

# **SCADAWave Manager Diagnostics User Manual**



**SCADAWave**

**CONTROL  
MICROSYSTEMS**

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PID 350024

- **ER50 & ER55 Remote Data Radio**
  - **EB60 Base Station**
  - **EH70 Hot Standby Base Station**
  - **MR40 Remote Data Radio**
  - **Ultra KR50 Data Radio**
-



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## Part A - SCADAWave Manager Diagnostics - Introduction

### Introduction

This section covers the operation of the Remote Diagnostic and Network Management Controller Software called SCADAWave Manager.

### Overview

The Diagnostic Controller is a Windows® based program, that can be run on a standard desktop or laptop PC.

The software runs in the 32-bit Windows environment and offers many options and configurations which are easily accessible via pop-up windows. These include group or timed polling, remote switching of duplicated base stations, viewing of data bases, logging and trending of real time parameters , etc.

The Diagnostic Controller can be installed to run as a stand-alone package, or as part of the SCADAWave Manager Software (See E,M or Ultra-Series User Manuals for more details on the SCADAWave Manager Software).

It is for use in conjunction with the E,M & Ultra-Series of data radio modems. The diagnostic facilities allow retrieval of critical radio parameters from each radio modem.

The use of the diagnostics facilities provided by the controller gives the radio modem system designer and operator a powerful tool for both the maintenance and fault finding in a system.

The general operating parameters that can be obtained from remote modem units are:-

- Last RSSI level.
- Last transmitted power level.
- Receive frequency offset. (E-Series Only)
- Power supply voltage level.
- Current internal temperature.

These are displayed on the controllers screen in a “quick read” format of bar graphs, as well as detailed response listings.

For radio modems to work with the SCADAWave Manager Diagnostics software, they must have the diagnostics option installed. This can be ordered with the product or installed at a later stage via the configuration programmer (E & Ultra-Series only). Contact your supplier for further details.

The SCADAWave configuration programmer can be used to verify the diagnostics option is installed in the radio modem. If the diagnostics option is installed, it will be stated in the Unit Information dialogue box when the radio modem is “Read”.

### Features

- 32-Bit Windows Based User Software.
- Full graphical presentation.
- Full SCADA style features such as database, trending, networking, etc.
- Able to interrogate and display important operating parameters of each radio modem.
- Provides performance data of any radio modem - good frames received, bad frames received, packet error rate, transmitted packet sizes, channel usage, etc. (E-Series Only)
- Provides statistical Packet Error Rate (PER) performance calculations for any unit.
- Provides powerful network tools such as channel occupancy statistics, average received transmission duration, etc.
- Can be set to background poll radio system for continuous system monitoring and logging.
- Provides full time/date stamped Status and Alarm logging/reporting. A relational database is created and managed using Microsoft Jet database engine Ver3.5. The database file, which is an “.mdb” file, can be accessed with external programs such as Microsoft Access.

## Installation

### Programmer and Diagnostics Utilities

The SCADAWave Manager Diagnostics software is normally shipped as part of the SCADAWave Manager Diagnostics which includes the E, M & Ultra-Series programmers. It can be downloaded from the support section of the Control Microsystems website as an individual zipped executable package. This user manual covers the installation as part of the SCADAWave Manager Software.

Please take a moment to read this important information before you install the software.

The installation of this Software Suite is a 2-step process.

Step 1 completes the typical installation of the SCADAWave Manager Software and will install the E, M & Ultra-Series Programming Software together with documentation for all relevant products.

Step 2 installs the SCADAWave Manager Diagnostics and is optional. This step is only required if your radios have Remote Diagnostics enabled.

#### STEP 1: Installation - SCADAWave Manager

Note: If a previous version of the SCADAWave Manager Diagnostics has been installed on your PC, you must uninstall it via Control Panel "Add/Remove Programs".

- Close down all other programs currently running.
- Place the CD-ROM in the drive on the PC.
- Using Windows Explorer locate the files on the CD-ROM.
- In Windows Explorer double click on the file called SCADAWaveManager\_Rxxx\_Installer.exe
- After the installer starts follow the directions.

#### STEP 2: Installation - SCADAWave Manager Diagnostic Software [Optional]

Note: If a previous version of the SCADAWave Manager software has been installed on your PC, you must uninstall it via Control Panel "Add/Remove Programs".

- Close down all other programs currently running.
- Place the CD-ROM in the drive on the PC.
- Using Windows Explorer open the "Diagnostics" directory on the CR-ROM.
- Double click on the file called setup.exe
- After the installer starts follow directions.

## SCADAWave Manager Front Panel

When started the SCADAWave Manager front panel appears. The larger buttons permit each of the three utilities to be started. The diagnostics button may be greyed out if this utility has not been installed or found in the correct file directory. Access to local help and an exit facility are provided by the remaining 2 buttons.

Diagnostics will start when you click on the "Diagnostics" button.



## Part B - Operating Instructions

### Introduction (Polled Diagnostics)

The diagnostics process is based on a series of polls being transmitted to the remote radio modem with each having its own unique assigned address (based on the serial number) which is factory preset.

When a diagnostic poll is received by a radio modem it checks to see if it is addressed to itself, and if so, it responds with its diagnostic data back to the SCADAWave Manager Diagnostics software. If it is not addressed to itself, the radio modem simply "passes the message on", and does not respond to the diagnostics software. In a multi layer system, several "pass on's" may occur before the destination radio modem is reached.

The radio modem's diagnostic response message is addressed to the SCADAWave Manager Diagnostics software, and as each radio modem in the "chain" decodes this message it will "pass it back", eventually the message reaches the SCADAWave Manager for processing.

The SCADAWave Manager uses a database to hold the radio modem units associated data [i.e. Serial number, assigned name, location, alarm limits, SID code address, base station pairing information, status poll response data, alarms, etc].

The radio modems address is the serial number of the radio modem which is factory preset. The name is any name that the user wishes to attach to the radio modem. This name is then used to address the unit for access to diagnostic facilities.

