Tide Level Monitoring Instrumentation

The following documentation details the electrical installation for the tide level monitoring instrumentation and also a summary of the logger configurations required to enable the system to report data automatically by E-mail across the Internet. Full product manuals and additional details can be found on the Web at:

NDACS Logger: www.keynes-controls.com/ndacsman/ndacs6000manv1010.doc
Wavecom Modem: http://www.wavecom.com/Products_V2

Acoustic Sensor

SPECIFICATION	MICROFLEX-C
Measuring Range	0.3 - 8 m
Enclosure	IP67 Glass filled nylon
Power Supply	12 - 30 VDC (loop powered)
Output	4-20 mA into 750 Ohms
Relays	None
HART Protocol	No
Integral LCD display	4 digit LCD
Cable Entries	2 x M20x1.5mm entries
Transducer Material	PVDF
Process Connection	2" BST
Resolution	1 mm
Accuracy	+/- 3mm
Operating Temperature	-20 to 70 Deg C
Operating Pressure	3 bar max
Temp Compensation	Yes
Maximum Separation	3000 m
Weight	850 g
Approvals	CE to EN50081-1 CE to EN50082-2
Total System Power	20W

DATA LOGGER

Power Supply	12-20 V DC @ 3W
No of Channels	8 Diff or 16 Diff depending upon specified model
Data Loggers	2 Independently Configurable Recorders General Logger - 13,000 Records 8 Channel Unit 6,500 Records 16 Channel Unit event Logger - 13,000 to 3 million records (Permanent data storage)
Logger Sample Rate	General Logger - User Defined - 1 sec to 3600 Sec (Hour) Event Logger 0.1,1,10,60,600,3600 Sec
Data Reports	Automatic E-mail Reports configurable for Hourly, Dairly, Weekly, Monthly, No Records FTP Server for dial-in data download
File Format	Comma Separate Variable CSV
Modem Support	GSM Mobile Phone with data link, GSM Modem, Hayes compatible Modem
Sensor Inputs	RTD, Thermocouples, Voltage, Current, Restistance, Strain Gauges, Load Cells, Current Loop 4-20 mA and 0-20 mA
Status Messages	Isalive (Dated Report) OnBootup (when unit restarts)
Network Ports	Ethernet Port, RS232 Modem Port, Internet Ready
ADC Resolution	24 Bit ADC - 16 Million Levels
Input Range	0,25mv, 50mV, 100mV, 500mV,1V, 5V
Sample Rates	1 to 100 Hz for 8 channel systems 1 to 50 Hz for 16 channel systems
WebServer	Systems Configuration and Data Viewing

Connecting Mains Electrical Power

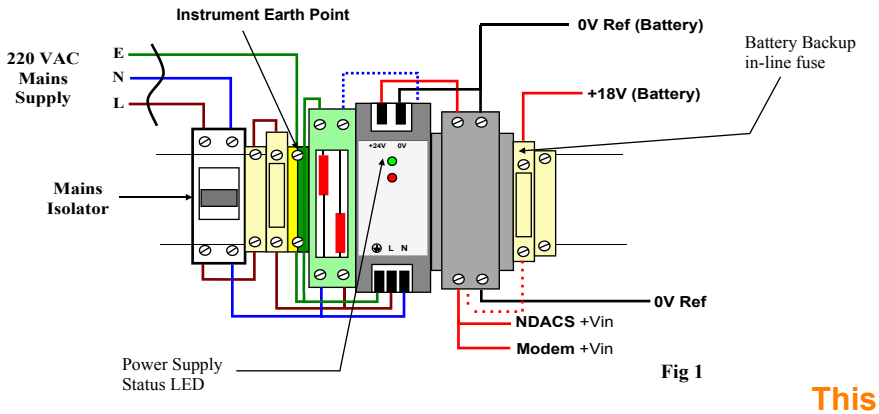


Fig 1

Step 1) Ensure that the mains power supply is switched off before connecting mains power cable to the instrumentation.

Step 2) Connect the Live and Neutral power cables to the isolator switch. **Brown** (Live) **Blue** (Neutral)

Step 3) Power On the Instrumentation and the Green status LED on the 24V DC power supply and logger unit and also the Red status LED on the modem will be illuminated.

