Fig 6.2. These five buttons active the main features of the 'EDAC 300 Series Configuration Manager' software mentioned above.

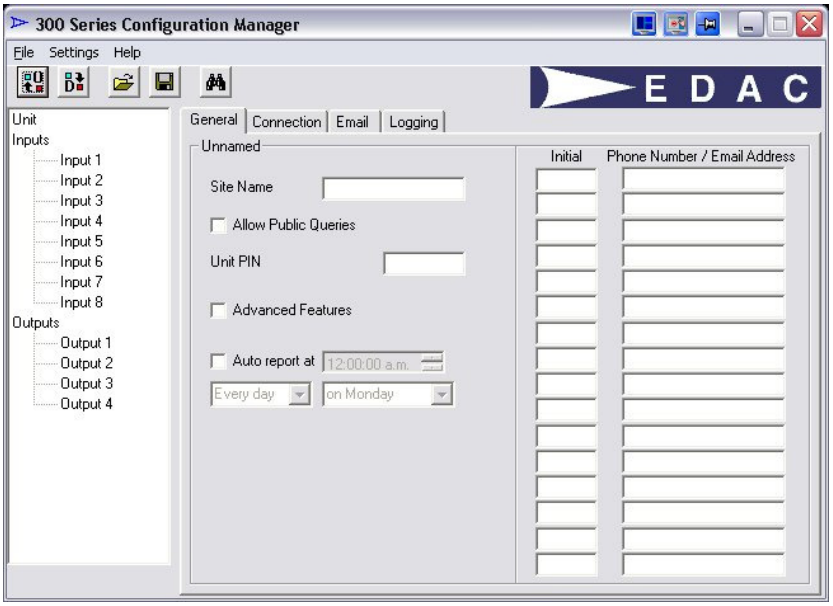

Fig 6.2 Main Config Window

- 

  Upload
  This button will fetch the configuration from the EDAC 320 unit currently connected to the PC and load it into the 'EDAC 300 Series Configuration Manager' software. Note that this will overwrite any configuration currently in the software.

- 

  Download
  This button will load the configuration from the 'EDAC 300 Series Configuration Manager' software into the 320 unit currently connected to the PC. Note that this will overwrite the previous configuration in the EDAC 320.

- 

  Open
  This button will open a dialog to load a configuration form a previously saved file. Note that this will overwrite any configuration currently in the software.

- 

  Save
  This button will save the configuration currently in the 'EDAC 300 Series Configuration Manager' software to a file on the PC hard drive. The software uses the *.320 file extension for EDAC 320 configuration files. The save button will save files to the installation directory on the hard drive. The save a file to a specific location use the 'Save as….' option from the 'File' menu.

- **Diagnostics**
  This button switches to the diagnostics page and starts diagnostics running. The diagnostics interface shows information about the EDAC 320 unit that is currently connected to the PC. This information included the status and reading from all of the inputs and outputs, as well as network connection, GPRS status and cellular signal strength.

6.3 Unit Page

The diagram in Fig 6.3 below shows the 'Unit Page' of the 'EDAC 300 Series Configuration Manager' software. This page can be accessed from any screen of the software by clicking on the 'Unit' branch of the tree on the left hand side of the screen (as circled in red). Note that the text used to identify the unit page in the list on the left hand side of the screen will change when the 'Site Name' filed is filled out (see section 6.3.1 for information on the 'Site Name' field).

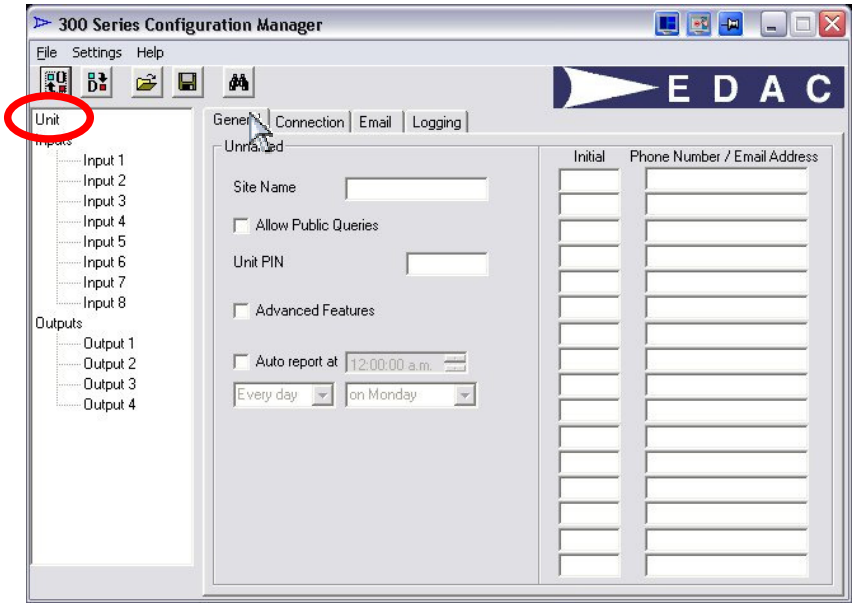

Fig 6.3 Unit Page

From the 'Unit Page', four tabs are accessible, the 'General' tab where site name, contact list and auto reporting options are set, the 'Connection' tab where cellular network APN and TCP/IP settings are configured, the 'Email' tab where options for sending and receiving email are entered and the 'Logging' tab where global logging options are configured.

6.3.1 'General' Tab

The 'General' tab is where global and contact list information for the unit is filled out. The '*General*' tab can be displayed by selecting the left most tab from the 'Unit' page of the software.

- **Site Name**
  The 'Site Name' is the text which is included at the beginning of every outgoing message from the EDAC 320. This normally identifies the location or the owner of the unit.

- **Allow Public Queries**
  This option allows the unit to reply to queries from any cellphone. If this option is not selected the unit will only reply to phone numbers that are programmed in the contact list. If this option is selected it will reply to queries from all phones (see section 8.3 and section 8.4.1 for more information on sending queries).

- **Unit PIN**
  The unit PIN defines the PIN that is used when switching outputs. If a PIN is defined then it must be included at the beginning of all output switching and contact change messages. The PIN number must be 4 digits long and should match any PIN enabled on the SIM card (see section 3.1 for more information on SIM PINs). The PIN can also be modified remotely via SMS (see section 8.4.9). The PIN can also be reset by contacting EDAC if required.

- **Phone Numbers / Email Addresses**

This is where the contacts that will be sending messages to and receiving messages from the unit are listed. Cellular phone numbers and email addresses can be entered here in any order or combination.

The primary contact is entered in the first space in the list. This is the user that will receive system and forwarded network notification messages. Enter the cellphone number of the primary user into the contact at the top of the list.

The other contact fields are where the cellphone numbers of other contact are entered. Note that these contacts can also be other EDAC 320 devices when using the remote output switching features (see section 10.3 for more information on configuring automatic remote output switching).

Note: It is recommended that alarm messages sent to email addresses are only used as a backup or in addition to SMS alarms.

- **Contact Initials**
  This field allows three initials to be assigned to each contact. These initials are used on other pages of the 'Configuration Manager' and can help identify the contact on pages where the actual number is not shown (such as the 'Alarm A' page)

- **Advanced Features**
  Selecting this box enables automatic output switching. see section 10.4 and section 10.5 for more information on automatic output switching).

- **Auto Report at**
  Selecting this check box enables the auto reporting feature. Select the time, frequency and period for the Auto Report messages (see section 10.1 for more information on 'Auto Reporting')

6.3.2 'Connection' Tab

The 'Connection' tab is where settings for the EDAC 320's PSD connection are entered. These settings must be entered correctly for PSD enabled features to function correctly (see section 3.1.2 for more information on PSD enabled features). The 'Connection' tab is shown in Fig 6.3.2.

Note that the 'EDAC 300 Series Configuration Manager' software comes included with two files containing the default PSD settings, one for Vodafone NZ, the other for Telstra Australia. It is recommended that new configurations are started from these default files. Use the 'Open' feature (see section 6.2) of the software to open either of these files from the installation directory.

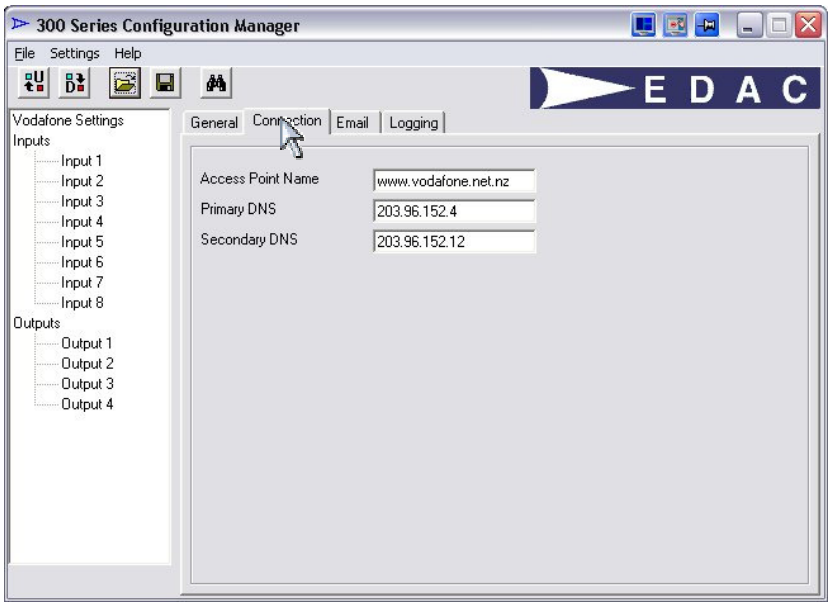

Fig 6.3.2 Connection Tab

- **Access Point Name**
  The 'Access Point Name' field is where the name/address of the link between the host cellular network and the internet is entered. This field MUST be correctly filled out for GPRS enabled features to function.

- **Primary DNS**
  The 'Primary DNS' field details the primary DNS server address used by the host cellular network

- **Secondary DNS**
  The 'Secondary DNS' field details the secondary DNS server address used by the host cellular network

The following table (6.3.2a) details the settings that should be entered on this tab for Telstra Australia and Vodafone NZ.

Carrier	Access Point Name	Primary DNS	Secondary DNS
Telstra (Australia)	telstra.internet	139.130.4.4	203.50.2.71
Vodafone (New Zealand)	www.vodafone.net.nz	202.73.198.15	202.73.206.16

Table 6.3.2a Connection Setting

DNS addresses for other carriers, if available, can be obtained by contacting the carrier. The google free DNS service may be used on any carrier, the IP addresses for the google DNS are 8.8.8.8 and 8.8.4.4.

6.3.3 'Email' Tab

The 'Email' tab details settings for outgoing and incoming email for the EDAC 320 unit. The diagram in Fig 6.3.3 shows the 'Email' tab which can be accessed from the 'Unit' Page.

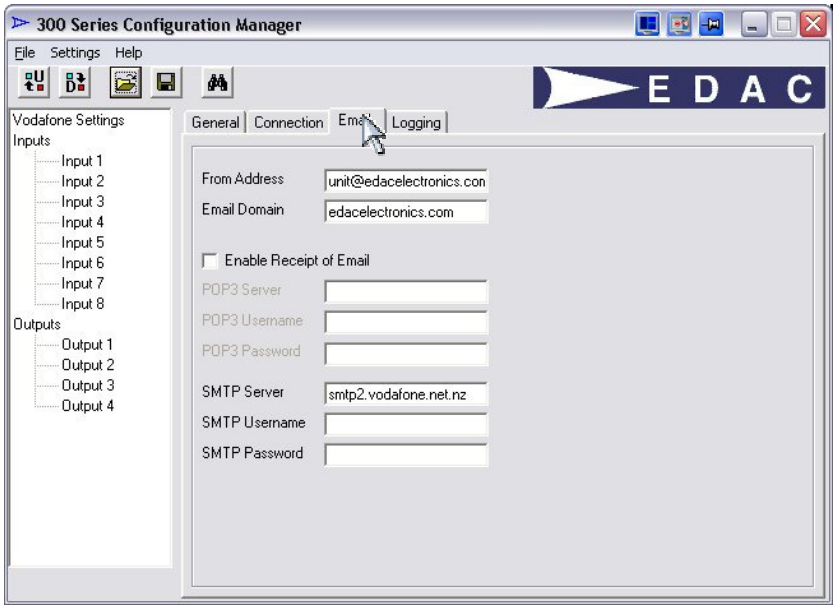

Fig 6.3.3 Email Settings

- **From Address**
  This field contains the email address that will be used as the 'From Address' in all outgoing emails from the EDAC 320. Note that this does not necessarily need to be an active email address if one is not able to be dedicated to the unit, however any email sent from the unit the is bounced or undeliverable will cause an error report be sent back to this address. If an active email address is not able to be dedicated to the unit, it is recommended that an active personal account is used here to ensure any email error reports are delivered

- **Email Domain**
  The email domain is sometimes used by outgoing (SMTP) mail servers to verify that the 'From Address' is valid. Enter everything after the '@' symbol in the 'From Address' field into the 'Email Domain' field

- **Enable Receipt of Email, POP3 Server, POP3 Username, POP3 Password**
  Not currently supported in EDAC 320 series.

- **SMTP Server**
  This field contains the address of the SMTP (outgoing) mail server. The address of this server is specific to the cellular network that the EDAC 320 is connected to. Listed below, is a table containing the SMTP server addresses for approved cellular networks. A custom, public SMTP server may be configured if available. The following table (6.3.3a) details the SMTP Server address and port number for Telstra Australia, 2degrees Mobile NZ, Telecom XT NZ and Vodafone NZ.

Carrier	SMTP Server Address	SMTP Port
Telstra (Australia)	mail.bigpond.com	25
2degrees (New Zealand)	smtp.2degreesmobile.net.nz	25
Telecom XT (New Zealand)	smtp.xtra.co.nz	25
Vodafone (New Zealand)	smtp2.vodafone.net.nz	25

Table 6.3.3a SMTP Server Addresses and Port Numbers

- **SMTP Username**
  This field contains the SMTP username required for SMTP servers that require authentication. Most SMTP servers (i.e. Vodafone NZ, Telstra Australia and Vodafone Australia) do not require SMTP authentication. Leave the field blank if authentication is not required. A custom, public SMTP server may be configured if available.

- **SMTP Password**
  This field contains the SMTP password required for SMTP servers that require authentication. Most SMTP servers (i.e. Vodafone NZ, Telstra Australia and Vodafone Australia) do not require SMTP authentication. Leave the field blank if authentication is not required. A custom, public SMTP server may be configured if available.

6.3.4 'Logging' Tab

The 'Logging' tab contains configuration information for the global logging settings for the EDAC 320. Shown below in Fig 6.3.4 is the 'Logging' tab page. Note that these settings configure global options for logging only and do not actually enable logging for each specific input. See section 6.4.1 and section 6.4.2 for details on enabling logging on each particular input.