The responses from the radio modem must have boundary limits placed on them. If a response is outside these limits then an alarm is raised. For instance, the DC supply volts can have a lower limit of 12V, and an upper limit of 16V. Should a response to a poll received show that the DC volts is at 11V, then an alarm is reported.

A radio modem can be excluded from a poll sequence by removing it from the poll group. Intensive polling of a single radio modem is possible using the Individual polling facility.

A poll "run" can be set up. A time can be designated for the controller to poll each of the modems in the system. This may be useful for systems that have a low traffic period where diagnostics can be "slotted in", thereby spreading the data throughput of the system more efficiently.

The screen is divided into three main scrolling sections - Status Polls, Alarms and Base Station Activities. The status poll section displays current poll activity while the alarm section displays any polls alarms which have been reported. The Base Station activity section displays any changeovers that have occurred to Hot Standby Base Units - if no Hot Standby Base Stations are employed within the system, this section will remain blank.

A relational database is created and managed using Microsoft Jet database engine. The database file, which is an ".mdb" file, can be accessed with external programs such as Microsoft Access. All polls and alarms are time and date stamped and saved to the database. All database entries can be sorted and printed.

For some multi layer systems, Stream Identifier (SID) Codes may have to be added to the diagnostic data packets. Each radio modem can be assigned a SID address (the default is 00) and the SID code feature enabled.

Refer to Appendix A "Technical Notes" for further details of SID code addressing.

In E & Ultra-Series radios the diagnostic controller of each radio stores packet statistics for later retrieval. The Diagnostic controller software uses these statistics to calculate packet and bit error rates, network efficiency, bandwidth utilisation, and radio link integrity. These network analysis features are an invaluable tool for larger networks.

### Introduction (Automatic Diagnostics)

Automatic diagnostics allows the monitoring of radios in a network without the need to generate a poll.

The data returned in automatic diagnostics is fixed in nature and includes the 5 standard parameters. Automatic diagnostics works by appending an unsolicited fixed format diagnostic data packet to the end of a user data message. Subsequently, automatic diagnostics can only work when user data is being transferred by the radio modem.

Automatic diagnostics is useful in situations for polled diagnostics could interfere with user data transfer and cause collisions. For more information on configuration of automatic diagnostics refer to the E, M & Ultra-Series user manual.

Note : For automatic diagnostic messages to be processed by the SCADAWave Manager the unit must be configured in the database. Automatic diagnostic response can be identified in the "status poll" window as they are Cyan coloured text.

### Modem Connection

The diagnostics controller normally connects via a COM port on the controller PC and the "System Port" on the radio modem (Port "A & B" can be used if required).

Note: The controller can connect to any port of any data radio modem within the system as long as the data radio port is configured accordingly. When "Settings" is selected, the controller will interrogate the computers com ports and display the available ports. Possible valid com ports are 1-16 or "None". Choose the desired port. None allows you to free the com port for use with other programs without exiting the diagnostic.

The modem port must have its SID codes enabled, and have the SID code set to the system diagnostics SID (normally this is set to "00").

The data format used is the SLIP protocol, running at 19200 baud, No parity, 8 data bits and 1 stop bit. Appendix B "SLIP Protocol" contains a detailed definition of the SLIP Protocol.

COM1 of the controller PC is to be directly connected to the 9 way D-Min of the modem using a 3 wire interface (see drawing below). Should the PC have a 25 way connector, then the standard RS232, 25 way to 9 way conversion should be used.

**Main Menu**

When the Diagnostic controller starts, a presentation screen is displayed which will then lead you into the main diagnostics screen. This is where all the major functions of the controller are accessed.

The main screen presents the operator with the typical Windows pull down type menu bars - "File", "Settings", etc. Icons of the most commonly used selections are also provided across the top of the screen.

This screen is divided into 3 main sections:-

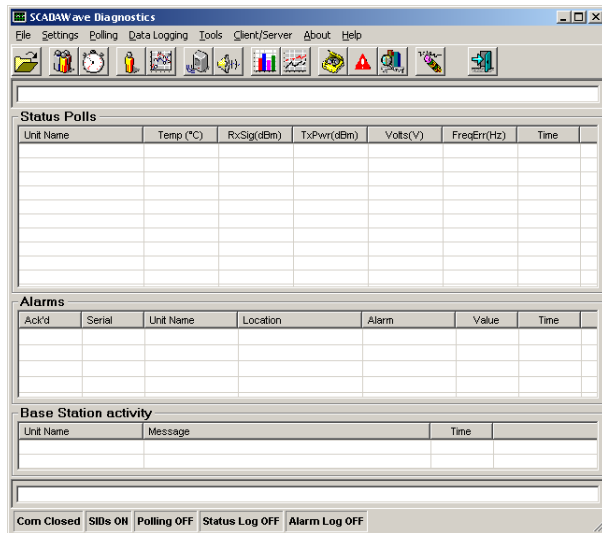
1. Status Polls screen which displays all poll results obtained.
2. Alarms screen which displays any alarms that occur.
3. Base Station Activity screen which displays any changeovers that occur with Hot Stand-by Base Stations within the system.

Note : Automatic Diagnostics "Status Polls" appear as CYAN in colour.

The line above Status Polls is a "Processing Status Bar". It will display messages about errors, warnings and poll processing.

The bottom row of the screen also displays a summary of the configured parameters such as which COM port is being used, whether SID codes are on or off, whether polling is enabled or disabled, current database path and file name, etc.