Do not touch the instrumentation with wet hands or allow water into the enclosure.

This System must be Earthed

This system uses mains power. Only suitably qualified personnel should make any changes to the system when the instrumentation is powered from the mains and the enclosure is open.

Electric Shock Hazard

Connecting Battery Backup To Instruments

Connecting the batteries to the instrumentation is straight forward.

Ensure that the +18V battery lead goes to the Red Tab (+) and the 0V Ref goes to the (-) Tab

Step 1) Connect the + 18V DC battery lead from the battery backup in-line fuse(Red cable with crimp socket to the + on the battery

Step 2) Connect the 0V Ref to the Battery (-) Tab. The battery OV Ref cable is the black cable containing the crimp terminal.

KEYNES CONTROLS

Electrical Systems Components

The following section details the different electrical components and their specifications making up the Tide level Monitoring system. When replacing the fuses and to ensure that the systems is protected ensure that only components to the defined rating are used.

Only technical competent personnel should work on this system. Do not touch the instrumentation with wet hands. Ensure that the system is Earthed at all times. Remove the mains power using the isolator before adjusting any cabling.

Battery Interface

The battery interface module is used to trickle charge the lead acid batteries used to provide alternative power to the NDACS data logger in case of mains supply failure. When the mains power supply is disconnected the output from the battery pack is connected automatically to the to the NDACS logger and WaveCOM modem. No loss of data will occur when the batteries are switched in. The charge current is approximately

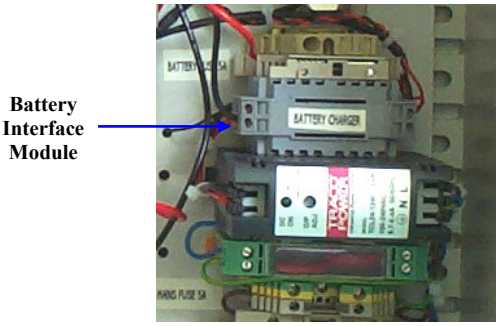
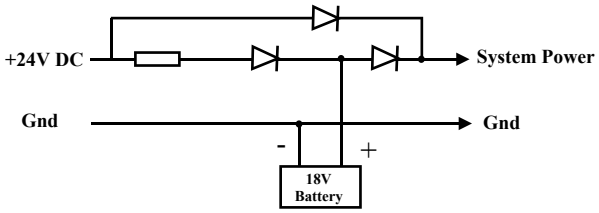


Fig-2

Pin-out

A = System Power	**B = Battery +**
C = Gnd	**F = Gnd**
G = Gnd	**H = +24V DC**



Battery Back-up In-line Fuse

Rating **5A**

The lead acid battery positive power lead contains an in line 5A fuse to act as a current limiter and switch. The fuse protects the batteries in case of supply failure and limits the amount of current that can be drawn in case a short circuit appears on the supply to the instrumentation and protects the batteries.

To remove the fuse simply lift the fuse restrain lever. This action will power off the instrumentation after removing the mains supply.

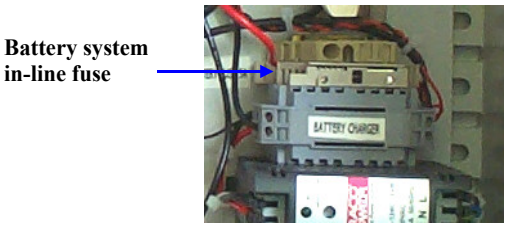


Fig-3

Fig-4

Mains Supply Fuse

Fig 3 shows the mains supply fuse. Remove the fuse to isolate the instrumentation from the mains supply.

Removing this fuse with the battery pack connected will force the instrumentation to run from the batteries.

Rating 5A

24V DC Power Supply

Fig 4 shows the 24V DC power supply used as the power supply for the instrumentation when operating with mains electrical power. The power supply contains a green status LED which is illuminated when operating on mains electricity but off when the instrumentation running on batteries.

Fig-5

KEYNES CONTROLS

Instrumentation Earth Point

The instrumentation has a central earth point and the external earth must be connected here. It is not recommended to use the system without the earth being connected. The Earth point utilises the industry standard **Green/Yellow** DIN Earth Tag.

Instrumentation Must Have An External Earth Connection.