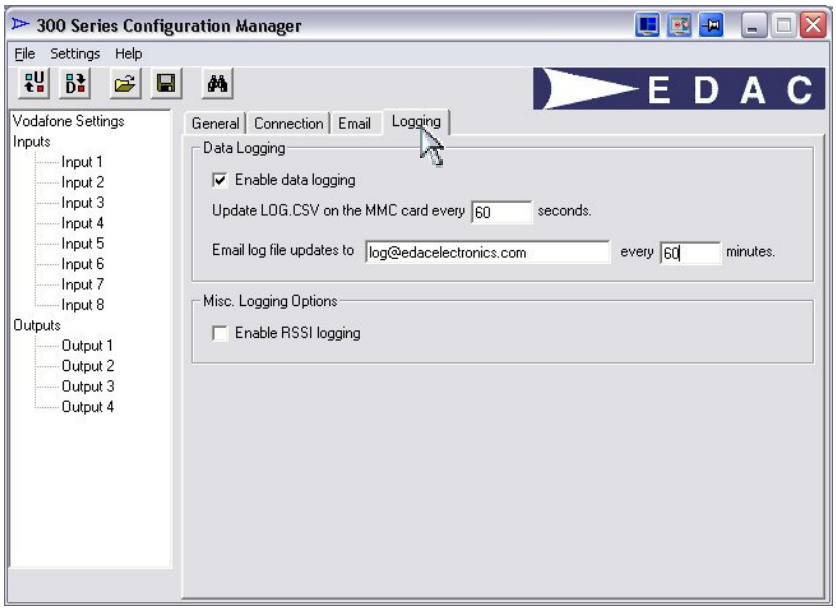

Fig 6.3.4 'Logging' Tab

- **Enable Data Logging**
  Ticking this box enables the data logging features of the EDAC 320. This box must be selected for any of the following settings/options to become active.

- **Update LOG.CSV on the MMC card every <time> seconds**
  This option sets the global logging rate for all inputs. The time entered here (in seconds between 5 and 86,400) is the interval at which the inputs are scanned, logged and the information is written to the data card.

- **Email log file updates to <email address> every <time> minutes**
  This option configures the automatic log file email update feature. Enter the email address that is to receive the log file update, and the interval at which they are to be emailed. Each email update will contain all information logged since the last email update.

- **Enable RSSI Logging**
  Enabling this option by ticking the box will cause the RSSI (or **R**elative **S**ignal **S**trength **I**ndicator) to be logged to the data card, at the logging interval defined in the 'Update LOG.CSV on the MMC card every <time> seconds' setting, along with other readings from the inputs.

6.4 Inputs

The 'Input' pages configure the input options for the EDAC 320 and can be accessed by clicking the appropriate tree branch for the input that is to be configured on the left hand side of the 'EDAC 300 Series Configuration Manager' software .

6.4.1 320 'Input' tab

The 'Input' tab configures the input sensor type options and input specific logging features of each input on the EDAC 320. Click on the 'Input' tab to access this page in the 'EDAC 300 Series Configuration Manager' software as shown in Fig 6.4.1 below.

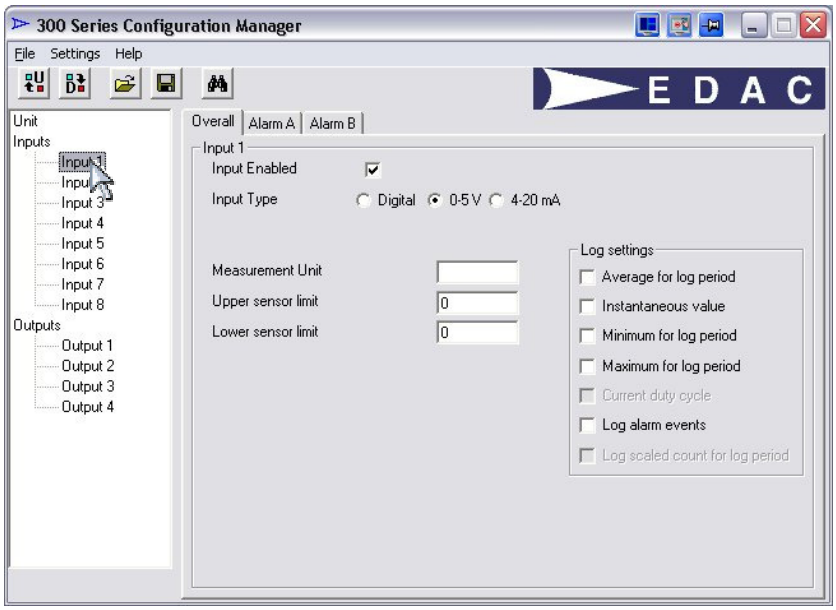

Fig 6.4.1 320 Input Configuration Options

- **Input Enabled**
  Tick this box to enable the input. All other options will be greyed out and unavailable until this box is ticked.

- **Input Type**
  Select the type of sensor to be connected to this input, digital, 0-5V or 4-20mA.

- **Measurement Unit (0-5V and 4-20mA Analogue only)**
  Enter the engineering units (or the measured units) of the sensor connected to this input (i.e. V for volts, *C for temperature or %RH for humidity). The contents of this field will be suffixed to the reading from the sensor when its value is displayed on the diagnostics screen or sent to a user e.g. 'Temp Alarm 2.3*C'.

- **Upper Sensor Limit (0-5V and 4-20mA Analogue only)**
  Enter the upper sensor unit limit in this field, or the actual measured value at 20mA or 5V.

- **Lower Sensor Limit (0-5V and 4-20mA Analogue only)**
  Enter the lower sensor unit limit in this field, or the actual measured value at 4mA or 0V.

- **Duty cycle for log period (Data Logging Enabled and Digital only)**
  Enabling this option will cause the duty cycle (ratio of closed to open calculated by dividing the time that the digital input is closed, by the time that the input is open) of the digital input over the log update period to be logged to the data card.

- **Average for log period (Data Logging Enabled only)**
  Enabling this option will cause the value, averaged over the log update period, to be logged to the data card.

- **Instantaneous value (Data Logging Enabled only)**
  Enabling this option will cause the instantaneous value (at the end of each log period) to be logged to the data card.

- **Minimum for log period (Data Logging Enabled and 0-5V and 4-20mA Analogue only)**
  Enabling this option will cause the lowest value recorded during the log update period to be logged to the data card.

- **Maximum for log period (Data Logging Enabled and 0-5V and 4-20mA Analogue only)**
  Enabling this option will cause the highest value recorded during the log update period to be logged to the data card.

- **Current duty cycle (Data Logging Enabled and Digital only)**
  Enabling this option will cause the duty cycle (ratio of closed to open calculated by dividing the time that the digital input is closed, by the time that the input is open) of the digital input over the last whole minute to be logged to the data card.

- **Log Alarm Events**
  Enabling this option will cause all alarm and reset event from this input to be logged to the 'ALARM.TXT' file on the data card. These events will be time and date stamped before being logged (i.e. at actual time of event).

6.4.2 321 'Input' Tab

As the EDAC 321 has pulse frequency counter capability on Inputs 7 and 8, when the 'EDAC 300 Series Configuration Manager' software 'Product Type' is set to '321 v3' (see section 6.1.1 for more information on setting the 'Product Type'), inputs 7 and 8 will appear with different options than the rest of the inputs.

Fig 6.4.2 shows the input configuration page for the EDAC 321.

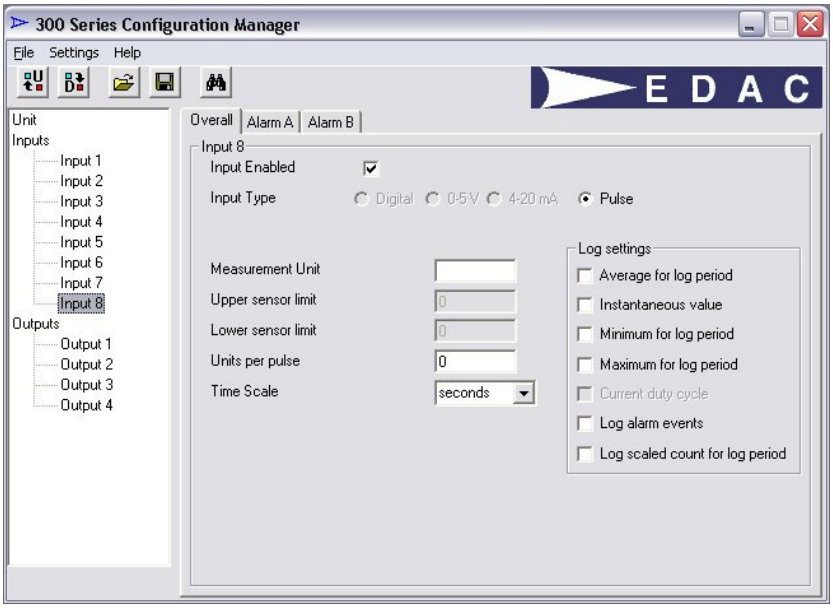

Fig 6.4.2 Pulse Input Configuration Options

- **Input Enabled**
  Tick this box to enable the input. All other options will be greyed out and unavailable until this box is ticked.

- **Measurement Unit**
  Enter the engineering units (or the measured units) of the sensor connected to this input (i.e. L for litres). The contents of this field will be suffixed to the reading from the sensor when its value is displayed on the diagnostics screen or sent to a user e.g. '34.5 l/s'.

- **Units Per Pulse**
  Enter how many real world units are being counted for every pulse that the EDAC 321 will receive (i.e. 100 Litres per Pulse). This value acts as a scaling factor for the pulse, multiplying the number of pulse received by this value when calculating totalised counts and count rate readings.

- **Time Scale**
  Select the time scale to be used when calculating count rate readings, either 'Seconds', 'Minutes' or 'Hours'. (i.e. 100L/s, 100L/m or 100L/h)

- **Average for log period (Data Logging Enabled only)**
  Enabling this option will cause the count rate value, averaged over the log update period, to be logged to the data card.

- **Instantaneous value (Data Logging Enabled only)**
  Enabling this option will cause the instantaneous count rate value (at the end of each log period) to be logged to the data card.

- **Minimum for log period (Data Logging Enabled only)**
  Enabling this option will cause the lowest count rate value recorded during the log update period to be logged to the data card.

- **Maximum for log period (Data Logging Enabled)**
  Enabling this option will cause the highest count rate value recorded during the log update period to be logged to the data card.

- **Log Alarm Events**
  Enabling this option will cause all alarm and reset event from this input to be logged to the 'ALARM.TXT' file on the data card. These events will be time and date stamped before being logged (i.e. at actual time of event).

- **Log Scaled Count for Log Period (Data Logging Enabled)**
  Enabling this option will cause the scaled totalised count for the log update period to be logged to the data card.

6.4.3 'Alarm A' Tab

The 'Alarm A' tab configures the alarm settings and notifications messages for each input on the EDAC 320. This page can be accessed by clicking on the 'Alarm A' tab from the input tree branch.

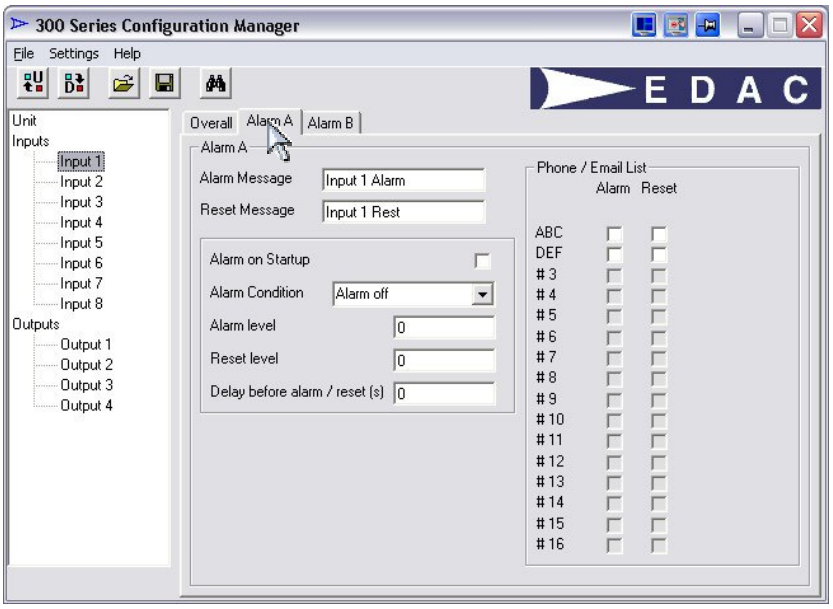

Fig 6.4.3 'Alarm A' Tab

- **Alarm Message**
  This is the message that will be sent to the users when this input goes into an 'Alarm State'. If an analog sensor is being used, the actual scaled reading and the measurement unit will be appended to this message. (40 char max)

- **Reset Message**
  This is the message that will be sent to the users when this input goes into a 'Reset State'. If an analogue sensor is being used, the actual scaled reading and the measurement unit will be appended to this message. (40 char max)

- **Alarm Condition**
  Select the physical state of this input that indicates an alarm condition. If this input is configured as digital, 'Alarm Off', 'Alarm when open' and 'Alarm when closed' options will be available. If a 0-5V or 4-20mA analogue is configured, 'Alarm Off', 'Alarm Above' and 'Alarm Below' options will be available.

  'Alarm Off' means the input will never generate alarm messages. The input will function in a reporting scenario, its readings will only be transmitted when the unit is queried.

  'Alarm when Open' (Digital Inputs Only) means the input will be in alarm state when the digital contact is open and in reset state when the digital contact is closed.

  'Alarm when Closed' (Digital Inputs Only) means the input will be in alarm state when the digital contact is closed and in reset state when the digital contact is open.

  'Alarm Above' (0-5V, 4-20mA Analogue Inputs and Pulse* Inputs) means the input will be in alarm state when the reading is above the set point, and will be in reset state when the reading is below the reset point.

  'Alarm Below' (0-5V, 4-20mA Analogue Inputs and Pulse* Inputs) means the input will be in alarm state when the reading is below the set point and will be reset when the reading is above the reset point.

- **Alarm on Start-up**
  The EDAC 320 monitors and records the current state of all configured inputs. If this option is selected on power up the EDAC 320 unit will compare the current state of the input with the last know state, and will send the appropriate message if it has changed. If this option is not selected the EDAC 320 will not send notification messages on power-up. **It is recommended that Alarm on Start-up is always enabled.**

- **Alarm Level (0-5V, 4-20mA Analogue Inputs and Pulse* Inputs)**
  Enter the real world value where the input will go into 'Alarm state'.

- **Reset Level (0-5V, 4-20mA Analogue Inputs and Pulse* Inputs)**
  Enter the real world value where the input will go into 'Reset state'.

- **Delay before Alarm/Reset**
  This option allows a time to be programmed, that the alarm/reset condition must be present for, before notifications messages will be sent. If the alarm/reset condition is removed before this time elapses, no notification messages will be sent. This allows for a de-bounce time to be programmed, which may help to eliminate false alarms. Enter the value in this field in seconds.

* Pulse Input Alarms use the instantaneous frequency which is disabled during file operations. It is recommended that the Delay before Alarm/Reset to be set to at least 1s.
IMPORTANT NOTE: The instantaneous pulse frequency is not calculated during file operations and as a result pulse inputs will not alarm or reset during the regular log update email sending process.

- **Contacts**
  Select the appropriate boxes for the contacts that are to receive alarm and reset messages for this input. Note that any combination of alarm and reset messages can be assigned to any user. The 'Alarm' and 'Reset' boxes should be used where the contact is a user, and the 'Remote Output (Alarm)' and 'Remote Output (Reset)' boxes should be used where the contact is another EDAC 320 unit (see section 10.5 for more information on 'Automatic Remote Output Switching').

- **On Alarm Condition (Advanced Features Enabled Only)**
  This feature gives the option of automatically switching outputs when this input goes into alarm condition. From the first drop down box select the output that is to be switched when this input goes into alarm condition. From the second box select whether the output is to be switched 'On' or 'Off' when this input goes into alarm condition.

- **Switch Local Output on Alarm (Advanced Features Enabled Only)**
  Select this check box if you wish to switch an output on this unit when this input goes into alarm state. If the output you wish to switch is on a second, remote unit, then the phone number of the remote unit needs to be entered into the contact list and the appropriate 'Remote Output' contact notification boxes need to be ticked (see section 10.5 for more information on 'Automatic Remote Output Switching').