**Menu Selection**



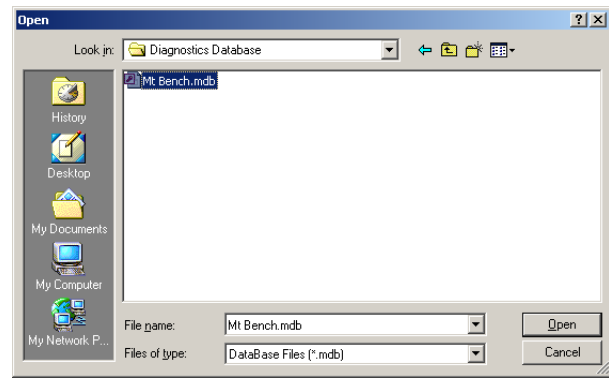
**File Menu**

To utilize the Remote Diagnostics facilities, a database must be created which includes the individual serial numbers, alarm parameters and various other parameters of each radio modem (this applies to both polled and automatic diagnostics).

Note: Not all options are available for some types of radio modems. Where these options occur, they are noted.

The file menu allows the operator to create a New database, Open an existing database, Add/Edit/Delete a database or View an existing database. All such database tools utilize standard Windows type formats for file selections as shown below.

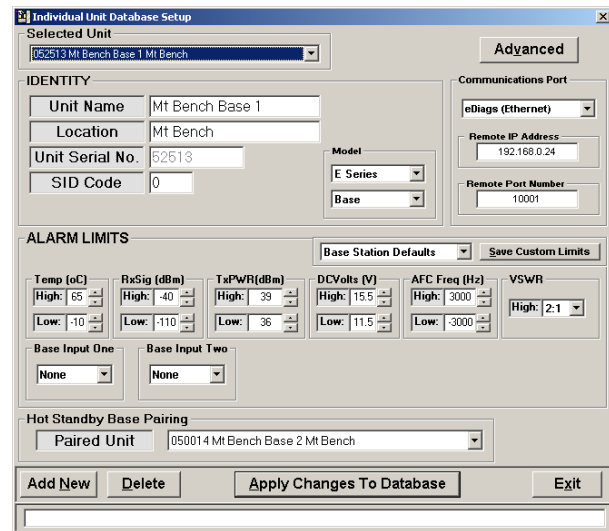
**New/Open**



These options allow you to create a new database or open an existing database file. When creating a new database you must supply the name of the new database file. After creation the software will automatically swap to the File - Add/Edit/Delete menu.

**Add/Edit/Delete**

After creating a New database or Opening an existing database, the Add/Edit/Delete menu can be accessed.



**Selected Radio Modem**

Selected radio modem is a pull down selection box, for selecting a radio modem to view or edit. This will be blank if no radio modems exist in the database.



### Radio Modem Name and Location

A name for the radio modem is required and must be unique (max. 20 character). Location allows the user to enter descriptions of sites and their locations (max. 20 characters).

### Radio Modem Serial Number

This is the factory preset unique serial number of the radio modem. This is obtained from the label located on the radio modem or read from the radio modem using the Programmer. On base stations the serial numbers can be read from label on the back or electronically with the programmer.

### SID Code (Diagnostic Stream Identifier)

This is the SID code address number being used by the radio modem for the diagnostics stream and is normally set to 0. This must match the diagnostics streams ID as configured in the radio modem.

In complex systems, units in a network can be separated into different areas by using different SID codes for each area.

In systems using Automatic Diagnostics, this SID code must match the SID code as configured in the E-Series radio configuration programmer.

### Model

This allows you to select the type of radio modem unit you are adding to the database. Select E, M or Ultra-Series as required. Units are either Base or Remote types.

### Communications Port

Select either serial (RS-232 serial data communications using COM1, etc) or eDiags (Ethernet) mode. When in serial mode, the standard serial communications port is used (See Settings Menu -> Controller Settings for more configuration options).

When eDiags mode is selected the remote IP address and port number must be specified. This will normally be the IP address and destination port number for a terminal server or similar device operating in UDP connection mode. (See Settings Menu -> eDiags port settings for more options).

### Alarm Limits

These configuration options allow the user to set thresholds for each radio modem. If the thresholds are exceeded then the diagnostics software will declare that the radio modem has an alarm. Default settings are provided for remote devices and base stations.

The alarm limits available for custom configuration are :

- Temp = Internal Modem Temperature
- RxSig = Receiver RF Signal Strength
- TxPwr = Transmitter RF Power
- DC Volts = Radio Modem Supply Voltage
- AFC Freq (E-Series Only) = Radio Modem Frequency Error
- VSWR (E & Ultra-Series Only) = Antenna Voltage Standing Wave Ratio

### Defaults drop down box

Choose either "Remote Modem Defaults" or "Base Station Defaults" from the drop down list. If you wish to over-ride the default limits, adjust the limits as required and then Click "Save Custom Limits". The default values for the type of unit selected (i.e.: either base station or remote modem) will now be updated with the new limits.

### Base Inputs (Base Stations & HSC Only)

Base stations have two digital inputs which can be monitored for a change in state and will generate an alarm accordingly.

### Hot Standby Base Pairing (HSC Only)

In a Hot Stand-by configuration two base stations are connected to one Hot Stand-by controller. In the SCADAWave Manager Diagnostics database setup both base stations must be paired together for correct operation of diagnostics. In a hot stand-by configuration, only one base station can be on-line (i.e.: able to transmit) at any one time. Diagnostics is still available from the off-line base stations (via the on-line base station).

Note : This option is only available if more than one base is configured in the database.

### Add New Button

Click this button to add a new radio modem to the database. The Selected Radio Modem, Name, Location, Radio Modem Serial numbers and Hot Stand-by Base Pairing fields will be cleared, ready for the entry of a new radio modem. After filling in the details click the "Apply Changes To Database" button to complete entry.

### Apply Changes to Database Button

Saves changes that have been made to selected radio modems in the database. Additions and changes made on the screen do not result in changes to the database unless this button is activated. This must be done before selecting a new serial number/unit.

### Delete Button

Allows deletion of radio modems from the database. Deleting a radio modem from the database will delete all of it's associated status poll and alarm history.

A selection list of serial numbers will appear. Select one or a group at a time and then press the "Delete" button on the selection box.