Transient Protection

The transient protection module fitted into the instrumentation protects against spikes in the mains power supply and lightening strikes to the mains input cables.

The transient protection is provided by a varistor module supplying protection across the Live - Neutral and Neutral - Earth mains connections. A transient will cause the main input fuse, see Fig X to fail.

Wiring Schematic & Component Layout

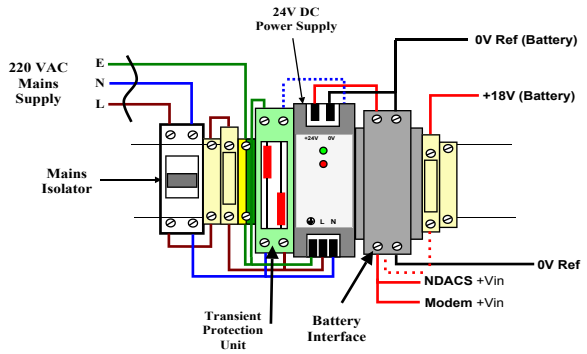
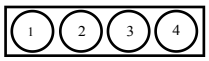


Figure 8 - General System Wiring Schematic

Pin-outs looking into logger Input



0V -Vin +Vin 2.5V Ref

Sensor Deployment

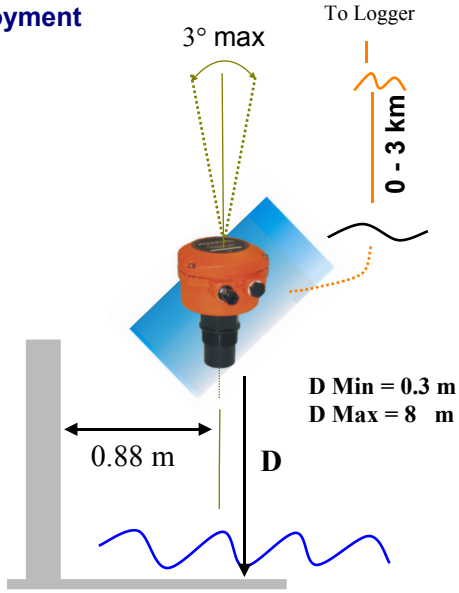


Fig 10

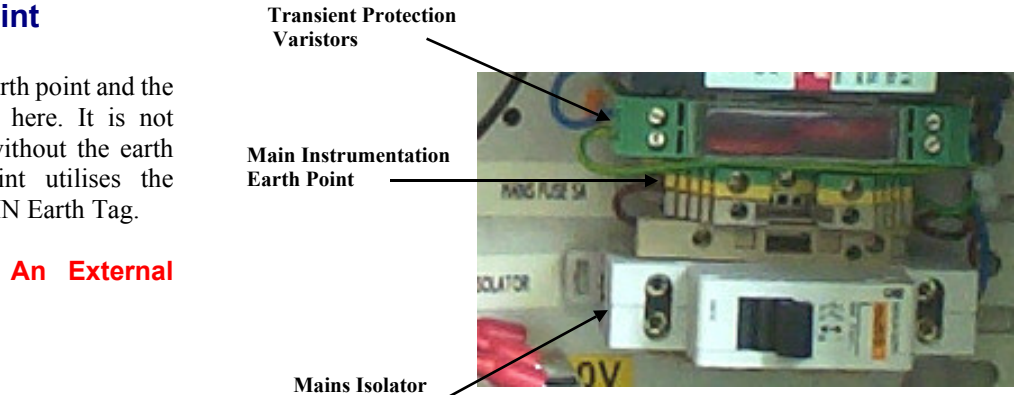


Fig 6

Mains Isolator Switch

The mains isolator switch power on and off mains supply to the instrumentation and isolates both the Live and Neutral mains inputs.

Current Loop Interface

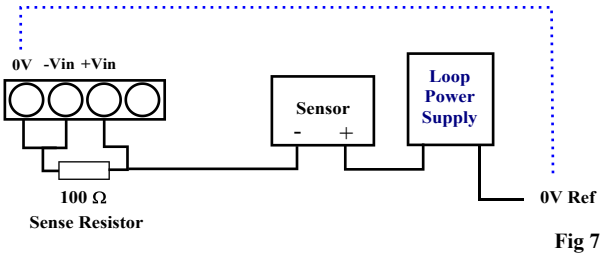


Fig 7

Level Sensor Power

The acoustic level sensor uses a powered current loop to obtain power and and pass signal information to the logger. As shown in Figure 7 the height signal in the form of the current loop is converted into voltage across the sense resistor before being recorded by the logger.