- **On Reset Condition (Advanced Features Enabled Only)**

This feature gives the option of automatically switching outputs when this input goes into reset condition. From the first drop down box select the output that is to be switched when this input goes into reset condition. From the second box select whether the output is to be switched 'On' or 'Off' when this input goes into reset condition.

- **Switch Local Output on Reset (Advanced Features Enabled Only)**
  Select this check box if the output you wish to switch, when this input goes into reset state, is local (or is on same unit). If the output you wish to switch is on a second, remote unit, then the phone number of the remote unit needs to be entered into the contact list and the appropriate 'Remote Output' contact notification boxes need to be ticked.

6.4.4 'Alarm B' Tab (0-5V and 4-20mA Analogue Only)

The 'Alarm B' tab contains an identical set of fields to the 'Alarm A' tab. The 'Alarm B' tab can be used to set up a second set of messages, contacts and alarm/reset points on the one input channel. This allows for a 'minor alarm' and 'major alarm' scenario to be configured.

6.5 Outputs

The settings for each output are found on the 'Output 1, 2, 3, and 4' trees as pictured in Fig 6.5 below.

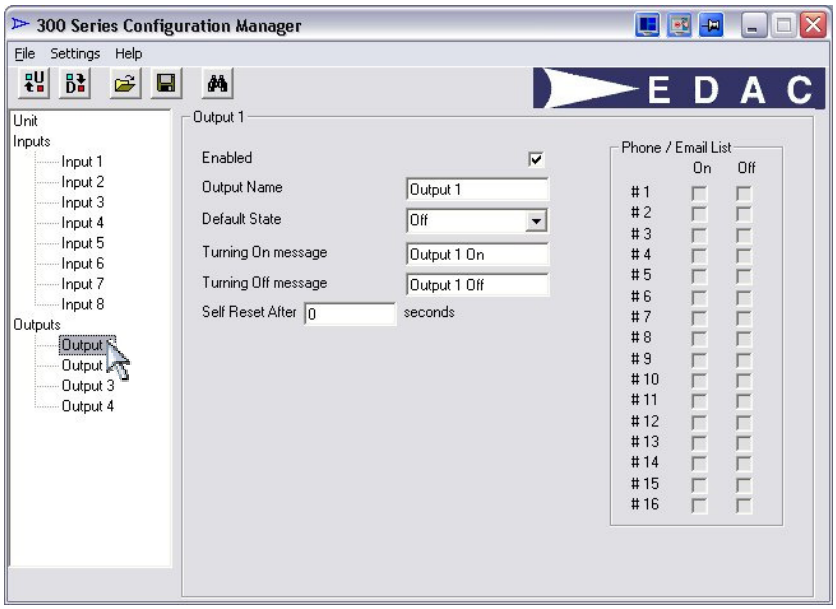

Fig 6.5 Output Configuration

- **Enabled**
  Tick this box to enable the output. All other options will be greyed out and unavailable until this box is ticked.

- **Output Name**
  Enter a name for this output in this box. This name is used in the configuration interface, but can also be used in the switching message for this output (see section 8.2 for more information on controlling outputs).

  For example: If output name is: "Pump"
  Then output switch command might be: "PIN# Pump on"

  Each name must be unique and cannot be the same as another output on the same unit.

- **Power On State**
  This assigns what state the output will be in when the unit is powered up, whether it is due to the unit suffering power loss, or if it is the first power up.

- **Turning On Message**
  This is the message which is sent to the contacts when the output is turned on. (40 char max)

- **Turning Off Message**
  This is the message which is sent to the contacts when the output is turned off. (40 char max)

- **Contacts**

Select the appropriate boxes for the contacts that are to receive 'On' and 'Off' messages

- **Self Reset After 'x' seconds**
  Enter a time here, in seconds (maximum: 255 seconds), to enable the 'Self Resetting Outputs' feature. The value entered here will be the time that the output will latch on for, when changed from the 'Default State' before self resetting. Enter the value '0' to disable the 'Self Resetting Outputs' feature. See section 10.2 for more information on 'Self Resetting Outputs'.

6.6 Diagnostics Interface

The diagnostics interface shown in Fig 6.6 allows the installer/user to see the current status of the inputs, outputs and network connection in real time. This is useful when installing, commissioning and mounting aerials, sensors and relays. To start the diagnostics interface running click on the 'Diagnostics' Button at the top of the main window.

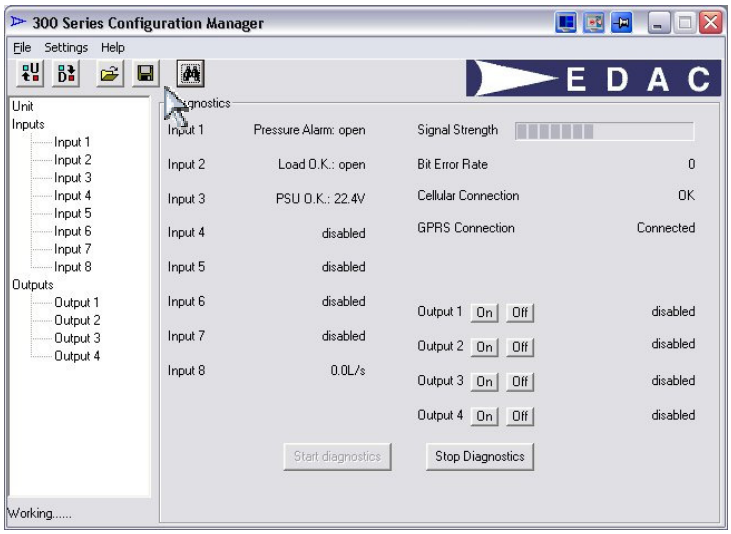

Fig 6.6 Diagnostics Interface

- **Input**
  This reports the current status of each input and the associated message.

- **Signal Strength**
  This field reports the current RSSI (Relative Signal Strength Indication) form the modem. The bar gives a visual indication, move the cursor over the bar for an actual reading. RSSI is on a scale of 0 to 31, 0 being no signal and 31 being perfect.

- **Bit Error Rate**
  Not supported in EDAC 320 series.

- **Cellular Connection**
  This indicates if a valid connection to the network has been established. If the cellular connection fails, then a button will appear that will allow the user to force the unit to try to re-connect to the network.

- **GPRS Connection**
  This indicates the state of the EDAC 320's PSD connection. If a PSD connection is available this will show as either Idle or Connected when in use. If the cellular connection is unavailable this will show as UNAVAILABLE.

- **Output 1, 2, 3, 4**
  This provides information on the current status of all outputs. Each individual output can also be switched using the 'On' and 'Off' buttons next to each output. This can be useful when installing and testing output wiring.

- **Start Diagnostics**
  This button will start the diagnostics running.

- **Stop Diagnostics**
  This button will stop the diagnostics running. The last known values for each field will be displayed, until either the page is changed or the diagnostics is started again.

7. EDAC 300 Series Remote Management (CSD Required)

The 'EDAC 300 Series Remote Management' software provides the user with an interface to download logged data files from the EDAC 320 as well as read and change contact list details on the unit remotely.

Note that all features of the 'EDAC 300 Series Remote Management' software require that the SIM card has a 'CSD' data number enabled. See section 3.1.1 for more information on 'CSD' data numbers. Also note that the features of this software require a dial up modem to be installed on the PC and connected to a phone line.

7.1 Setup

The 'EDAC 300 Series Remote Management' software requires configuration before it can be used to remotely access log files and contact lists on a 320. The software also needs to be associated with a modem on the PC where it is installed. The software can also be setup to connect to several different EDAC 320 units.

7.1.1 Edit Connections

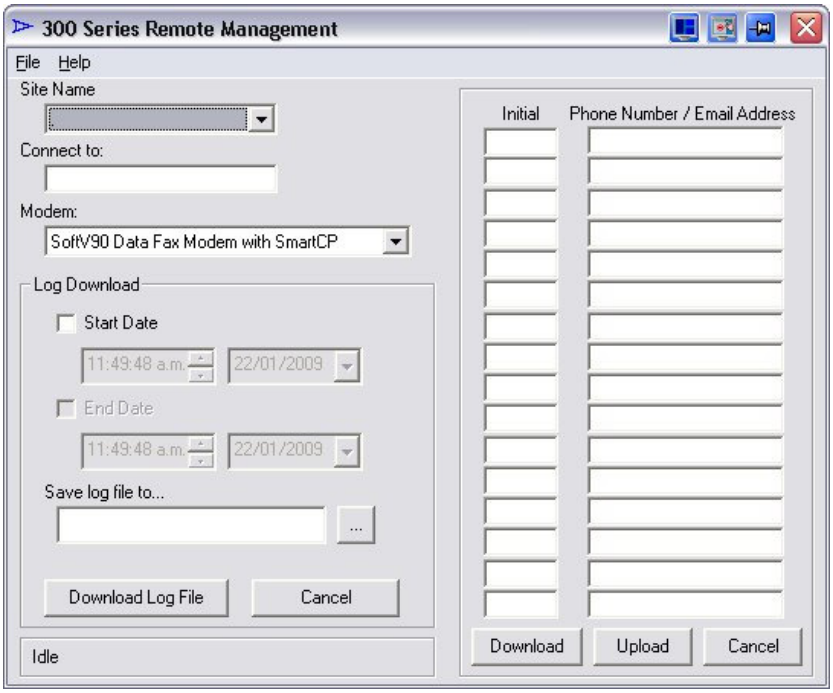

Fig 7.1.1 EDAC 300 Series Remote Management

The first step in configuring the software to connect to an EDAC 320 unit is to add the connection information. This identifies the site name and associated a number to be dialled with it.

From the *'File'* menu select the *'Edit Connections'* option as shown below in Fig 7.1.1a

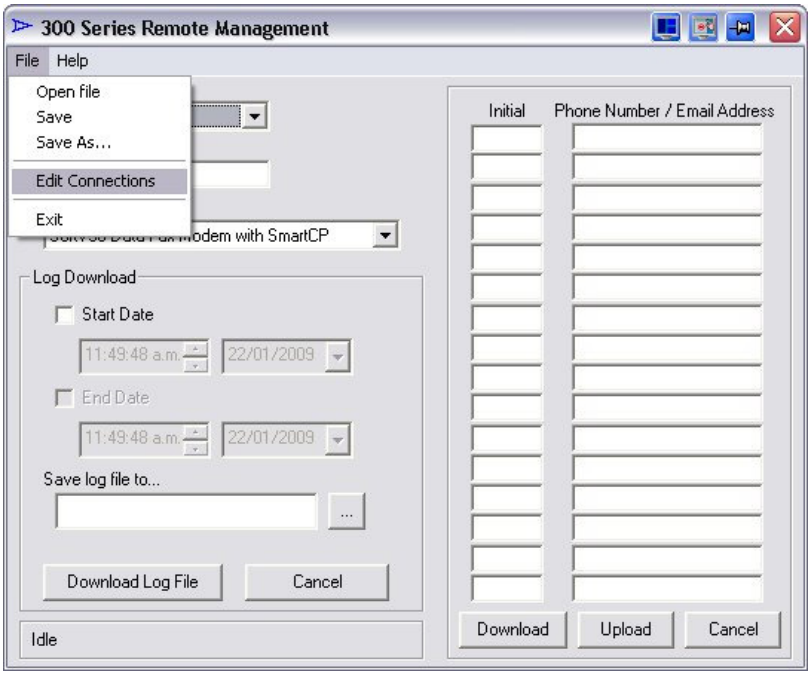

Fig 7.1.1a Opening 'Edit Connections' Dialog

This will open the following dialog window from which sites can be added, edited and deleted.

Fig 7.1.1b Add / Edit Connections

In the *'Connection Alias'* box enter a name to be used to identify the site, in the *'Connect to'* box enter the phone number, including any numbers require to get an outside line from the PC modem.

Ensure to enter the 'CSD' data number NOT the voice/SMS number. The features of this software will not function unless the 'CSD' data number is entered here. See section 3.1.1 for more information on CSD data numbers.

Once the information is entered and correct click on the *'New'* button to save a new entry to the site list.

This entry can be altered at a later date, by selecting the entry from the *'Connection alias'* list, changing the details and clicking the *'Save'* button. Entries can also be deleted by selecting the connection from the *'Connection alias'* box, then Clicking on *'Delete'*.

Close the window with the 'x' in the top left hand corner of the window when the changes are complete. The main window will then be active again.

7.1.2 Modem

The second step is to configure the modem that the 'EDAC 300 Series Remote Management' software will connect through.

A dial up modem MUST be fully installed on the PC and connected to a working phone line for any of the features of this software to function.

From the 'Modem' list shown in Fig 7.1.1 select the modem to be used for the connection. If the modem does not feature in this list, it is either not installed properly or is not a compatible type.

7.2 Downloading Log Files

Once the connection has been configured and the modem to be used has been selected the main window of the 'EDAC 320 Remote Management' software should look something like what is shown in Fig 7.2

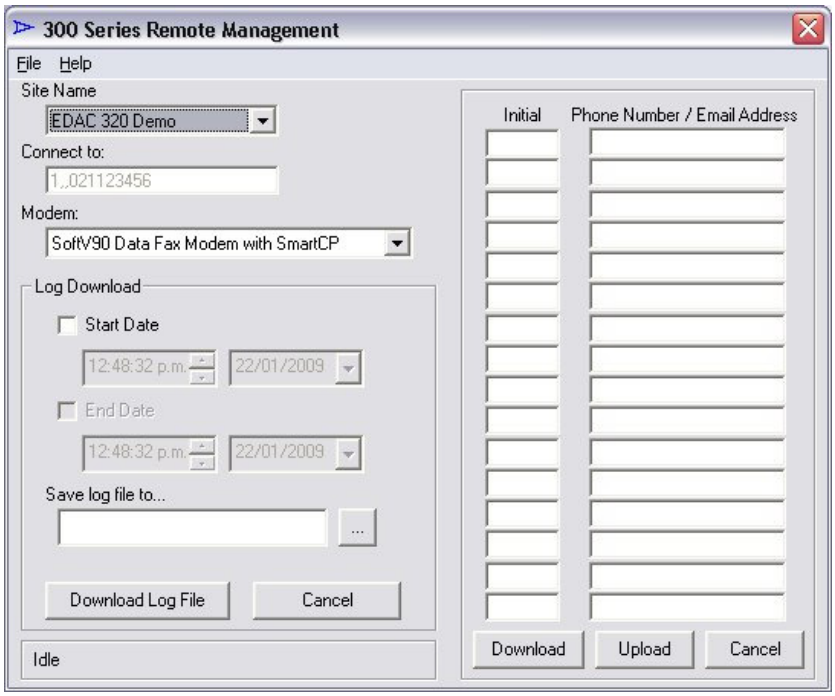

Fig 7.2 EDAC 300 Series Remote Management

The software is now almost ready to connect to an EDAC 320 and download a log file.

The software allows the option to either download the entire log file, or to selectively download parts of the log file that fall between pre-defined dates. To selectively download parts of the log file tick the *'Start Date'* tick box, then define the time and date from where the downloaded log file will start. Optionally and end time and date can also be defined by ticking the *'End Date'*

Once the start and end dates have been defined (if required) then the path and name of the saved log file needs to be defined. Click on the '***...***' Button next to the '*Save log file to….*' Dialog box and enter a suitable save path and file name for the log file.

Now the log file can be downloaded. Click on the '*Download Log file'* button. The software will dial up through the modem, connect to the remote EDAC 320 unit and begin downloading the file. Once the download has finished the log file will open for review.