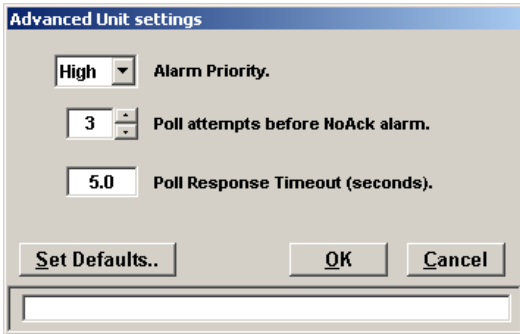
### Exit Button

Press this button to exit the Add/Edit/Delete menu area.



**Advanced**

Click this button to modify advanced radio unit settings.



Alarm Priority : Radio modems can be configured as either High or Low priority. See Settings -> Email and Local Alarm Reporting menus for more information on unit priority and alarms.

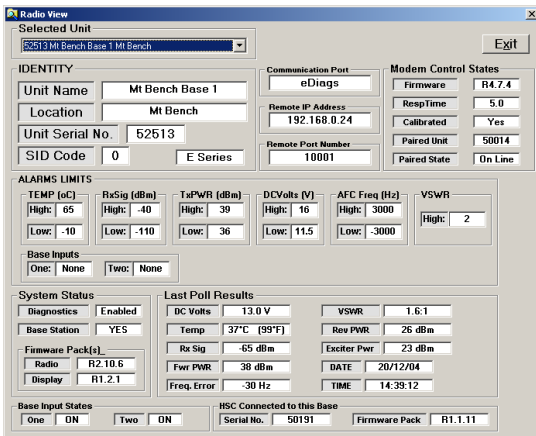
Poll Attempts : This parameter specifies the number of times a diagnostics poll (from the diagnostics software) is not answered by a radio unit before a No Ack alarm is generated.

Poll Response Timeout : This parameter specifies the time (in seconds) the diagnostics software will wait for a response to a diagnostics poll.

**View Radio Modem Details**

The View Radio Modem Details screen shows the “selected unit” alarm limits and last poll results (radio and firmware information). This page will also auto refresh (every 6 seconds) if the unit selected for viewing is part of an active single or group poll.

Note : The view window is different for Remote radios and Base Stations (with and without a Hot Stand-by Controller-HSC).



**Modem Control States :**

Firmware : The current modem firmware version.  
 Calibrated : Indicates calibration status of diagnostics.  
 Paired Unit : Serial No of other base in a Hot Stand-by Configuration (HSC Only)  
 Paired State : Indicates if paired base is currently the on-line or off-line unit (HSC Only)

**System Status :**

Diagnostics : Enabled or Disabled  
 Base Station : Indicates if unit is a Remote or Base Station  
 Firmware Packs : (Base and HSC Only)  
     Radio : Base Station Firmware Version  
     Display : Base Station Display controller firmware version

**Last Poll Results :**

Temp : Radio Temperature  
 Rx Sig : RX Signal Strength  
 Fwd PWR : Forward TX Power  
 Rev PWR : Reverse TX Power  
 VSWR : Voltage Standing Wave Ratio  
     - VSWR has white background when less than 2.0:1  
     - VSWR has yellow back ground when greater than 2.0:1 but less than 3.0:1  
     - VSWR has red background when greater than 3.0:1  
 DC Volts : Supply Voltage  
 Freq Error : RX Freq Error  
 Date : Date of Last Poll  
 Time : Time of Last Poll

**HSC Connected to this Base (HSC Only) :**

Serial No : Serial No. of Hot Stand-by Controller  
 Firmware Pack : Firmware version of HSC

**Modem Control States :**

Firmware : The current modem firmware version.  
 Calibrated : Indicates calibration status of diagnostics.  
 Paired Unit : Serial No of other base in a Hot Standby Configuration (HSC Only)  
 Paired State : Indicates if paired base is currently the on-line or off-line unit (HSC Only)

**System Status :**

Diagnostics : Enable or Disabled  
 Base Station : Indicates if unit is a Remote or Base Station  
 Firmware Packs : (Base and HSC Only)  
     Radio : Base Station Firmware Version  
     Display : Base Station Display controller firmware version

**Last Poll Results :**

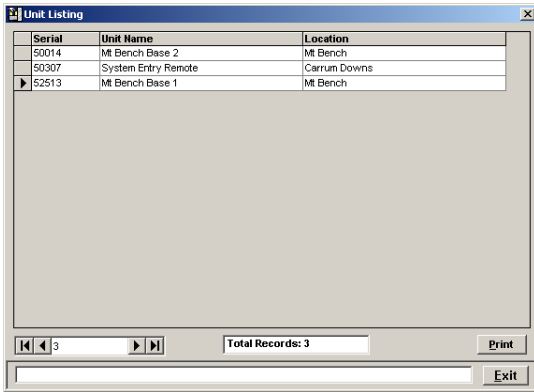
Temp : Radio Temperature  
 Rx Sig : RX Signal Strength  
 Fwr PWR : Forward TX Power  
 Rev PWR : Reverse TX Power  
 VSWR : Voltage Standing Wave Ratio  
     - VSWR has white background when less than 2:1  
     - VSWR has yellow back ground when greater than 2:1 but less than 3:1  
     - VSWR has red background when greater than 3:1  
 DC Volts : Supply Voltage  
 Freq Error : RX Freq Error  
 Date : Date of Last Poll  
 Time : Time of Last Poll

**HSC Connected to this Base (HSC Only) :**

Serial No : Serial No. of Hot Stand-by Controller  
 Firmware Pack : Firmware version of HSC

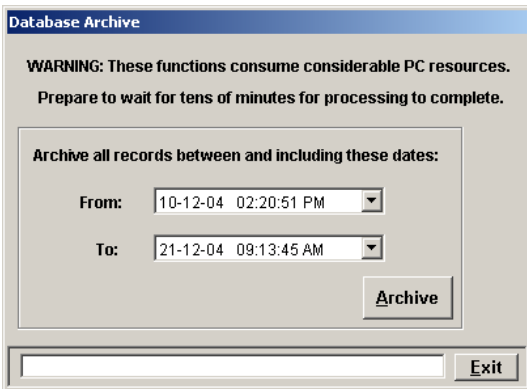
**Database Utilities**

**View Radio Modem Summary List**



This screen shows a summary of all units in the database. This list can also be printed for future reference. The listed radio modems can be sorted using any of the three columns.