The 24V Power supply and the 0V Ref on the logger unit complete the current loop.

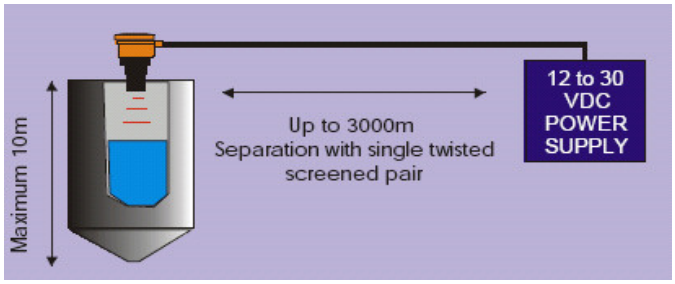


Fig 9

The acoustic sensor can be deployed up to 3 Km away from the logger unit when using a 4-20 mA current loop to pass signals to the logger for recording purposes.

The acoustic sensor should be deployed approximately 1 m from any supporting walls to prevent false readings

Modem to Logger Interface

The Wavecom GSM modem connects to the NDACS logger by the 9 pin D connector located on the rear of the logger unit to the 15 pin D connector mounted on the base of the Wavecom Modem.

Remote Antenna Installation

A low profile SMA connector on top of the modem connects the remote antenna mounted on top of the IP67 Polycarbonate enclosure to the modem unit. The remote antenna mount passes through the hole cut into the top of the enclosure.

Mounting External Antenna

The external rubber antenna screws tightly onto the base unit once the remote antenna stub is passed through the Poly-carbonate enclosure through the hole provide above the modem. Ensure that the antenna is tightly attached so that no water can ingress around the mounting

Keynes Controls recommends fitting silicon grease around the external antenna mount above the modem at the top of the enclosure.

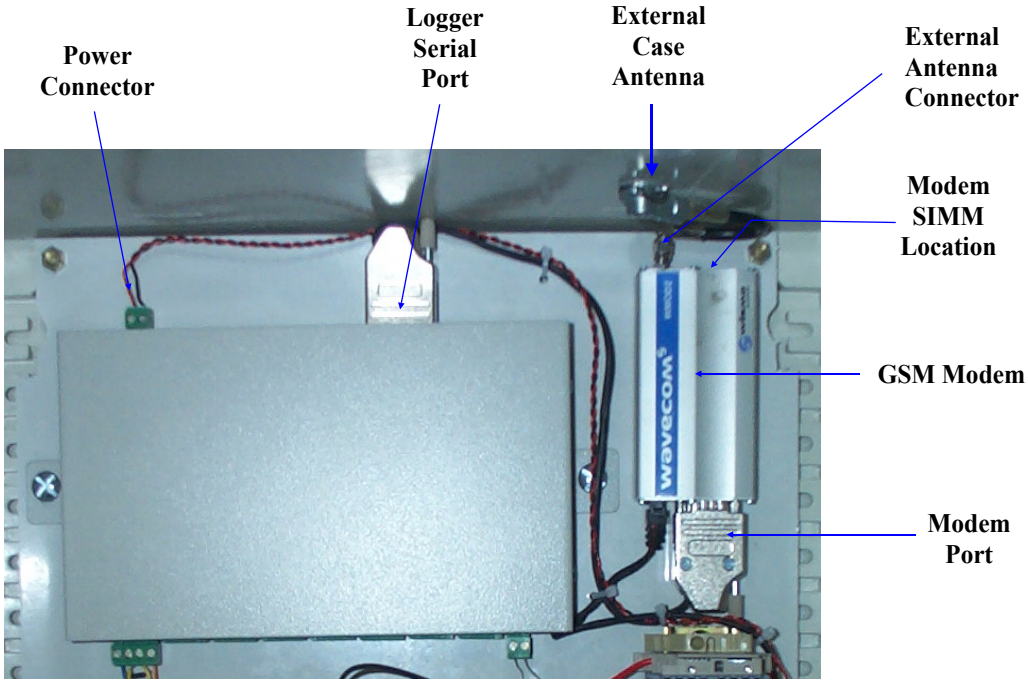


Fig 11

Software Configuration

The following notes detail setting the logger unit to process and display the tide information. Process options are available for real-time and averaged results. The real-time tide level results should be able to show wave as well as tide information.