7.3 Downloading/Uploading Contacts List

The 'EDAC 300 Series Remote Management' software can be used to download, update and upload contact lists within a remote EDAC 320 unit.

It is highly recommended that the contact list is downloaded into the software before it is edited and uploaded back into the unit as the contact list displayed in the software will completely overwrite the list saved in the EDAC 320. Also note the alarm notification configuration will be preserved when numbers are overwritten or updated. Alarm notification configuration cannot be changed remotely.

Ensure the steps in section 7.1 have been completed before attempting to upload or download contact lists.

To upload the contacts list from a unit, select the unit from the *'Site Name'* box and click the *'Download'* button. The software will dial out through the modem and download the contact list from the remote EDAC 320 unit. Once the list has been downloaded it will be displayed in the software in a similar way to what is shown in Fig 7.3

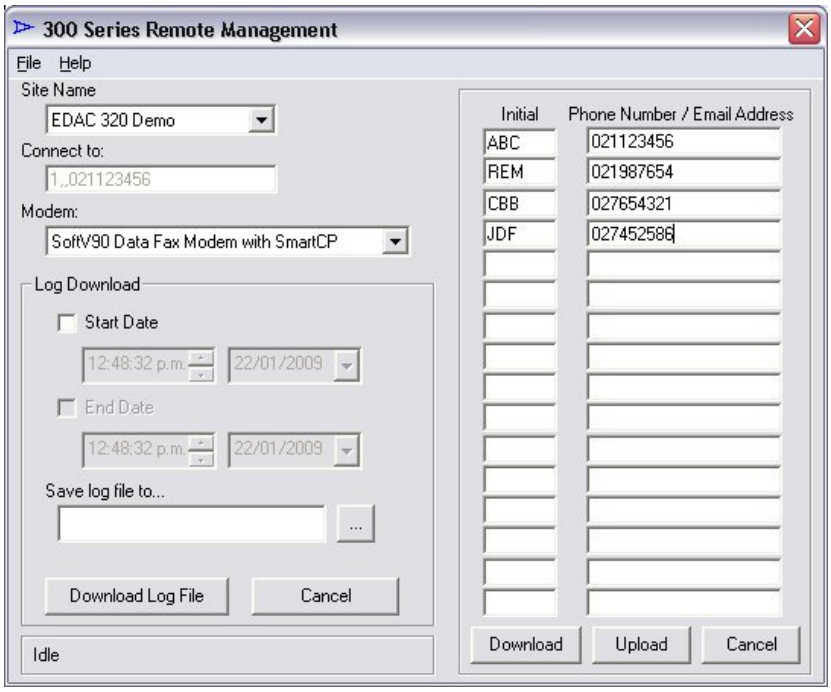

Fig 7.3 Uploaded Contacts

The contacts can now be altered as required, ensure all changes are correct before uploading them back into the remote EDAC 320 unit.

8. EDAC 320 – Notification, Control and Queries

8.1 Alarm Notification Messages

Alarm notification messages are generated when an input changes state or an alarm condition is detected. These messages are user configurable and can be sent to any combination of cellphone contacts.

Alarm notification messages are made up of several different messages from within the EDAC 320 unit. An example of a typical alarm message follows.

EDAC 320 Demo	'Site Message'
Input 1 Alarm	'I/O Message(s)'
09:11 19/07/05	'Time/Date'

The EDAC 320 continually monitors the state of all inputs. Occasionally, if an analog sensor becomes faulty or is not properly configured, it may read out of bounds. The EDAC 320 will notify the primary user (see section 6.3.1 for more information on configuring the primary user) of the fact that an input sensor is reading out of bounds. This message will look similar to the following example:

EDAC 320 Demo
Input 1's sensor is reading out of bounds, it might be faulty.
09:11 19/07/05

If this message is received the sensor, its associated wiring and the configuration should be carefully checked.

8.2 Controlling Outputs

The user can remotely control the state of any output by sending an SMS message to the unit. The EDAC 320 uses two levels of security to ensure only authorised users can switch outputs. These are *'PIN'* security and *'Caller ID'* security. This means that the user must have two things in order to a switch an output, they must know the PIN number of the unit (if a PIN has been programmed, see section 6.3.1 for more information on programming the PIN) and the number of the phone they are sending the command from, must programmed into the contacts list of the unit (see section 6.3.1 for more information on programming contacts).

8.2.1 Switching Commands

The message to switch an output must be in the correct format to be accepted. The format is as follows:

No unit PIN set:

<Output number>space<on/off> For example: **1 On**

If unit PIN is set in the configuration:

<PIN#>space<Output number>space<on/off> For example: **1234 1 On**

Note the spaces between the PIN number, the output number and the command. Also note that if no PIN number has been configured in the unit, the PIN part of the message is not required.

Also note that the **<Output number>** field can be replaced by the **'Output name'** (see section 6.5 for details on configuring output names). For example if output one is setup with the name of 'Pump' the command could look like this:

No unit PIN set:

Pump On

If unit PIN is set in the configuration:

1234 Pump On

8.2.2 Output Switch Command Expiry Times

Output control commands can often be time sensitive and due to the fact SMS messaging is not a time critical service, some commands should not be actioned if they are received after a certain time.

The EDAC 320 allows an expiry time and date to be set on output command messages so that if they are received after a certain pre-defined time and date they are discarded by the EDAC 320.

The context of the message should be structured as follows:

<**Output Control Command**>;<**Expiry Time/Date Command**>

The ‘expiry time/date’ command will only have an effect when coupled to a remote control command. However system and remote control commands are not dependant on being coupled to an ‘expiry time/date’ command, and will function independently.

The format of the ‘expiry time/date’ command is as follows:

YYYYMMDDHHMMSS

Where:

YYYY is the calendar year of expiry
MM is the calendar month of expiry
DD is the calendar day of expiry
HH is the hour of expiry (in 24 hour format)
MM is the minutes of expiry
SS is the seconds of expiry

For example:

Pump 4 Off;20070719000100

This command would be actioned if received before 00 hours 01minutes 00 seconds (or 12:01am) on the 19th of July 2007

Note that the resolution with which expiry time is defined can be set by omitting parts of the command. For example, a resolution of one hour can be set on a message by not defining the seconds and minutes in the command. The omitted parts are assumed to set to zero.

For example:

Pump 2 On;2007071913

This will be actioned if received before 1pm on the 19th of July 2007. Note how the minutes and seconds are not defined.

Resolution can be defined up to one year, so a message could be defined as valid for a whole year

For example:

Pump 2 On;2008

This will be actioned if received before the end of 2007. Note how the seconds, minutes, hours, days and month, are not defined.

8.2.3 Responses

The EDAC 320 can be configured to respond to output commands, confirming that the command message has been received and the action has been taken (see section 6.5 for more information on configuring output switching notification). Output response messages are generated whenever an output is switched (either remotely or locally).

A typical response to an output command will look like the following:

EDAC 320 Demo	‘Site Message’
Output 1 On	‘Output Message’
09:11 19/07/05	‘Time and Date’

If an output command has been sent by a valid user (i.e. phone number programmed in contact list) and the command is invalid or in an incorrect format the EDAC 320 unit will respond with the following message.

EDAC 320 Demo
The command or pin number was not valid
09:44 22/07/05

If an output command has been sent by a valid user (i.e. phone number programmed in contact list) and the command is valid but the output is not enabled, the EDAC 320 unit will respond with the following message.

EDAC 320 Demo
Output 'x' is not enabled
09:44 22/07/05

If a command is sent by an invalid user (i.e. phone number not programmed into contact list), no response will be sent.

8.2.4 Multiple Output Commands

It is possible to switch multiple outputs with one SMS message. This saves the time and expense of sending multiple messages when more than one output has to be switched at once. Binary like values are used to indicate the required state of each output. The format for switching multiple outputs is as follows:

<**PIN#**> space **outall** space <**OUT1**><**OUT2**><**OUT3**><**OUT4**>

Replace the <OUTx> field with any of the following values to indicate the required state of the output.

1	=	ON
0	=	OFF
x	=	Make no change to current state

For example a typical multiple output switch message may look like the following:

1234 outall 110x

This message would switch outputs 1 and 2 on, output 3 off and make no change to output 4. Notification messages will be sent for all outputs that have been switched. The command above would initiate three separate responses as detailed below (assuming the outputs are configured to send notifications messages – see section 6.5 for more information on configuring output notification messages).

EDAC 320 Demo	'Site Message'
Output 1 On	'Output Message'
09:11 22/07/05	'Time and Date'

EDAC 320 Demo
Output 2 On
09:11 22/07/05

EDAC 320 Demo
Output 3 Off
09:11 22/07/05

8.3 Status Query

The status query provides information about the current state of all inputs and outputs. Note that if the 'Public Queries' option is not enabled, the number of the cellphone has to be programmed into the contact list in order to receive a response (see section 6.3.1 for more information on enabling public queries).

To obtain a status report, send the following command:

Status

A typical response to this command might look as follows: Note that this information may be split over two separate SMS messages if required.

EDAC 320 Demo	'Site Message'
Input 1 Alarm	'Input 1 current status' (alarm message)
Input 2 OK	'Input 2 current status' (reset message)
Input 3 OK	'Input 3 current status' (reset message)
Output 1 On	'Output 1 current status' (turning on message)
Output 2 Off	'Output 2 current status' (turning off message)
Output 3 Off	'Output 3 current status' (turning off message)
09:11 17/07/05	'Time and Date'

Disabled I/O will not appear in a reply to a status query.

8.4 Advanced SMS Commands

8.4.1 System Queries

The system query provides information about the status of the units' cellular connection. In order to obtain a system report, send the following command:

Sys

A typical response to this command will look like the following

EDAC 320 Demo	'Site Message'
RSSI = 20	'RSSI reading from modem'
09:11 17/07/05	'Time and Date'

RSSI (or 'Received Signal Strength Indication') gives information about the strength of the cellular network signal. RSSI is measured on a scale of 0 (no signal) to 31 (perfect signal). Note that a minimum RSSI reading of 10 is recommended for reliable operation.

8.4.2 Multiple Commands

Multiple SMS commands can be sent together in one message. This saves the time and expense of sending multiple messages to perform more than one task. Use the standard commands as described in the sections above, separated by a '**+**' symbol.

For example:

sys+status

This command would return both system and status information in separate messages. Note that the information, from each query, may be split over more than one message if required.

Another example

1234 Output1 On+1234 Output 2 Off

This command would turn output 1 on, and output 2 off at the same time. The responses will be sent back as required/configured (see section 5.6 for more information on configuring output responses).

8.4.3 SMS Forwarding to RS232 port

The EDAC 320 can forward SMS received messages out through the RS-232 port. This can allow the user to control various other pieces of equipment that can respond to RS-232 serial commands.

In order for an SMS message to be recognised and forward through the RS-232 port there are several conditions that must be met. The first is that the number of the cellular phone that the SMS is sent from must be programmed into the contacts list (see section 6.3.1 for more information on programming the contact list), the second is that the SMS message must be formatted properly.

The message must contain the unit PIN, if it set in the configuration, (see section 6.3.1 for more information on programming the unit PIN) followed by the message to be forwarded contained inside angle brackets. The PIN and the message should be separated by a space.

For example:

<**PIN#**> space <**forwarded message**>

i.e.

1234 <pump start>

This command would forward 'pump start' out of the EDAC 320's RS-232 port. There are also two modifiers, line feed (moves to next line) and carriage return (moves cursor to start of current line) that can be used. Each of these modifiers is preceded by the '**#**' symbol.

#n = line feed
#r = carriage return.

Use '**##**' if '**#**' is needed as part of the message to be forwarded. Another example follows:

1234 <pump start #n report status ##>

This command would send the following string out the RS-232 port

pump start
report status #

Because SMS messaging uses a limited character set, only the characters listed in the table 8.4.3 below are supported. Some cellular networks may support more characters than listed below, forwarding of these characters may work, but cannot be guaranteed.

Supported SMS Forwarding Characters											
A	B	C	D	E	F	G	H	I	J	K	L
M	N	O	P	Q	R	S	T	U	V	W	X
Y	Z	a	b	c	d	e	f	g	h	i	j
k	l	m	n	o	p	q	r	s	t	u	v
w	x	y	z	-	@	!	*	‘	“	<	>
,	;	:	(	)	$	%	&	=			

Fig 8.4.3 Supported SMS Forwarding Characters

8.4.4 Querying Contacts List via SMS

Cellphone numbers and email addresses in the EDAC 320 contact list can be queried individually or as the complete contact list. The query message must contain the unit PIN number, if it set in the configuration, (see section 6.3.1 for more information on the 'Unit PIN')

To query the entire contacts list send the following SMS to the EDAC 320:

<**PIN#**> space **contacts?**

For example:

1234 contacts?

Note that the reply will be made up of multiple messages.

To query an individual contact the format of the message is as detailed below:

<**PIN#**> space **contact**<**list position**>**?**

For example:

1234 contact2?

This would return a message containing the cellphone number or email address stored in position 2 of the contact list.

8.4.5 Updating Contacts List via SMS

Cellphone numbers in the contacts list in the EDAC 320 can be updated via SMS. This feature is useful if a user changes service providers or cellphone numbers.

Note that email addresses in the contacts list cannot be updated via SMS. Also note that the position of the number in the contacts list also needs to be known before it can be changed or updated.

The message must contain the unit PIN number, if it set in the configuration, (see section 6.3.1 for more information on the 'Unit PIN') the position in the contact list of the number to be changed, and the new number.

Below the format of the message is detailed:

<**PIN#**> space **contact**<**list position**>**=**<**new number**>

For Example:

1234 contact3=021123456

This command would change the number in list position 3 to '021123456'. Note that all alarm, reset and output switching message associations from the old contact list entry will be preserved, i.e. all messages that were sent to the old number will be sent to the new number after it had been changed.

Note that the number of the phone that the command is sent from needs to be programmed into the contacts list before the command will be accepted.

If the command is successful a response similar to the one below will be sent back to the phone from where the command was issued.

EDAC 320 Demo	'Site Message'
Contact 2 changed to "021123456"	'Change Notification Message'
10:09:39 10/08/06	'Time and Date'

If the command is sent from a phone whose number is not programmed into the contacts list, no response will be sent.

If the command is sent from a phone whose number is programmed into the contacts list but the command or PIN number is invalid the following response will be received:

EDAC 320 Demo	'Site Message'
The command or PIN was invalid:	'Command Error Message'
"1235 contact2=021234567"	'Contents of erroneous command'
10:09:30 10/08/06	'Time and Date'

Extreme caution is advised when using this command. Failure to properly use this command may render the unit inoperable by writing invalid numbers into the contacts list.

8.4.6 Updating Log Update Email Address via SMS

The email address used for regular email log updates can be modified via SMS using the command below:

log email=<email address>

where <email address> must be a valid email address.

The message must contain the unit PIN number, if it set in the configuration, (see section 6.3.1 for more information on the 'Unit PIN')

Note: The number of the cell phone sending the message must be in the contacts list of the EDAC 320.

8.4.7 SMS Request for Email of Logged Data

The data stored in the three log files on the flash memory card can be emailed to the email update address specified in the configuration (section 6.3.4).

log.csv file

To email the log entries since the last regular update use the command:

email latest

To email the complete log.csv file to the email address specified in the configuration use the command:

email log

To specify a range of from and to dates and times use the command:

email log=<from>**-**<to>

Where the date and time format must be as shown: yyyy/mm/dd hh:mm:ss

e.g. **email log=2010/01/01 03:04:00-2010/02/01 05:06:07**

The time section can be disregarded if required

e.g. **email log=2010/01/01-2010/02/01**

Keywords can also be used in place of entering a date and time:
to select the first entry in the log file use the keyword - **start**
to select the last entry in the log file use the keyword - **end**

e.g. another way to email the complete log would be to use the command:

email log=start-end

This command does not affect the data sent in regular log updates.

system.log file

email system

email system=<from>-<to>

Where the date and time format must be as shown: yyyy/mm/dd hh:mm:ss

The time section can be disregarded if required

The keywords Start and End (as above) can also be used with the email system command.

alarm.log file

email alarm

email alarm=<from>-<to>

Where the date and time format must be as shown: yyyy/mm/dd hh:mm:ss

The time section can be disregarded if required

The keywords Start and End (as above) can also be used with the email system command.