**Archive Between Dates**



**Make copy of database (radio info only)**

This facility will make a copy of the database with only radio modem information. All previous diagnostic results (logged information) will be removed from the existing database and then copied to a new file name. This is useful when you want to copy a database from one PC to another as it results in a significantly smaller file size or as a backup file.

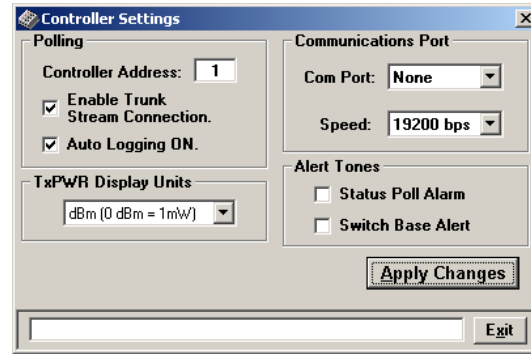
**Compact and Repair**

This facility will compact and repair an existing database.

**Settings Menu**

Under this menu systems all configurable parameters for the SCADAWave Manager Diagnostics software can be customized.

**Controller Settings**



The controller settings menu allows the user to configure various setup parameters as divided into four sections.

**Polling**

**Controller Address**

Normally set to 1 (default). Radio networks which have multiple SCADAWave Manager diagnostics software packages active, must use different controller addresses or system performance may be impacted. The range of controller address can be 1 to 999.

Note : For systems using Automatic Diagnostics, this address must match the diagnostics controller address as configured in the E-Series configuration programmer.

**Enable Trunk Stream Connection**

Enabled or disabled (Default enabled). Most typical E, M & Ultra-Series diagnostics connections require this to be enabled.

**Auto Logging ON**

When enabled all collected radio modem data will be stored in the database when polling is turned on.

**Communications Port**

**Com Port**

With the pull down box, select the required communications port. Com 1 to Com 16 are supported.

**Speed**

Select the required com port speed (9k6 or 19k2bps). Default is 19k2bps.

**Alert Tones**

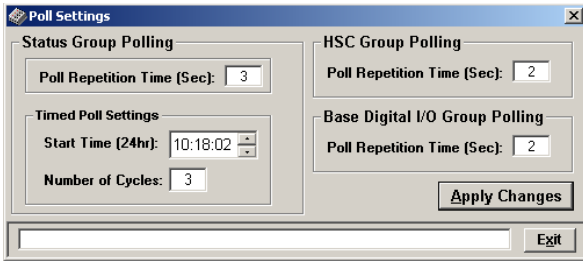
When enabled will emit a tone from the PC speaker or sound card when status poll alarms occur and/or Base Station changeovers occur.

**Tx Power Display Units**

Select either “dBm” or “milli Watts” as the display units. Power will be displayed throughout the system in the selected power measurement unit.

Note: Power will always be stored in the database file as milli-watts

**Poll Settings**



This menu allows the configuration of items related to polling.

**Poll Repetition Time**

Is the time in seconds (2 to 3600 secs) between each status poll of the group poll cycle. Each unit in the poll group will be polled in turn, at this time interval.

**Timed Polling**

Allows the user to schedule a period when the group poll will commence. This is a useful feature for systems that have times of minimal traffic loading such as the early hours of the morning.

**Start Time**

Time at which the Timed poll cycle will commence. The time format will be as per the regional settings of the operating system.

**Number of Cycles**

This is the number of times the controller will cycle through the poll group when the Timed Group poll commences. Each unit in the poll group will be polled this number of times.

**HSC Group Polling (HSC Only)**

This is the time in seconds (2-3600) between consecutive polls for each Hot Standby Controller status display. Diagnostics allows for up to 50 instances of the HSC status window. The poll repetition time is the time waited between each window. (ie: 3 HSC status windows with a time of 2 secs would take 6 seconds to complete an update on all three windows).

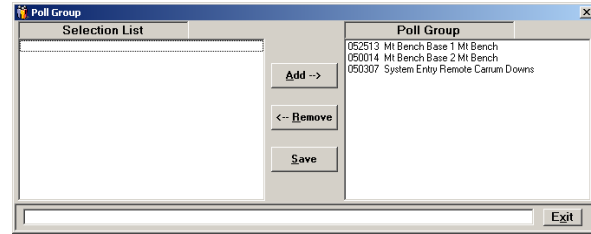
**Base Digital I/O Polling (Base Only)**

Is the time in seconds (2-3600) between consecutive polls for each base station digital I/O display. The timer behaves in the same way as the HSC group polling time.

**Apply Changes**

Applies and saves the changes made to configuration items in this menu.

**Poll Group Select**



This dialog box enables the adding and removing of radios in the automatic poll group. Units in the Selection list box are available for adding to the poll group. These units will not be polled during a group poll cycle.

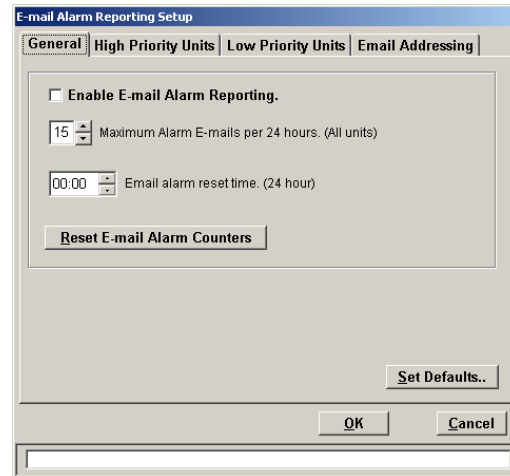
Units in the Poll Group list box will be polled during a group poll cycle.