System Setup

The NDACS logger has been configured to accept an input signal from a level sensor in the range of 1 to 8 m representing a signal of 4 - 20 mA loop signal from the water level sensor.

The 4 - 20 mA current loop gives an input to the logger of 0.4 to 2V across a 100 Ohm precision sense resistor. It is not possible to know in advance how the level sensor will be deployed or how the results are to be shown to an operator

What is going to be demonstrated by example is how the logger can be configured to allow representation of the input signal to show results in easily understandable format.

Process options

The Tide level sensor can be used on 2 process options, Scaled Current (Averaged) and Scaled Current. The Scaled Current option gives real-time results. The Scaled Current (Averaged) gives the average value of a defined time period. The (Averaged) option is used to remove the spray and wave effects on the tide information.

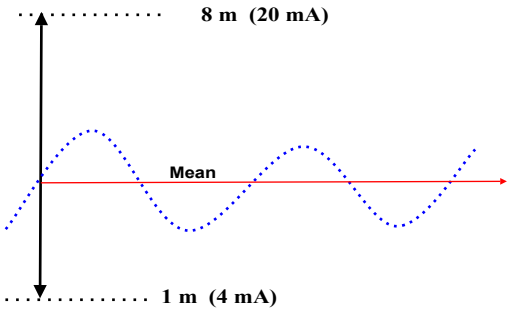
Scaled Current - Averaged

This process option averages the results from the input sensor over a defined period typically 1 minute. When used with the level sensor the wave effects and water spray are removed.

A = Sense Resistor (typically 100 Ohm)
B = 0.004 (4 mA) C=0.02 (20 mA)
D= Range for 4 mA input
E= Range for 20 mA input
F = Averaging Period (seconds)

Example 1. For the supplied Tide level sensor with a range of 1 to 8 m used to determine tide measurements over a period of 1 minute then the configuration parameters are:

A = Sense Resistor (typically 100 Ohm)
B = 0.004 (4 mA) C=0.02 (20 mA)
D= 1
E= 8
F = 60 (Averaging period in seconds)



Example 2. Display the tide range in engineering units over a range of 1 to 8 m with a mean (datum) level representing 0 m at a height of 3.5 m (mid point) of operation of the level senor.

Process Option: *Current Scaled - Average*
A = Sense Resistor (typically 100 Ohm)
B = 0.004 (4 mA) C=0.02 (20 mA)
D= -3.5
E= 3.5
F = 60

Notes regarding Process Options

Direct :- shows value across sense resistor in volts

Current Scaled :- Shows engineering results for defined current input parameters

Current Scaled (Averaged) :-
Shows engineering results for define current input parameters averaged over a defined logging period.

Web Page Configuration Of the Logger

The NDACS logger operations are fully configurable using the instruments in built web pages. The following instructions only detail what is required to configure the logger to record data and report automatically using the GSM modem. For any additional information regarding the logger operations see the NDACS manual.

Accessing the Logger Web Pages

to access the looger web pages enter the command

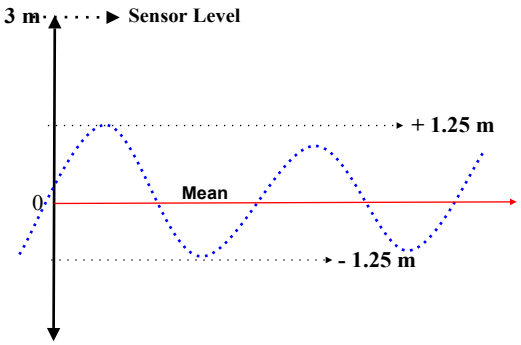
http:// Instrument IP-Address

Example. Logger with IP address 23.0.0.95

http://23.0.0.95 into the address bar of a web browser.