Note: The number of the cell phone sending the message must be in the contacts list of the EDAC 320.

8.4.8 SMS Request to Modify Email Retry Interval for Regular Log Updates

A timer (in minutes) can be set for retrying the sending of a failed regular log update email by sending an SMS to the EDAC 320 with the command:

email retry timer=<number of minutes>

When the timer is set if a regular log update email fails to send due to a network error the EDAC 320 will attempt to resend the email after the number of minutes specified. To disable the timer set it to 0 minutes.

The time interval can also be queried using the SMS command:

email retry timer?

The EDAC 320 returns a message showing the value of the time interval in minutes, if set.

By default the timer is disabled.

Note: The number of the cell phone sending the message must be in the contacts list of the EDAC 320.

8.4.9 Modifying the Unit PIN via SMS

The EDAC 320 unit PIN can be modified via SMS using the command below:

<**PIN#**> space **new pin=**<**new PIN**>

e.g. **1234 new pin=5678**

Note: The number of the cell phone sending the message must be in the contacts list of the EDAC 320 and a PIN must already be set in the configuration. A lost or forgotten unit PIN can be reset remotely by EDAC if required.

8.4.10 Removing log files via SMS

The log.csv file can be removed from the SD card by using the SMS command:

<**PIN#**> **remove data**

The number of the cell phone sending the message must be in the contacts list of the EDAC 320 and the message must contain the unit PIN number, if it set in the configuration (see section 6.3.1 for more information on the 'Unit PIN').

IMPORTANT NOTE: This command permanently deletes the log file from the SD card.

9. Data Logging

9.1 Overview

The EDAC 320 is capable of recording and logging a wealth of information from its inputs, as well as information about the cellular connection and the system state of the EDAC 320. This information can be useful across a wide range of applications, such as monitoring and recording the usage and status of a particular system, keeping track of resource consumption, recording equipment failure and downtime as well as providing accountability and traceability in manufacturing and processing.

The EDAC 320 is configured to log information to an onboard flash card (see section 6.3.4, section 6.4.1 and section 6.4.2 for more information on configuring data logging options), this flash card is of the common SD type typically found in digital cameras and MP3 players. Information can be retrieved from this flash card either locally by removing the card and inserting into a P.C. or remotely either via email or dial up modem connection.

Information is logged to one of three different files on the data card, general log information is stored in the LOG.CSV file, alarm/reset events are stored in the ALARM.LOG file and system events are stored in the SYSTEM.LOG file.

9.2 SD Data Card

The EDAC 320 uses a data flash card to store data logged form the inputs. This data can be retrieved from the SD card, and analysed at any time. This section will cover the initialisation and installation of the data card in the EDAC 320.

9.2.1 Supported Card Types

The EDAC 320 will support all types of properly formatted SD cards including 'SD' and 'SD high speed X150' cards. The EDAC 320 will also support some types of 'MMC' memory cards including 'MMC' and 'MMC Plus'.

9.2.2 Initialising/Formatting New Cards

Ensure all other removable storage devices such as digital cameras, USB disks, and MP3 players are removed from the system before proceeding.

Insert the card into an appropriate card reader/adaptor (not included) and connect to a spare USB port on a Windows 2000 or XP Pro/Home PC (Ensure the card reader is installed properly before attempting to use – refer to the documentation included with the card reader for specific instructions).

Open 'My Computer' from the 'Start' menu. A window will open similar to the one below in Fig 9.2.2.

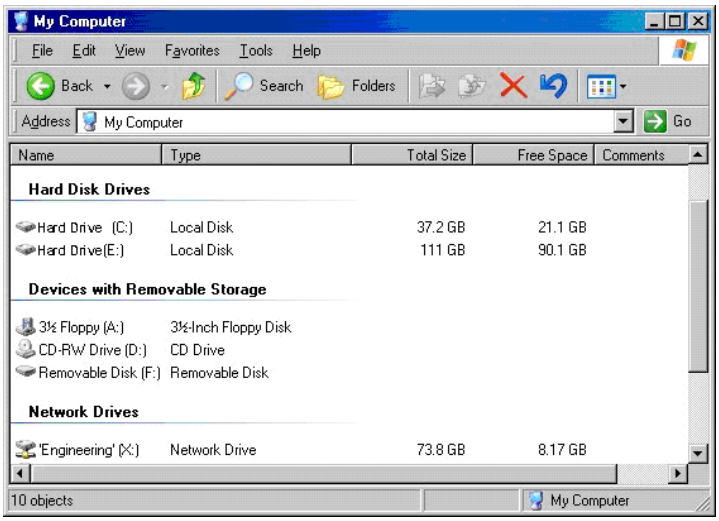

Fig 9.2.2 'My Computer'

Look for, and right click on the 'Removable Disk' device. From the menu that appears select 'format' as shown below in Fig 9.2.2a.

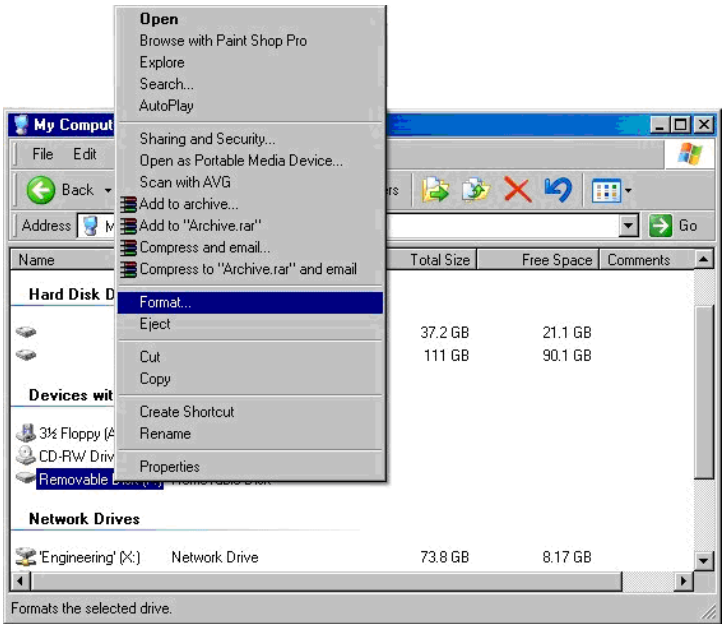

Fig 9.2.2a Right Click Menu – Select 'Format'

Once format has been selected from the right click menu the window shown in Fig 9.2.2b will appear. Ensure that 'FAT' is selected in the 'File System' box and un-check the 'Quick Format' tick box.

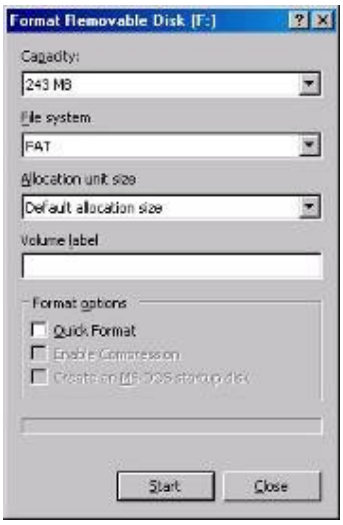

Fig 9.2.2b Format Disk Dialog Window

Click on the 'Start' button and then click 'OK' on the following confirmation box, the SD card will begin formatting. This may take anywhere between a few seconds and a few minutes depending on the size and speed of the card.

The SD card is now ready to be inserted and used with the EDAC 320.

9.2.3 Installing/Removing SD cards

Once the SD/MMC card has been initialised and formatted it can then be inserted into the EDAC 320 for use. Follow the instructions below to insert the SD/MMC card into the EDAC 320.

Refer to the user documentation for the data card in use and ensure that any write protection features the card might have are disabled.

Locate Data card slot on the side of the EDAC 320. Ensure the data card is orientated with the electrical contacts facing down and the angled corner facing forwards.

Fig 9.2.3 Inserting Data Card

Insert the card into the slot on the side of the EDAC 320 as shown below in Fig 9.2.3a

Fig 9.2.3a Locking Data Card into Place

Push the card in until it locks in place, the card may protrude slightly from the side of the EDAC 320 as shown below in Fig 9.2.3b, or it may sit flush with the endplate depending on the type of data card in use.

Fig 9.2.3b View with Data Card Locked into Place

To remove the card, push it in again and the card holder will unlock, the card can then be removed.

9.3 Log File Formats

The logged information is recorded in either a *.TXT file format or a *.CSV spread sheet file, both of which are readable with Microsoft Office, Notepad and most other office application suites.

Below are samples and explanations of each file format.

9.3.1 LOG.CSV

The 'LOG.CSV' file is where the general log information is stored. The LOG.CSV file is in a 'comma separated value' (CSV) format which can be opened in most popular spreadsheet programs such as Microsoft Excel or text editors like 'Notepad' or 'Microsoft Word'.

Below is an example of how the logged data is presented when opened in a spreadsheet program such as Microsoft Excel.

Date / Time	Input 1 Instant	Input 2 Instant	**Input 8 Instant (V)**	Input 8 Minimum (V)	Input 8 Maximum (V)	RSSI
5/09/2006 11:42	Pressure Alarm	Overload Alarm	21.7	21.61516	21.72914	21
5/09/2006 11:43	Pressure OK	Load O.K.	17.97	17.96793	21.72914	20
5/09/2006 11:43	Pressure OK	Load O.K.	10.25	10.21755	18.02491	20
5/09/2006 11:44	Pressure OK	Overload Alarm	9.99	9.9611	10.27454	18
5/09/2006 11:44	Pressure OK	Overload Alarm	10.02	9.93261	10.07508	20
5/09/2006 11:45	Pressure Alarm	Overload Alarm	**10.02**	9.79014	10.07508	6
5/09/2006 11:45	Pressure Alarm	Overload Alarm	10.02	9.93261	10.07508	11
5/09/2006 11:46	Pressure Alarm	Overload Alarm	9.96	9.79014	10.04658	12
5/09/2006 11:46	Pressure Alarm	Overload Alarm	10.02	9.93261	10.04658	7
5/09/2006 11:47	Pressure Alarm	Overload Alarm	9.99	9.93261	10.04658	11
5/09/2006 11:47	Pressure Alarm	Overload Alarm	9.99	9.93261	10.04658	11
5/09/2006 11:48	Pressure Alarm	Overload Alarm	9.99	9.93261	10.04658	11
5/09/2006 11:48	Pressure Alarm	Overload Alarm	9.99	9.73315	10.04658	20
5/09/2006 11:49	Pressure Alarm	Overload Alarm	18.2	9.93261	18.85124	20

Fig 9.3.1 'LOG.CSV' File Example

Note how the column headers contain a description of the information that follows i.e. 'Input 8 Instant (V)', also note how each entry is time/date stamped by the corresponding entry in the first cell of the row. All this information combined in the table gives fully time date stamped entries for each logged input.

For example, if the row with the date entry 5/09/2006 11:45 is followed over to the 'Input 8 Instant' column we can see that at 11:45 on the 8/09/2006 input 8 had a voltage value of 10.02 V.

9.3.2 ALARM.LOG

The 'ALARM.LOG' file is where alarm and reset events from inputs are stored. Each Alarm/Reset event (subject to configuration) is recorded here with a time/date stamp. The ALARM.LOG file is in a text file format (*.TXT) and can be opened by most major word processing programs such as Microsoft Word or Notepad.

Below is an example of how the Alarm log is presented when opened in Notepad.

```
2006/09/05 11:43:03   ,Load O.K.
2006/09/05 11:43:07   ,Pressure OK
2006/09/05 11:43:40   ,PSU Alarm          Current Value: 10.3V
2006/09/05 11:44:07   ,Overload Alarm
2006/09/05 11:45:07   ,Pressure Alarm
2006/09/05 11:49:03   ,PSU O.K.           Current Value: 18.2V
```

Fig 9.3.2 'ALARM.LOG' File Example

Note how each line contains a separate alarm/reset event including time, date, alarm/reset message from the input, as well as a reading from inputs configured for analogue sensors.

9.3.3 SYSTEM.LOG

The 'SYSTEM.LOG' file is where system related events such as cellular network and configuration events, and CSD call events are logged with time/date stamps. The SYSTEM.LOG file is in a text file format (*.TXT) and can be opened by most major word processing programs such as Microsoft Word or Notepad. This file can be extremely useful for EDAC customer support technicians when diagnosing issues with the operation of the unit.

Below is an example of how the system log is presented when opened in Notepad

```
2006/09/05 11:29:00   ,Configuring
2006/09/05 11:29:13   ,Config completed
2006/09/05 11:42:13   ,Configuring
2006/09/05 11:42:26   ,Config completed
2006/09/05 11:45:45   ,No SIM inserted
2006/09/05 12:02:47   ,Unit brownout
2006/09/05 12:05:46   ,Unit repowered
2006/09/05 12:15:20   ,CSD answered
2006/09/05 12:15:20   ,CSD call dropped without NO CARRIER
```

Fig 9.3.3 'SYSTEM.LOG' File Example

Note how each line contains a separate time/date stamped system event.

9.4 Retrieving Log Files

9.4.1 Locally

To locally retrieve a log file a PC or laptop with a properly installed SD/MMC card reader is required (see documentation included with your card reader for details on installation). Disconnect all other removable media devices (such as digital cameras, MP3 players, iPods, USB flash disks etc) from the PC before proceeding.

Remove the data card from the EDAC 320 and insert into the card reader, the system should recognise the new volume. From 'My Computer' find and double click on the 'Removable Disk' entry as shown below.