Clicking the Save button will save any changes in the poll group to the database.

**Email Alarm Reporting**

This section of menu items allow the configuration of diagnostics email alarm reporting. This facility allows diagnostics alarms to be sent to a recipient via email.

**General**



**Enable E-mail Alarm Reporting**

If checked (ticked) enables diagnostics alarms to be sent via email.

**Maximum Alarm E-mails per 24 hours**

Specifies the maximum numbers of E-mail alarms that the diagnostics software will generated in a 24 hour period.

**E-mail alarm reset time**

The time at which all "maximum email" counters are reset. Default value is 00:00 (Midnight).

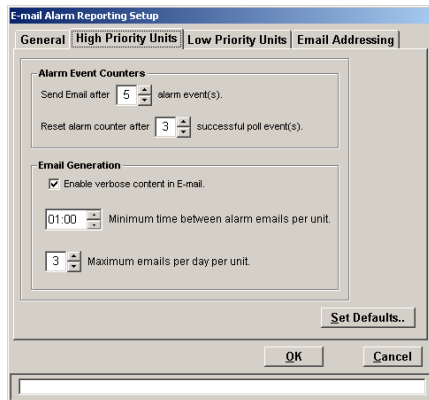
**Reset E-mail Alarm counters**

Allows the manual reset of all E-mail alarm counters.

**High and Low Priority Units**

The E-mail alarm reporting system can apply different rules for units that are defined as High or Low priority in the database. Typically, a base station or other unit that is critical to the entire operation of the network is normally defined as high priority. Other units are defined as low priority. The E-mail alarm reporting rules can then be defined so that technical support personnel will receive immediate notice of high priority units when a problem occurs.

Note : High and Low Priority unit rules are implied in exactly the same way. This section of the user manual is applicable to both.



**Alarm Event Counters**

Each time diagnostics polls a radio for its parameters it compares the returned result against the alarm limits as defined for that unit in the data base. Each instance where the result is outside the defined limits is declared an alarm. This parameter specifies the number of alarms (events) for a specific radio before an E-mail alarm will be generated.

**Send E-mail after (n) alarms events**

Specifies the number of individual radio (unit) alarm events before an E-mail alarm will be generated.

**Reset Alarm counters after (n) successful poll events.**

Specifies the number of successful radio polls before the e-mail alarms counters are reset. Some radios can generate alarms intermittently. In order to capture diagnostics alarms from intermittent radios and generate e-mail's, this parameter can be set so that multiple successful polls are required before the e-mail alarm reporting system declares there is no longer a problem with that unit (radio).

**E-mail Generation**

These parameters specify the rules associated with generating e-mail's on a per unit basis [i.e.: specific to one particular unit].

**Enable verbose content in e-mail.**

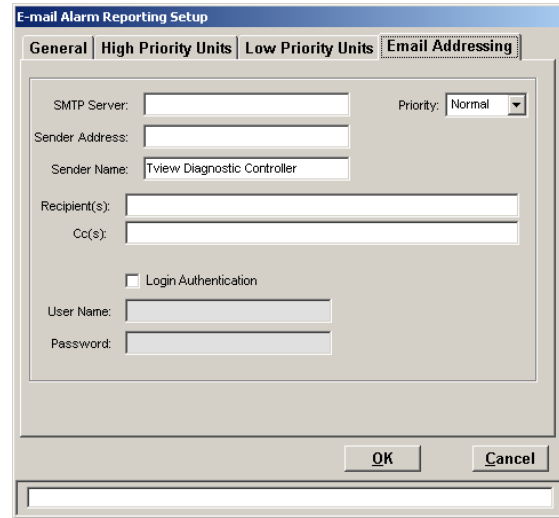
When checked [ticked] e-mail alarms will contain all diagnostics parameters. When not checked, e-mail alarms will only contain the radio parameters that generated the alarm.

**Minimum time between alarm e-mail's (per unit)**

Specifies the minimum time that must expire before another email will be generated for the same unit.

**Maximum emails per day per unit.**

Specifies the maximum number of emails per day any one specific unit (when in the alarm condition) will generate. This parameter is specified to prevent a flood of emails when a radio unit does not recover from an error.



**Email Addressing**

**SMTP Server**

Specifies the SMTP server IP address.

**Sender Address**

Specifies the email address a diagnostics alarm will use as the "sender" when reporting an alarm to recipients.

**Sender Name**

As per "Sender Address" but specifies the senders name.

**Recipient(s)**

Specifies the email address where email alarms will be sent to. Multiple email addresses can be specified by must be separated with a comma.

**CC(s)**

As per Recipient(s). See above.

**Login Authentication**

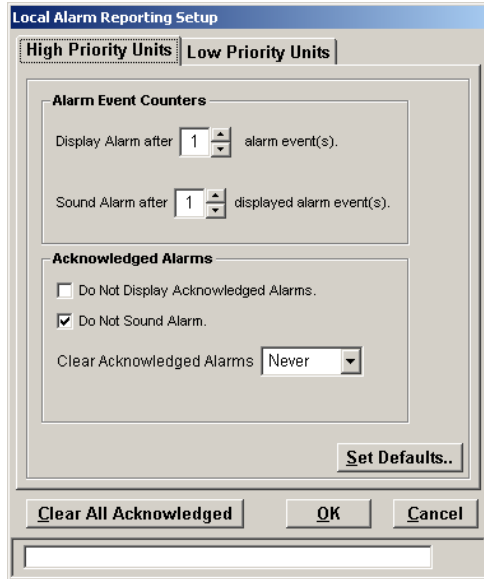
When checked diagnostics will login to the SMTP server using secure authentication.

**Username & Password**

Specifies the username and password to use when secure authentication is enabled [see above].

### Local Alarm Reporting Setup

Local alarms are those diagnostics alarms that are displayed in the Alarms output window on the PC screen. Diagnostics provides a configurable set of rules for displaying local alarms in the alarm window.