As long as the network of the analysis PC is suitably configured then the instrument web pages will now appear.

Example 3. The average tide range in Hong Kong is 2.5m. and if the the tide level sensor is deployed at 3m above the mean tide level and is to show water levels representing levels + Value for levels greater than mean level and - Value in meters for levels below the mean tide level then the following process options are to be used



Process Option: *Current Scaled - Average*
A = Sense Resistor = 100 (typically 100 Ohm)
B = 0.00799975 C=0.0131428
D= 1.25
E= -1.25
F = 60

where 0.00799975 represents current at 1.75 m below sensor & 0.0131428 represents current 4.25 m below sensor. Note 1.75 m below sensor represents range of 1.25 m above mean and 4.25 represents 1.25 m below mean level.

Note. The full range of the tide sensor is 4 - 20 mA representing a signal of 1 to 8m.

Therefore: 16mA = 7 m (range)

16/7 = 1m

so 2.5 m tide range = 16/7 * 2.5

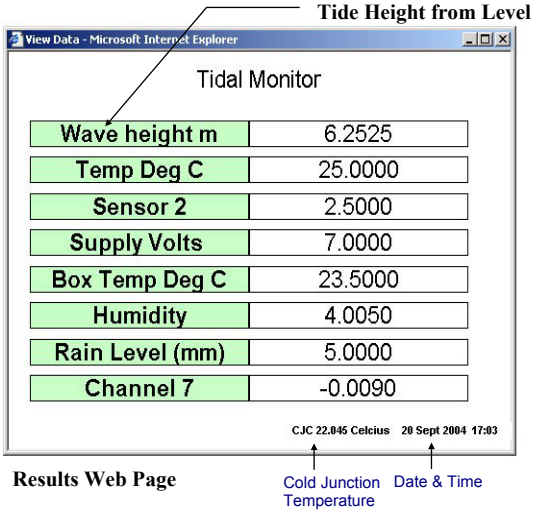
The range of the signal will be

Min range = 3 - 1.25 = 1.75 m = 16/7 * 7/4 + 4 mA = 8mA

Max range = 3 + 1.25 = 4.25m = (16/7)*17/4 + 4 mA = 13.714

so Min = **8mA** and Max = **17.714 mA**

Note. 4 is the offset in 4-20 mA current loop.



Results Web Page **Fig 14**

Figure 14 shows a typical real-time display instrument web page.

Default Password

A password is required to access the instrument web pages.

Enter the password "**view**" (lower case) to enter the logger unit in order observe the real-time information and to download the archived data.

For full operational access contact the unit supplier for the default system password used to allow full system configuration.

File Transfer

Press File Transfer button on the Default instrument web page.

No matter which communications link to the instrument is used the same file transfer web page, see Fig 16 is presented to control the file download operations.

The archived data can be observed in a web page, stored to a file on a computer system or loaded directly into a spread sheet. No matter how the General Logger recording rate is configured up to 30 individual data files are recorded representing up to 1 month of data.

FTP and HTTP file transfer operations are standard features of most modern operating systems including the Microsoft Windows and Unix.

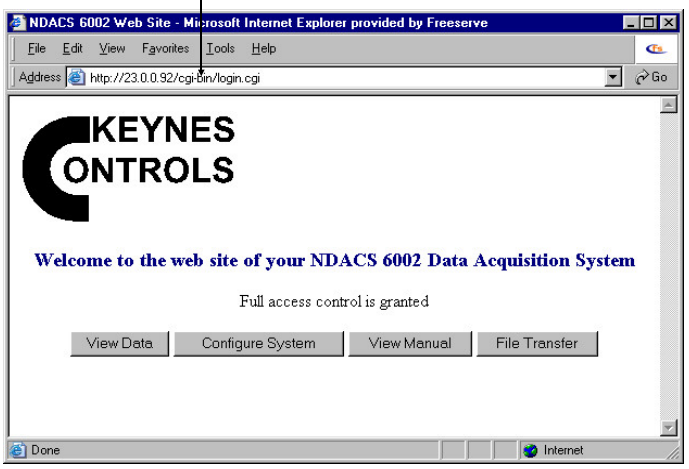
To **download** data simply move the mouse pointer over the FTP or HTTP hyperlink tag adjacent to the file to be downloaded and select the **right mouse button**.