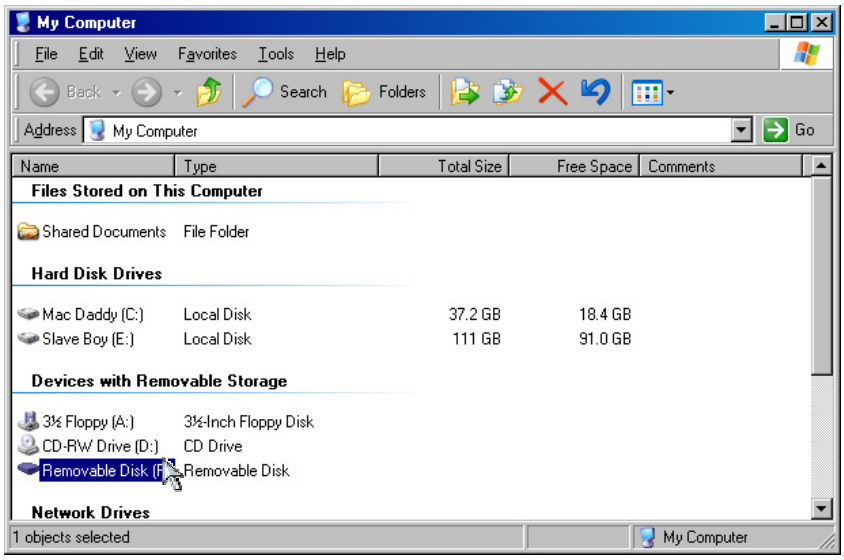

Fig 9.4.1 'My Computer'

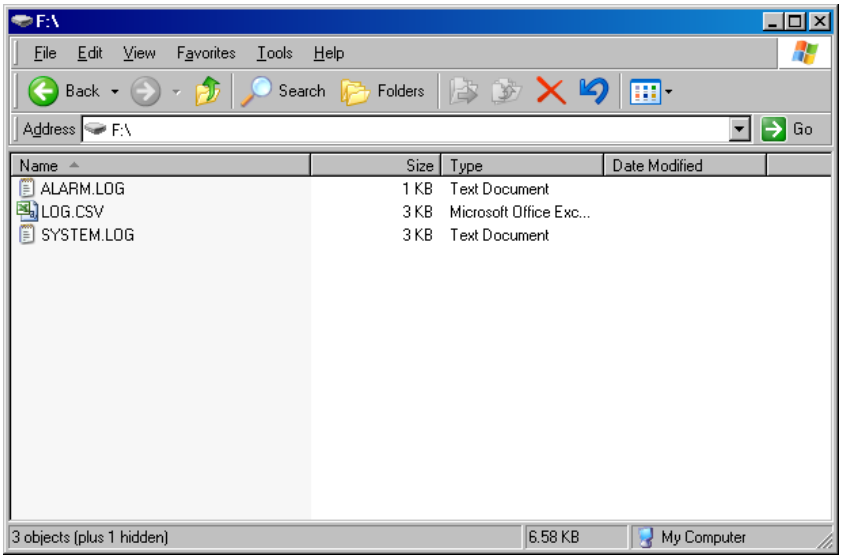

Fig 9.4.1a Data Card Contents

A data card may contain up to three different files as described in section 9.1. The 'ALARM.LOG' file that contains a time/date stamped log of alarm and reset events on the unit, the 'SYSTEM.LOG' that contains a time/date stamped log of system events, and 'LOG.CSV' that contains the logged information from the inputs.

Any of these files can be copied over to the PC for storage and analysis. The files can also be deleted to clear the log information from the data card. A new file will be created when the data card is inserted back into the EDAC 320.

9.4.2 Remotely via SMS request for email update (PSD Required)

See section 8.4.7 for the SMS commands required to email a log file to the email update address specified in the configuration (section 6.3.4).

9.4.3 Remotely Using the Remote Management Tool (CSD Required)

See section 7 for a full explanation of the process for setting up the 'EDAC 300 Series Remote Management' software and downloading log files from an EDAC 320 unit.

10. Application Notes / Advanced Features

10.1 Auto Reporting

The 'Auto Reporting' feature is designed to give peace of mind in applications where the unit is either very remote, or is mission critical to the operation of the equipment it is connected to. This feature allows the unit to automatically send a status message, at a pre-defined interval, on a daily, weekly or monthly basis, providing peace of mind that the unit is alive and operating correctly.

The 'Auto Report' message is sent to the 'Primary User' in the phone number list (see section 6.3.1 for more information on Configuring the 'Primary User').

The auto report feature is configured on the 'Global/Phone Numbers' page of the 'EDAC 300 Series Configuration Manager' as described in section 6.3.1and as shown below in Fig 10.1.

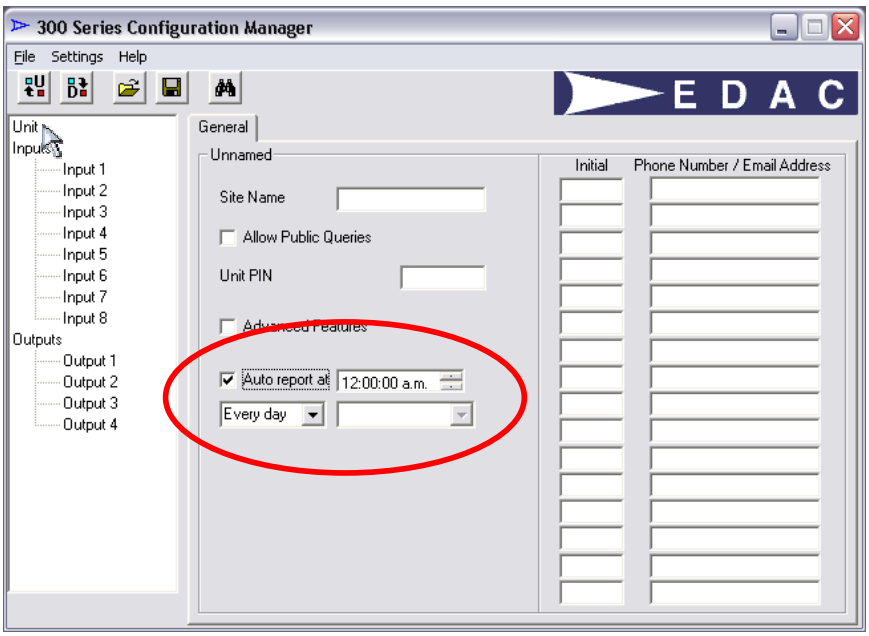

Fig 10.1 EDAC 300 Series Configuration Manager - Unit Page

Tick the 'Auto Report At' check box to enable the feature. Set the time of day for the message to be sent, and then select either a daily, weekly or monthly interval. If a weekly interval is selected, choose the day of the week for the 'Auto Report' message to be sent, if monthly is selected select the day of the month for the 'Auto Report' message to be sent.

Note that if monthly is selected, and either the 29th, 30th or 31st day of the month is selected, in months where the day selected does not exist (February for example only has 28 days) the message will be sent on the last day of month that the message is due for delivery in.

An example of what the 'Auto Report' message might look like is shown below:

EDAC 320 Demo	*'Site Message'*
Reporting:	*'Reporting Message indication'*
Input 1 Alarm	*'Input 1 current status' (alarm message)*
Input 2 OK	*'Input 2 current status' (reset message)*
Input 3 OK	*'Input 3 current status' (reset message)*
Output 1 On	*'Output 1 current status' (turning on message)*
Output 2 Off	*'Output 2 current status' (turning off message)*
Output 3 Off	*'Output 3 current status' (turning off message)*
09:11 17/07/05	*'Time and Date'*

Note that the contents of this message may be split over two or more SMS messages if required

10.2 Self Resetting Outputs

The outputs on the EDAC 320 can be configured as self resetting, or 'momentary'. The Self Resetting output feature allows the user to configure an output on the EDAC 320 to turn on momentarily, for a pre-defined time when activated (maximum: 127 seconds), and then automatically turn itself off.

This enables the EDAC 320 to simulate a button press for starting and stopping devices such as pump soft start controllers, centre pivot and lateral irrigators, and process machinery.

The 'Self Resetting Output' feature is configured in the output page as described in section 6.5, and as shown below in Fig 10.2.

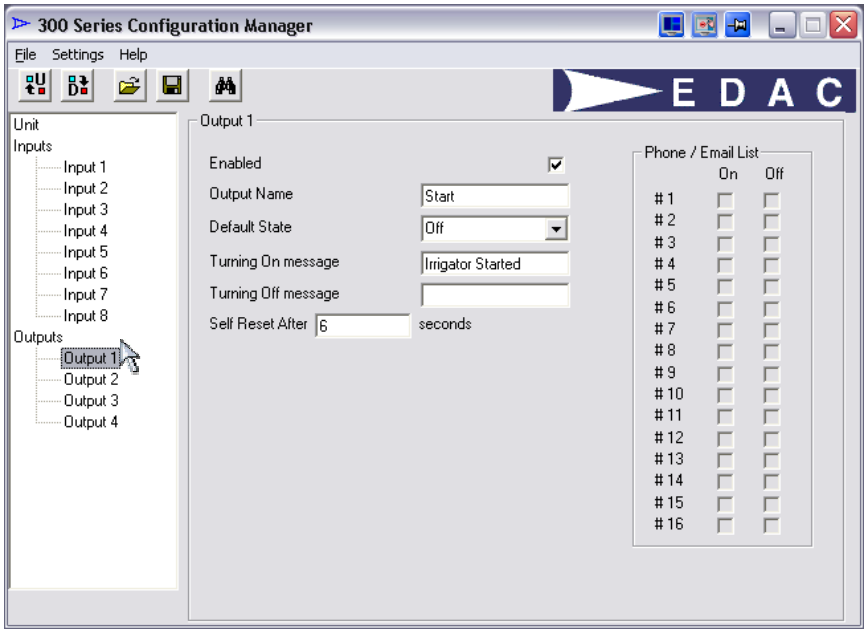

Fig 10.2 Output Configuration

To disable the 'Self Reset' feature and set the outputs as latching, enter '0' into the 'Self Reset after x seconds' field. To enable the feature enter the time (in seconds) that the output will remain active for before self resetting.

Note that this action will only occur when the output is being switched ***from*** the 'Default State' (as configured in the output page) and not if the output is manually switched back to the 'Default State' before the self reset time elapses.

10.2.1 Single Word Output Commands

When the 'Self Resetting Output' feature is enabled, single word output commands can be used. If the 'Output Name' is a single word, with no spaces, just the text entered in the 'Output Name' field can be used to switch the output from the 'Default State', without the 'On' or 'Off'.

For example, using the configuration in Fig 10.2 above ('Default State' is "Off", 'Output Name' is "Start" and 'Self Reset after x Seconds' is set to "6") sending the SMS message "**Start**" to the unit will turn the output on for 6 seconds, then it would self reset and turn off.

Note that the command will still have to meet the PIN number and caller ID security requirements described in section 6.2 and that the 'Output Name' used can not contain any spaces.

10.3 Through Mode Data Connection (CSD Required)

The RS-232 serial port on the EDAC 320 can be used to connect to external devices such as PLC's or data-loggers. Put simply, the EDAC 320 works like a RS-232 modem, but rather than working though traditional fixed line services, it works through wireless cellular networks. Remote connections can be established through the EDAC 320 allowing data communications between a base PC and the remote device.

Note that the account the EDAC 320 is connected on will need to have a 'Circuit Switched Data' number enabled. See section 3.1.1 for more information on 'Circuit Switched Data' numbers.

To initiate a through mode connection, the modem on the PC must start a connection by dialling the 'Circuit Switched Data' number of the EDAC 320 unit. The PC modem and the EDAC 320 should negotiate a connection. Once connected data should be able to be sent to and from the EDAC 320.

A terminal program such as 'HyperTerminal' or 'Terra Term' will need to be used to control the PC modem. Connect a terminal program to the COM port the modem is connected to (if the modem is internal the COM can normally be found in the hardware properties). Alternatively third party software such as PLC programming software or any product that supports dialling to a remote site through a modem can be used.

Some basic commands should be entered into the PC modem to set it up to work with the EDAC 320. Below is an example of the commands that need to be entered to set up the PC modem and initiate the connection.

AT&F	**<ENTER>**	'Factory Reset modem'
ATn1	**<ENTER>**	'Enable auto baud rate detection'
AT&k4	**<ENTER>**	'Turns on flow control'
ATDT<Phone#>	**<ENTER>**	'Dials EDAC 320 and connects'

Use the 'Circuit Switched Data' number of the EDAC 320 in the <Phone#> field. The PC modem should now dial the EDAC 320 and connect. Wait for the following response to confirm the connection was successful.

CONNECT 9600

The PC and the EDAC 320 are now connected and data can be sent and received between the two units.

The properties of the EDAC 320's RS-232 port can be configured to work with most devices that are externally connected. See section 10.7 'RS232 AT commands' for more information on changing the properties of the RS-232 port. It should be noted that if these are changed the unit may no longer communicate with 'EDAC 300 Series Configuration Manager'.

10.4 Automatic Local Output Switching

The EDAC 320 can be configured to automatically switch the state of an output depending on the state of an input. For example an input can monitor a temperature sensor and automatically turn on a fan if it gets too hot. The following section will explain how to configure the EDAC 320 to automatically switch local (i.e. on the same unit) outputs.

First of all the 'Advanced Features' option needs to be enabled. Using the 'EDAC 300 Series Configuration Manager' (see section 6 for more info on 'EDAC 300 Series Configuration Manager') switch to the unit page and select the 'Advanced Features' option as shown in Fig 10.4 below.

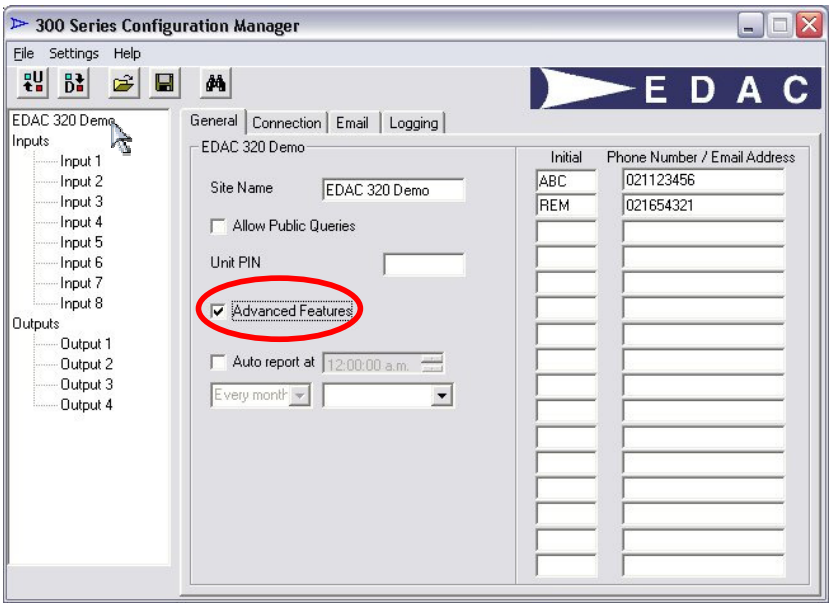

Fig 10.4 Enabling Advanced Features

Next the output that needs to be switched must be configured correctly. Bring up the configuration page for the output that you wish to control. This page is shown below in Fig 10.4a. Make sure the output is enabled and the 'Turning On' and 'Turning Off' messages have been set up. The output should also be set up to send notification messages if required.

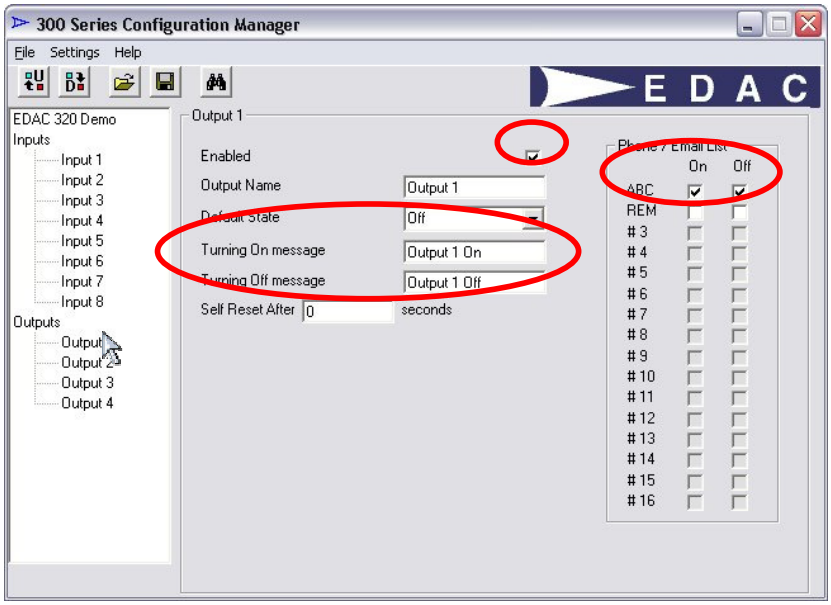

Fig. 10.4a Output Config

The input that is to control the output then needs to be set up. Bring up the appropriate input configuration page as shown below in Fig 10.4b.