#### High and Low Priority Alarms

The rules associated with local alarms can be specified for both high and low priority units.

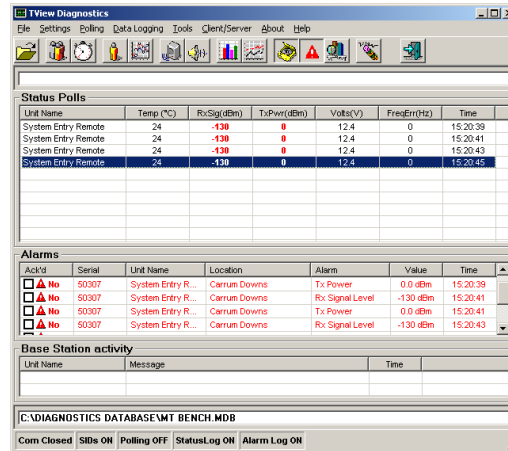
#### Alarm Event Counters

##### Display Alarm after (n) alarm event(s)

Each time diagnostics polls a radio for its parameters it compares the returned result against the alarm limits as defined for that unit in the data base. Each instance where the result is outside the defined limits is declared an alarm. This parameter specifies the number of alarms (events) for a specific radio before an local alarm will be generated.

##### Sound alarm after (n) displayed alarm event(s)

This parameter allows the audible alarm sound to be triggered after configurable number of local alarm events. The audible alarm is useful to get attention of PC or console operators.



#### Acknowledged Alarms

When local alarms are displayed in the “Alarms” window they will initially NOT be acknowledged. This is shown in the screen below. To acknowledge an alarm the check box (tick box) in the left most column of the local alarm reporting window is checked (ticked).

#### Do not display acknowledged alarms

When ticked acknowledged alarms will not be displayed in the local alarm output window. When not ticked acknowledged alarms will be displayed as black in the local alarm output window.

#### Do not sound alarm

Acknowledged alarms will not cause the audible sound to be triggered.

#### Clear Acknowledged Alarms

Users must be careful of acknowledging alarms if the “Do not display acknowledged alarms” option is ticked. Units that are alarming may disappear from the system if acknowledged alarms are not regularly reset to unacknowledged.

This option specifies the period after which all acknowledged alarms return to the unacknowledged state.

#### Set Defaults

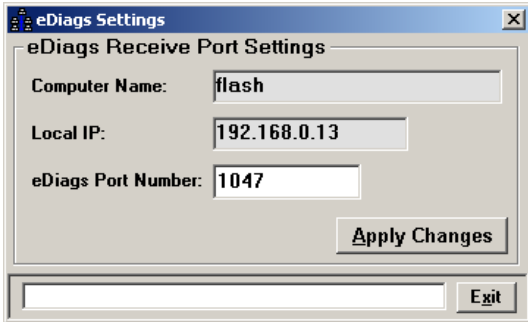
This parameter saves returns all values to the factory default.

#### Clear All Acknowledged Button

When pressed this button clears all acknowledged alarms. It provides a manual mechanism to reset the acknowledged alarms to unacknowledged.

**eDiags Port Settings**

This menu is used in conjunction with the settings configured in the terminal server or other Ethernet device that diagnostics is communicating with.



**Computer Name**

This is the network name of the computer that the diagnostics software is running on. It is provided for management purposes only.

**Local IP**

This is the IP address of the computer that the diagnostics software is running on. It must match the destination IP address in the terminal server or Ethernet device. Ensure only fixed IP address are used (i.e.: Not DHCP assigned addresses).

**eDiags Port Number**

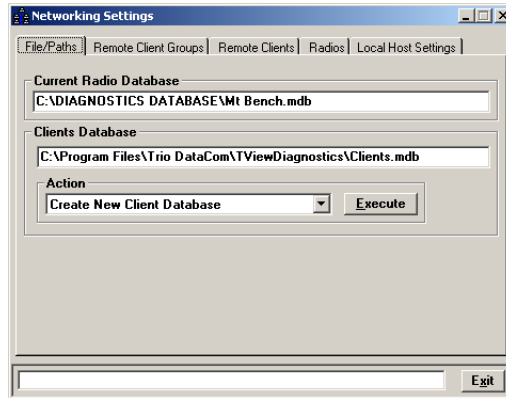
This is the UDP port number diagnostics uses for Ethernet responses from the terminal server. It must match the destination port as configured in the terminal server or similar device.

**Client/Server Setup**

Monitoring the radio network from multiple workstations on a LAN network is possible using the networking facilities provided by the Diagnostics Controller.

**File/Paths Setup**

Before other parameters can be configured, a local database needs to be defined for both the client and server PCs.



When in Server mode the Diagnostic controller stores additional Client specific information in a separate database file (.mdb).

**Current Radio Database**

This specifies the location and filename of the current radio diagnostics database (ie: where radio diagnostics data is stored). This is provided for management purposes only and can not be configured in this menu.

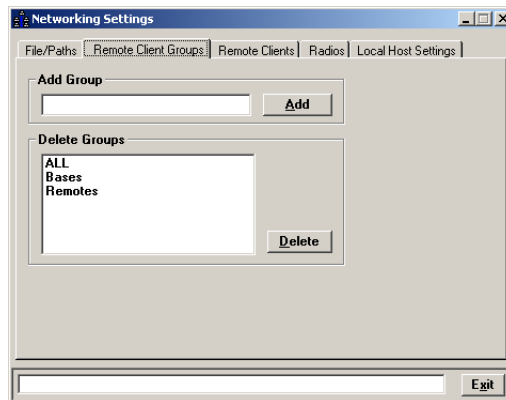
**Clients Database**

This specifies the current client configuration database (i.e: where information about client PCs is stored). Most of the parameters configured via the Client/Server setup menu are stored in this database.