A new window will appear with options to Open, Open Data File in new window, Store to file to disk, or to print file.

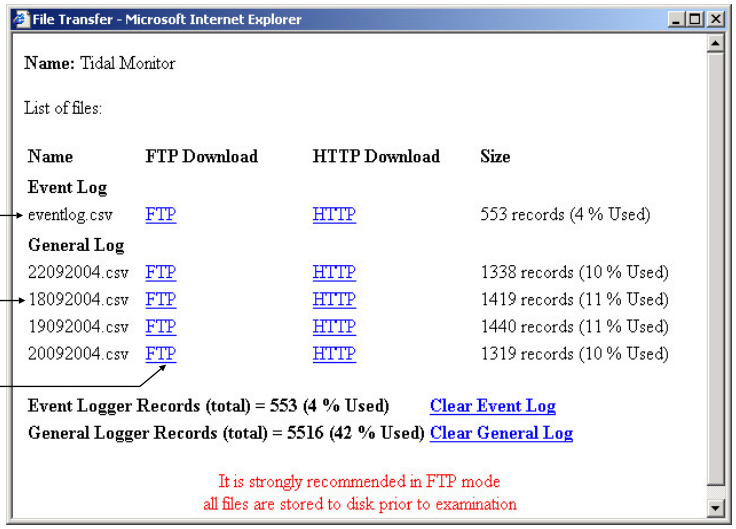
Activate the desired task.

Opening the data file in a new window should load the archive data into a web browser for examination.

Instrument IP Address



Default Instrument Web Page **Fig 15**



Event Log File Flash Memory

General Purpose Time Stamped Data Files

FTP File Hyperlink tag

File Transfer Web Page

Modem Configuration For Dial-up ISP

The NDACS logger can be configured to automatically E-mail data and status messages to an operator by using a dial-up ISP (Internet Service Provider) account. For this to happen the logger must be configured to connect to the Internet.

Select the ***Modem*** Configuration Window

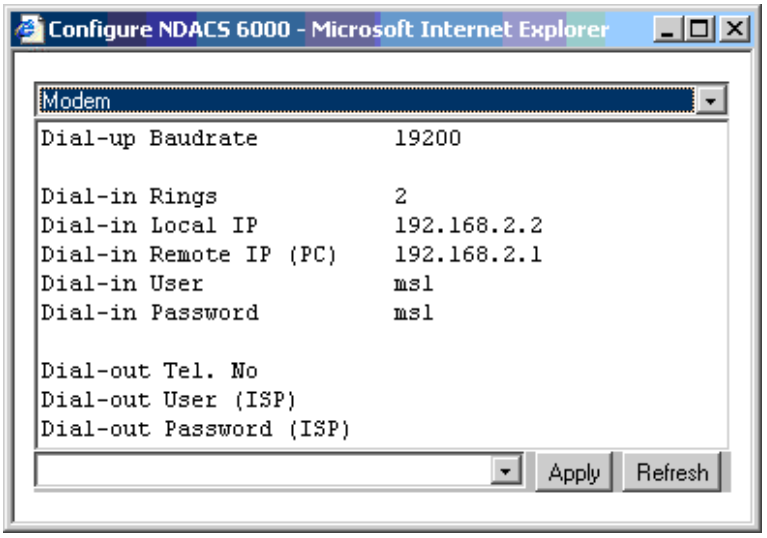
Enter "**Dial-out Tel, No**" as the ISP telephone number
Enter " **Dial-out User (ISP)**" ISP User Name
Enter " **Dial-out Password (ISP)**" ISP Password

Select the ***Auto Reporting*** Configuration Window

Set "***Instrument E-mail Setup***" option to **Dial-out**.

Enter "***SMTP IP***" This address is supplied by ISP
Enter "**Instrument E-mail Address**"

E-mail address to be used to identify instrument. Can be **User Defined** but may be assigned by ISP



Enter "***User E-mail Address***"

This is the address where data from the instrument is sent. Multiple E-mail addresses can be defined by

User1 E-mail Address; User2 E-mail Address; etc.

For fully detailed example see NDACS manual at

www.keynes-controls.com/ndacsman/ndacs6000manv1010.doc