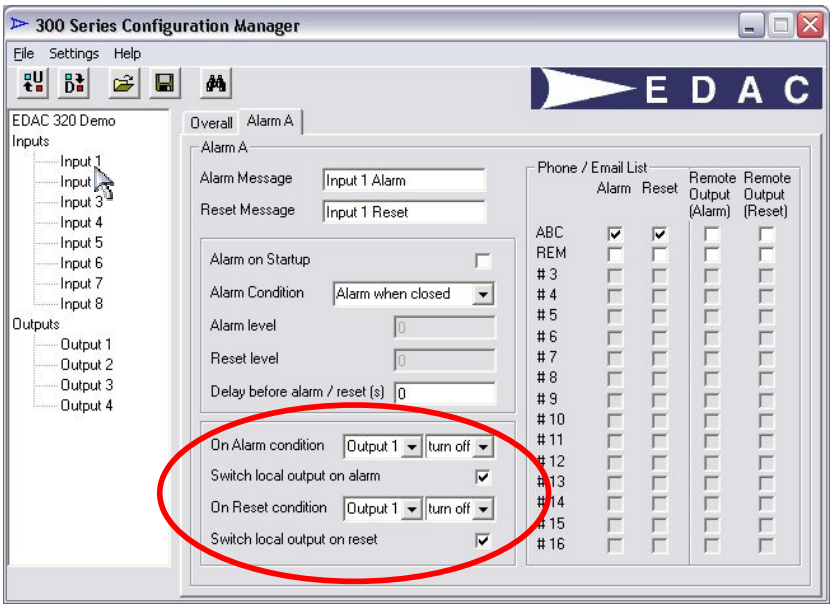

Fig. 10.4b Switching Configuration

Next to the 'On Alarm Condition' text, are two drop down boxes. Select the output to be switched from the first box, and the action to be taken when this input alarms from the second box. Next to 'On Reset Condition' select the output to be switched and the action to be taken when the input goes into a reset state. Ensure both 'Switch local output on alarm' and 'Switch local output on reset' boxes are ticked.

Also note that the 'Alarm Condition' box must not be set to 'Alarm Off', (i.e. input must be alarming) in order for the output to be switched.

The output should now be automatically controlled by the state of the input. Note that the output can still be switched manually. Also note that If the output is already in the state that it is to be switched to when a particular event occurs, no change will be made, and no output notification will be sent.

10.5 Automatic Remote Output Switching

As well as automatically controlling outputs on the same unit, the EDAC 320 can automatically control outputs on other remote units. Because of the nature of cellular communications the physical distance between the two units is irrelevant, as long as cellular reception is available to both units. The diagram below graphically shows how two units can be linked together.

An example application for this feature could comprise of a frost monitoring and irrigation start system. One EDAC 320 may be connected to a temperature sensor out in the middle of the orchard, but the pump that needs to be started when a frost occurs is some distance away at the edge of the orchard.

One EDAC 320 can be connected to the pump and one to the temperature sensor. The two units can then communicate with one another when a frost occurs, the first unit detecting the frost, then sending an SMS to the second which starts the irrigation, which in turn, then notifies the user of the event.

The setup of this feature is very similar to that of 'Automatic Local Output Switching' (see section 10.4); however there are a few important setting that need to be configured properly.

The first is that the unit PIN needs top be *EXACTLY* the same on both units. Ensure the 'Unit PIN' as shown in Fig. 10.5 is identical on both units.

The phone number of the remote unit needs to be entered into the contact list of the first unit and vice versa. This is so that the remote unit and the local unit know to accept commands from each other. Ensure the phone number of the other unit is entered in the contact list in each unit. The example in Fig. 10.5 shows the user configured in contact 1 (with initials ABC) and the remote unit configured in contact 2 (with initials REM).

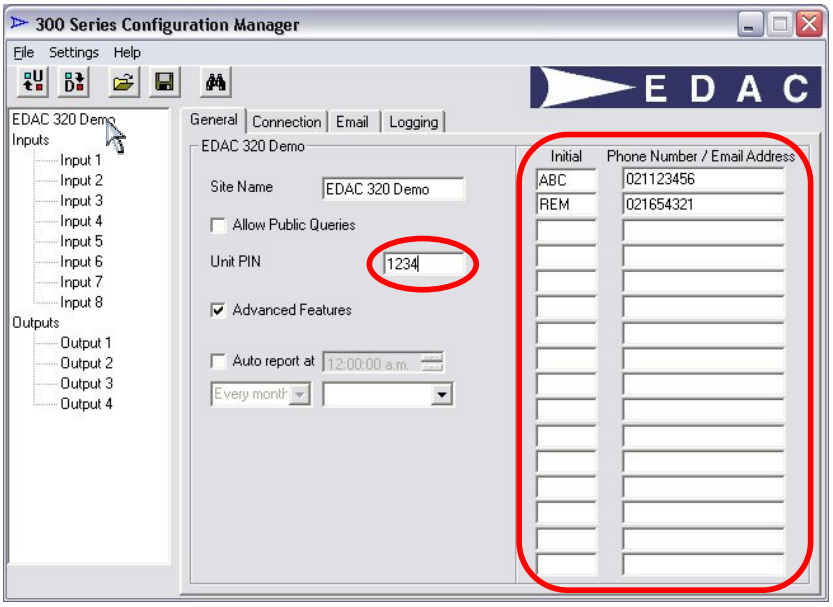

Fig 10.5 Remote Output Switching Setup

The last thing is to configure the base unit to send the appropriate command to the remote unit. This is setup in a similar fashion to local output switching, but the 'Switch Local Output on Alarm' and 'Switch local Output on Reset' boxes are not ticked, and the 'Remote Output (Alarm)' and 'Remote Output (Reset)' boxes must be ticked next to the contact that contains the base units' number.

The example in Fig 10.5a below shows the user configured on contact 1 (with initials ABC) and the remote unit configured in contact 2 (with initials REM).

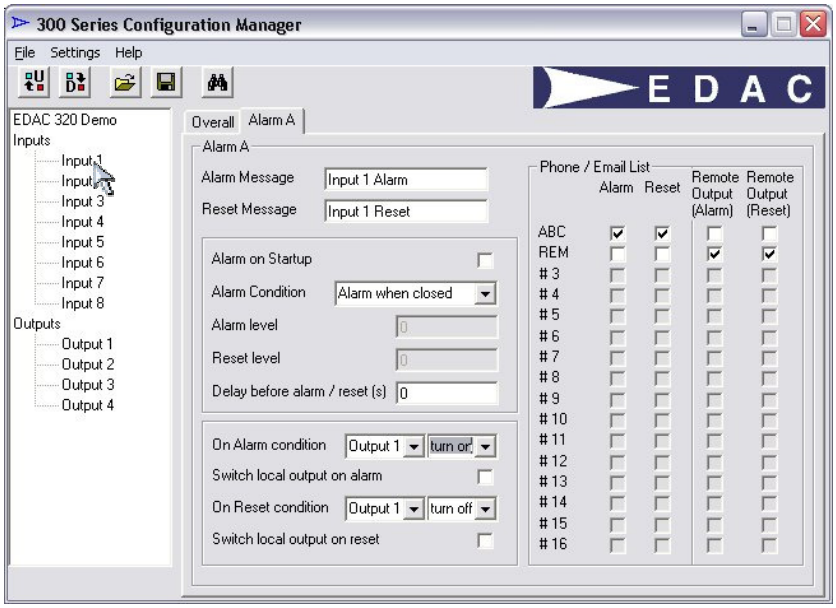

Fig 10.5a Remote Output Alarm Setup

Note how the 'Remote Output (Alarm)' and 'Remote Output (Reset)' tick boxes are used for the remote unit contact.

10.6 Power Supply Monitoring

The EDAC 320 has the ability to monitor the voltage supplied to it when running from a D.C. power supply. This feature can be particularly useful in solar powered applications as the 320 can monitor the status of the system batteries.

An input is dedicated to PSU monitoring (**when this function is enabled** for 320-NG), see Table 10.6 for the assigned input for each model type.

Model	PSU Monitoring Input
EDAC 320-NG	8
EDAC 321-NG	6

Table 10.6 PSI Monitoring Inputs for EDAC 320 and 321

There are three steps to setting up power supply monitoring, hardware setup, calibration and configuration setup.

10.6.1 Hardware Setup

EDAC 320-NG

The 'Power Supply Monitoring' Jumper needs to be enabled (moved to the 'ON' position) before this feature can be used. See section 4.2.1 for more information on changing the power supply monitoring jumper.

Note that changing this jumper to the 'ON' position disables the standard features of the PSU monitoring input (Table 10.6). Any sensors or contacts previously connected to this input will no longer operate. Any existing sensors or contacts on this input will need to be shifted to another spare input if power supply monitoring is enabled.

EDAC 321-NG

No hardware changes are required.

10.6.2 Calibration

The power supply monitoring input of the EDAC 320 needs to be calibrated before it can be used.

The calibration process requires a variable DC power supply, digital Multimeter and a PC with Microsoft Excel and a terminal program such as TeraTerm (provided on the CD-ROM).

The instructions for the calibration are included in the excel file (EDAC 300 Series-PSU Monitor Calibration) provided on the CD-ROM.

When the calibration data has been collected and entered in to the spreadsheet the upper 'Upper Sensor Limit' and 'Lower Sensor Limit' can be entered in to the unit configuration, see section 10.6.3 Configuration Setup.

10.6.3 Configuration Setup

The power supply monitoring input, table 10.6 is dedicated when the power supply monitoring jumper is changed to the 'ON' position, and as such the configuration for the input needs to be set correctly for this to function correctly.

Fig. 10.6.3 below shows the 'Input 8' configuration page in the Configuration Manager.

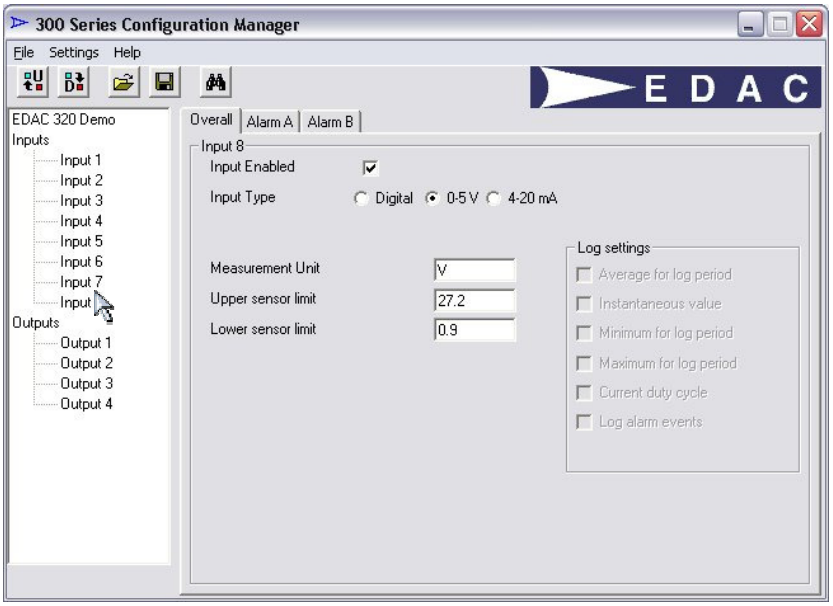

Fig. 10.6.3 PSU Monitoring Setup

Ensure the following settings and values are entered on this page:

Input Enabled	Checked
Input Type	0-5V
Measurement unit	V
Upper Sensor Limit	From calibration spreadsheet (EDAC 300 Series-PSU Monitor Calibration)
Lower Sensor Limit	From calibration spreadsheet (EDAC 300 Series-PSU Monitor Calibration)

The '**Upper Sensor Limit**' and '**Lower Sensor Limit**' values need to be copied from the "EDAC 300 Series-PSU Monitor Calibration" spreadsheet when the calibration process (see section 10.6.3) is completed.

Alarm conditions and notification messages can now be set up for the power supply monitoring. Change to the 'Alarm A' tab to configure these. Fig. 10.6.3a shows how these might be typically set up.

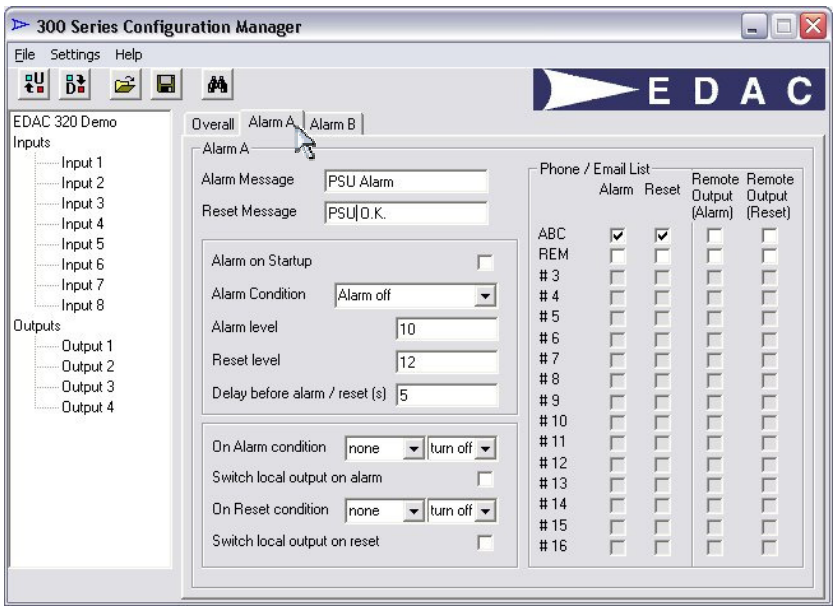

Fig 10.6.3a PSU Monitoring Alarms

Note that when the actual voltage falls below the value in the 'Alarm Level' field, the input will alarm, and when the actual voltage comes back up above the value in the 'Reset Level' field, the input will reset.

10.7 RS232 AT Commands

Some features of the EDAC 320 can be accessed through a terminal program connected to the COM port of your PC (e.g. Hyper-Terminal). The terminal session should be configured to 9600 baud rate, 8 data bits, no parity and 1 stop bit (9600 8,n,1).

It should be noted that using these commands is recommended for advanced users only. Incorrect use of these commands may render the unit inoperable.

To use one of the commands type the command into the terminal window and press enter. The EDAC 320 will respond as required.

Command	Description	Returns
RS-232 Port Settings		
ATE0	Turn the RS-232 port character echo off (default)	***OK***
ATE1	Turn the RS-232 port character echo on	***OK***
AT+CMGS?	Return the level of system reporting at initialization	***+CMGS=0*** reporting at initialization is off ***+CMGS=1*** reporting at initialization is on
AT+CMGS=?	Command format to set the level of system reporting at initialization	***=+CMGS={0,1}***
AT+CMGS=<0,1>	Set the status of the startup messages print out 0 switch reporting at initialization off 1 switch reporting at initialization on	***OK***
AT+VERBOSE?	Return the level of reporting on the RS-232 port (Manipulates the ATE and AT+CMGS commands)	***+VERBOSE=0*** port is in silent mode ***+VERBOSE=1*** reporting enabled
AT+VERBOSE=<0,1,2>	Set the level of reporting on the RS-232 port 0 - startup messages off, UART echo off 1 - startup messages on, UART echo off 2 - startup messages on, UART echo on	***OK***
AT+BAUD?	Return the current UART baud rate	***+BAUD=<xxxxx>***
AT+BAUD=?	Return available UART baud rates	***BAUD: {1200,2400,4800,9600,14400, 19200,38400,57600}***
AT+BAUD=<1200,2400,4800, 9600,14400,19200,38400,57600>	Set the UART baud rate **CAUTION**: If the baud rate is changed the settings for any attached hardware/software will also need to be changed before communications may resume	***OK*** (or ***ERROR*** if invalid baud rate entered)
AT+COMM?	Return the current UART port parameters	***+COMM=***<data>,<parity>, <stop>
AT+COMM=?	Command format to set up the UART port parameters	***+COMM:*** <data>(7,8),<parity>(O,E,N), <stop>(1,2)
AT+COMM=<7,8>,<O,E,N>,<1,2>	Set the RS-232 port settings	***OK*** (or ***ERROR*** if invalid settings entered)

Inputs / Outputs

AT+IN<x>	Return the value of an input	If the input is enabled: '***+IN***<x>***=***<alarm/reset message>***:*** <open, closed> or if the input is disabled: ***+IN***<x>***=disabled***
AT+OUT<x>	Return the state of output x	***+OUT***<x>***=***<output message>***:*** <open, closed>
AT+OUT<x>=<ON,OFF>	Switch an output on or off	***OK***

Cellular

AT+RSSI	Returns the current signal strength reading (RSSI) from the modem	***+RSSI=<xx>***
AT+CNI	Return the status of the network connection	Network connection available: ***+CNI=OK*** Network connection unavailable: ***+CNI=failed***
AT+GPRSSTATE	Return the GPRS/EDGE/HSPA state	PSD available: ***+GPRSSTATE=Idle*** PSD unavailable or not supported: ***+GPRSSTATE=UNAVAILABLE***
AT+RN	Attempt to reconnect to the cellular network	Network connection available: ***+CNI=OK*** Network connection unavailable: ***+CNI=failed***
AT+SMS=?	Command format to send SMS from the unit	***+SMS="***<contact>***",***<message><CR><LF>
AT+SMS="<phone number>",<message>	Send an SMS message to the contact specified. The contact may be a cell phone number or email address	***OK***
@AT	Enter a modem AT command (without entering through mode)	Returns reply from modem
AT+THROUGH	Enable modem through mode	***Modem through mode enabled (Ctrl+C to resume normal operation)***

Configuration

AT+PRINT	Print the unit configuration to the RS-232 port	Complete listing of the current configuration
AT+PRINTCONTACTS	Print the contacts list to RS-232 port	***phone1=***"", ***phone2=***"",… ***phone16=***""
AT+MODIFYCONTACT<x>=	Modify contact x (0-15) in the contact list	***OK***
AT+TIME=?	Print the command format to set the time to the RS-232 port	***AT+TIME="dd/mm/yy,hh:mm:ss"***
AT+TIME?	Print the current system time to the RS-232 port	***+TIME: dd/mm/yy,hh:mm:ss***
AT+TIME="dd/mm/yy,hh:mm:ss"	Set the system time	***OK*** (or ***ERROR*** is invalid parameters entered)
AT&F	Factory reset the unit	***OK***
AT&R	Hardware reset the unit	N/A

Through Mode Data Connection (CSD Only)

###	This command is only accessible when the unit has been accessed by a 'Through Mode Data Connection' (see section 10.3 for more information). ### takes the EDAC 320 out of a transparent serial link, and enters 'Command Mode', allowing access to all of the AT commands as if connected directly to the RS-232 port	N/A
AT+EXTM	This command is only accessible when the EDAC 320 has been accessed via a 'Through Mode Data Connection' (see section 10.3 for more information). After 'Command Mode' has been entered using the ### command, AT+EXTM is used to return to a 'Through Mode Data Connection (as when the connection was first established)	N/A

Data Logging

AT+LOG=<text to log>	Make an entry to the log.csv file	***OK*** (or ***ERROR*** if flash memory card cannot be accessed)
AT+REMOVEDATA	**CAUTION:** This command permanently deletes the log.csv and latest.csv files from the flash memory card	***OK*** (or ***ERROR*** if flash memory card cannot be accessed)

Print Log File to RS-232 Port

AT+PRINTLATEST	Print the log entries since the last regular update email (latest.csv) to the RS-232 port (Does not delete latest.csv)	
AT+PRINTLOG	Print the complete log file (log.csv) to the RS-232 port	All log entries
AT+PRINTLOG=<from>-<to>	Print part of the log.csv file to the RS-232 port from and to can be a date, date and time or a keyword date and time: yyyy/mm/dd hh:mm:ss date: yyyy/mm/dd start of log file (first entry): Start end of log file (last entry): End	Log entries for the requested time range
AT+PRINTSYSTEM	Print the complete system log (system.log) to the RS-232 port	All system log entries
AT+PRINTSYSTEM=<from>-<to>	Print part of the system.log file to the RS-232 port from and to can be a date, date and time or a keyword date and time: yyyy/mm/dd hh:mm:ss date: yyyy/mm/dd start of log file (first entry): Start end of log file (last entry): End	System log entries for the requested time range
AT+PRINTEVENT	Print the complete event log (alarm.log) to the RS-232 port	All event log entries

AT+PRINTEVENT=<from>-<to>	Print part of the alarm.log file to the RS-232 port from and to can be a date, date and time or a keyword date and time: yyyy/mm/dd hh:mm:ss date: yyyy/mm/dd start of log file (first entry): Start end of log file (last entry): End	Event log entries for the requested time range
AT+PRINTERROR	Print the complete error log (system.log) to the RS-232 port	All error log entries
AT+PRINTERROR=<from>-<to>	Print part of the error.log file to the RS-232 port from and to can be a date, date and time or a keyword date and time: yyyy/mm/dd hh:mm:ss date: yyyy/mm/dd start of log file (first entry): Start end of log file (last entry): End	Error log entries for the requested time range

Email Log Update Parameters

AT+EMAILRETRYTIMER?	Return the value of the email retry timer for regular log updates. **This timer is not enabled by default**	If the timer is disabled: ***The timer is disabled*** If the timer is enabled: ***The timer is set to x minutes***
AT+EMAILRETRYTIMER=<x>	Set the retry timer for regular email log updates to x minutes	***The timer is set to x minutes***

Email Log File

AT+EMAILLATEST	Email the log entries since the last regular update email (latest.csv) to the update email address (Section 6.3.4). Does not delete latest.csv	***OK*** (or ***ERROR*** is email fails to send)
AT+EMAILLOG	Email the complete log file (log.csv) to the update email address in the configuration (Section 6.3.4)	***OK*** (or ***ERROR*** is email fails to send)
AT+EMAILLOG=<from>-<to>	Email a section of the log file to the update email address in the configuration (Section 6.3.4) from and to can be a date, date and time or a keyword date and time: yyyy/mm/dd hh:mm:ss date: yyyy/mm/dd start of log file (first entry): Start end of log file (last entry): End	***OK*** (or ***ERROR*** is email fails to send)
AT+EMAILSYSTEM	Email the complete system log (system.log) to the update email address in the configuration	***OK*** (or ***ERROR*** is email fails to send)
AT+EMAILSYSTEM=<from>-<to>	Email a section of the system log (system.log) to the update email address in the configuration (Section 6.3.4) from and to can be a date, date and time or a keyword date and time: yyyy/mm/dd hh:mm:ss date: yyyy/mm/dd start of log file (first entry): Start end of log file (last entry): End	***OK*** (or ***ERROR*** is email fails to send)
AT+EMAILEVENT	Email the complete event log (alarm.log) to the update email address in the configuration	***OK*** (or ***ERROR*** is email fails to send)

AT+EMAILEVENT=<from>-<to>	Email a section of the event log (alarm.log) to the update email address in the configuration (Section 6.3.4) from and to can be a date, date and time or a keyword date and time: yyyy/mm/dd hh:mm:ss date: yyyy/mm/dd start of log file (first entry): Start end of log file (last entry): End	***OK*** (or ***ERROR*** is email fails to send)
AT+EMAILERROR	Email the complete error log (error.log) to the update email address in the configuration	***OK*** (or ***ERROR*** is email fails to send)
AT+EMAILERROR=<from>-<to>	Email a section of the error log (error.log) to the update email address in the configuration (Section 6.3.4) from and to can be a date, date and time or a keyword date and time: yyyy/mm/dd hh:mm:ss date: yyyy/mm/dd start of log file (first entry): Start end of log file (last entry): End	***OK*** (or ***ERROR*** is email fails to send)

11. Glossary

SMS
SMS (or **S**hort **M**essage **S**ervice) is a text message delivery service on cellular networks. The EDAC 320 uses SMS messaging as it primary means of communication

SIM
A SIM card (or **S**ubscriber **I**dentity **M**odule) is a small card used on GSM and UMTS cellphone networks. The SIM card contains information about the account that the phone is connected on, as well as the number of the phone.

GSM
GSM (or **G**lobal **S**ystem for **M**obile communications) is a second generation (2G) cellular communications network scheme, used commonly by Vodafone. GSM is an accessible, highly reliable, standard for voice, picture/video and data communications.

UMTS
UMTS (**U**niversal **M**obile **T**elecommunications **S**ystem) is a third generation (3G) mobile cellular technology for networks based on the GSM standard.

Pre-Pay
'Pre-Pay' is a way of paying for cellular services. A device connected on a 'Pre-Pay' account is 'topped up' with credit, which is used up when services are accessed. 'Pre-Pay' is useful for non-critical monitoring and control applications; however care is advised when using 'Pre-Pay' in critical applications. This is due to the fact that if the device runs out of credit, NO communications will be allowed by the network.

CSD
CSD (or **C**ircuit **S**witched **D**ata) is a term for communications that occur through cellular networks. The EDAC 300 series of products use CSD for transparent communications with externally connected devices.

PSD
PSD (or **P**acket **S**witched **D**ata) is a packet oriented mobile data service on 2G (via GPRS or EDGE) and 3G (HSPA or HSPA+) cellular communications systems. The EDAC 320-NG and 321-NG use PSD for email updates and alarms.

GPRS, EDGE
GPRS (or **G**eneral **P**acket **R**adio **S**ervice) is a means of transmitting internet data through 2G GSM cellular networks. GPRS is the underlying technology for premium mobile services such as picture messaging, video messaging and mobile internet technologies.

HSPA (HSDPA, HSUPA), HSPA+
HSPA (or **H**igh **S**peed **P**acket **A**ccess) is a means of transmitting and receiving data through 3G WCDMA cellular networks. HSPA is an amalgamation of HSDPA (**H**igh **S**peed **D**ownlink **P**acket **A**ccess) and HSUPA (**H**igh **S**peed **U**plink **P**acket **A**ccess).

Digital input
A digital input is used to monitor the state of various pieces of equipment. A digital input has two different states, on and off (or open and closed), one state indication a normal condition, the other indicating an alarm condition.

N.O.
N.O. (or **N**ormally **O**pen) is a type of digital input where the open (or off) state indicates a normal condition and the closed (or on) state indicates an alarm condition.

N.C.
N.C. (or **N**ormally **C**losed) is a type of digital input where the closed (or on) state indicates a normal condition and the open (or off) state indicates an alarm condition.

Analogue
Analogue is a type of input, consisting of a variable voltage or current signal over a specified range.. The analog signal can be scaled and converted into 'Real World' values, meaning the readings come back in the actual units that are being measured (i.e. temp = *C or pressure = kPa). Alarm and reset points are can be assigned in real world units. When these points are crossed, notification messages can be sent.

4-20mA
4-20mA is a type of analog signal, consisting of a constant current feed. 4-20mA is probably the most commonly used type of analog signal due to the fact that it can be run through cable over relatively long distances without severe degradation in signal.

0-5V
0-5V is a type of analog signal consisting of a constant voltage. 0-5V is a less commonly used type of analog signal, mostly due to the fact that any cable used to transmit the signal needs to be kept relatively short due to the fact that part of the signal can be 'dropped' over long cable runs affecting the performance of the sensor. 0-5V has an advantage however in that the signal can be fed into multiple display or monitoring units (such as the EDAC 320).

Loop Powered
Loop powered is a type of 4-20mA analog sensor which draws its power supply form the input terminal of the EDAC 320 (sometimes referred to as parasitic power).

Sensor Powered
Sensor powered is a type of 4-20mA analog sensor which draws its power from an external supply, different from the supply to the EDAC 320.

Alarm Level
Alarm is a pre-defined condition, detected by an input sensor, which will initiate notification messages.

Reset Level
Reset is a pre-defined condition, detected by an input sensor, which will initiate notification messages.

Contacts
Contacts are entries in the EDAC 320 to where the 320 will send alarm and reset notification messages, as well as other system and logged information. EDAC 320 contacts can be made up of either cellular phone numbers or email addresses.

RSSI
RSSI (or '**R**eceived **S**ignal **S**trength **I**ndication') is an indication of the strength of the cellular network signal. RSSI is read on a scale of 0 (no signal) to 31 (Perfect signal).

SMA
SMA (or '**S**ub-**M**iniature version **A**') is the type of connector used for the EDAC 320's cellular antenna or aerial connection. SMA is the most commonly used connector type for cellular modems and telemetry devices.

dbi
dbi is a term used for measuring the performance of a particular type of aerial. The dbi rating indicates how sensitive the aerial is i.e. how well it can listen for signals. The most commonly used aerials will have a dbi rating between 1 and 6 dbi, however some aerials (Yagis for example) can have a dbi rating of up to 20.

Jumper
A jumper is a connector device used to change the hardware configuration of the inputs on an EDAC SMS 300. The Jumper consists of three (or more) metal pins protruding from the circuit board at right angles, and a piece of plastic coated metal which slides over two (or more) of the pins, connecting them together.

RS-232 Serial
RS-232 (or serial) is a communications protocol used by computers for sending and receiving information. RS-232 is commonly used for configuring devices, such as the SMS 300, from Windows based PCs.

DB9
A DB9 is a type of connector most commonly used for RS-232 (serial) connections. The connector is named because of its 'D' shaped outer shell and the 9 connectors pins.

COM (Communications) Port
A COM port is a common name for an RS-232 port on a P.C. or laptop. COM ports are becoming less frequently fitted to PCs with USB becoming the preferred method for communications with external devices.

Baud Rate
Baud rate refers to the speed of an RS-232 connection. Baud rate is also sometimes referred to as bps (or '**B**its **P**er **S**econd').

USB
USB (or **U**niversal **S**erial **B**us) is a communications interface which has become very common on PCs. USB is used to connect to everything from keyboards and mice, to printers, scanners, faxes and modems. The EDAC 320 has a built in USB interface which when installed properly will emulate a COM port on the PC, allowing the 320 to be configured from PCs that do not have a RS-232 interface.

SD Memory Card
SD (or **S**ecure **D**igital) is a type of flash data card used by the EDAC 320 to store log files. SD cards are commonly found in digital cameras and MP3 players. Information on an SD card can be accessed by inserting the card into a PC with a card reader installed.

MMC Memory Card
MMC (or **M**ulti **M**edia **C**ard) is a type of flash data card. MMC cards are compatible with most devices that support SD cards. The EDAC 320 supports both SD and MMC data flash cards.

12. Product Support

For end-user level customer support, contact your local distributor or installer.

13. Notes

14. Document History

Version	Date	Author	Notes
1.0	07/10/2011	Sam Lea	For use with version 3.20.4 and 3.21.4 firmware and above
1.1	14/10/2011	Sam Lea	Update to section 10.6 – PSU monitor calibration
1.2	09/11/2011	Sam Lea	Correction to 321 input specifications
1.3	30/01/2012	Sam Lea	Notes on pulse inputs added to section 6.4.3 “Latest” keyword removed from email sms commands “email latest” SMS command added “remove data” SMS command added AT command list updated