**Action**

This menu items allows the system administrator to perform several options :

- Create a new client configuration database
- Change to a different client configuration database
- Link client database to current radio database



**Remote Client Groups**

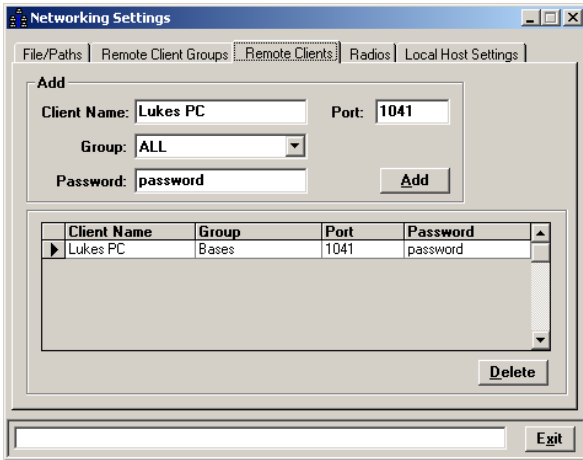
System administrators can restrict remote clients to only viewing radio diagnostics data of a specific group of radio. See also Radio Group Management window.

**Add Groups**

Specify a new group name to add.

**Delete Groups**

Specify a group name to delete.



**Remote Clients**

This menu allows individual remote clients to be configured to remote access diagnostics information.

**Client Name**

This option allows a descriptive name to be given to a client for management purposes.

**Group**

This option allows a client to have restricted access to a specific group or access to ALL groups.

**Password**

This option allows a password protection system to be used for remote clients.

**Port**

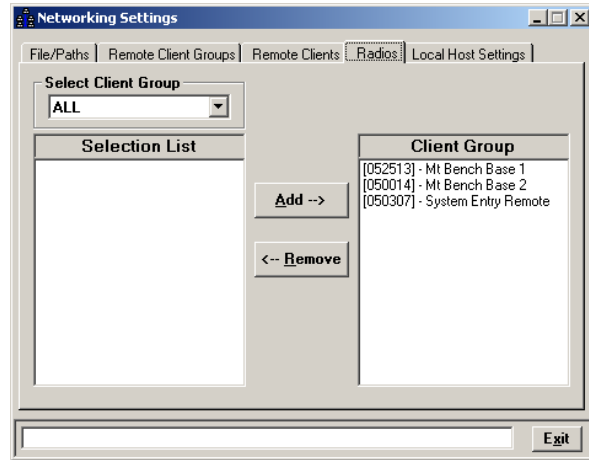
This options allows a UDP Port number to be specified for each client.

**Add**

This option adds the currently selected remote client to the database.

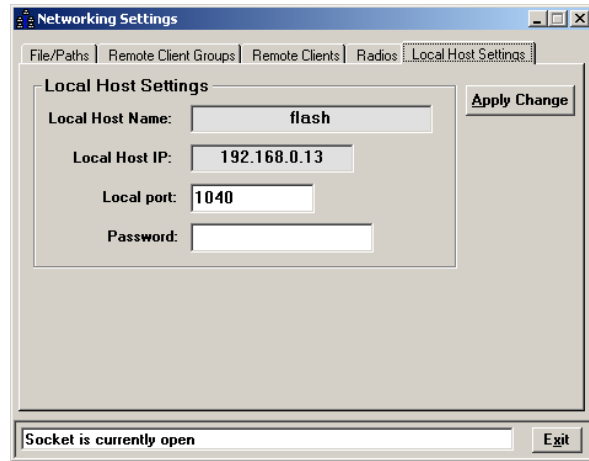
**Deleted**

This option deletes the currently selected remote client from the database.



**Radio Group Management**

This menu allows individual radios to be added to a specific group. Please note that a radio can not be added to more than one group.



**Local Host Settings**

This menu allows the server UDP port and password to be configured. The “server” is the local host machine.



**Polling**

**Overview**

In order to obtain diagnostics information, the diagnostics controller provides a number of automatic polling facilities, which include: Group polling, Timed polling and Individual polling. The Group and Timed poll facilities will automatically cycle through a selected group of units at a predetermined interval as specified in the Polling Setup menu. The Individual poll facility permits intensive polling of a single unit at a selectable rate, independent of any Group polling that may be active at the time. Individual polling also displays results in a bar graph format.

When the modem is polled for the first time, the controller will poll (ask) the radio for its calibration constants and firmware revision (these can be viewed in the "View" window under the File menu). When this initialisation procedure is complete, status polling can commence. If the radio were to perform a "cold boot" (e.g. loss of power, cold boot command received, etc), the controller will detect this and initiate the above initialisation procedure again and display "cold boot" alarm in "other".

During group status polling, E-Series Hot Standby bases one and two are polled simultaneously. The offline unit is highlighted with an asterisk (\* ) prefix.

The status poll requests that are reported and displayed on the main screen are:

- Temperature
- Received Signal Strength
- Transmitter Power
- DC Supply Volts
- Received Frequency Error
- Time and date stamped

The line above Status Polls is a "Processing Status Bar". It will display messages about errors, warnings and poll processing.

**Alarms**

If the controller receives a status poll where the result (Temp, Rx Sig, Tx PWR, DC Volts or Freq Err) is outside the user programmed alarm limits, the poll is declared to be an Alarm and the information is displayed in the "Alarms" area. Alarm conditions are declared after three consecutive polls show an alarm. This eliminates the reporting of erroneous alarms.

Other alarms (not related to those mentioned above) may also cause an Alarm condition. These polls are also displayed in the Alarm window with further details shown in the "Other" column. The alarm types are:

- No Ack : Failed to respond to a diagnostics poll
- Diags Not Installed : Diagnostics has not been installed on the unit being polled.
- Re-Boot : Radio has been re-booted since the last received diagnostics poll.
- Ports Halted : Radio ports have been halted.
- Not Remote : Radio has been configured in the database as a remote but is detected as a base.
- Not Base : Radio has been configured in the database as a base but is detected as a remote.
- ERROR : Unknown or unexpected error.
- Switch Base : A Hot Standby Controller change over event has occurred.

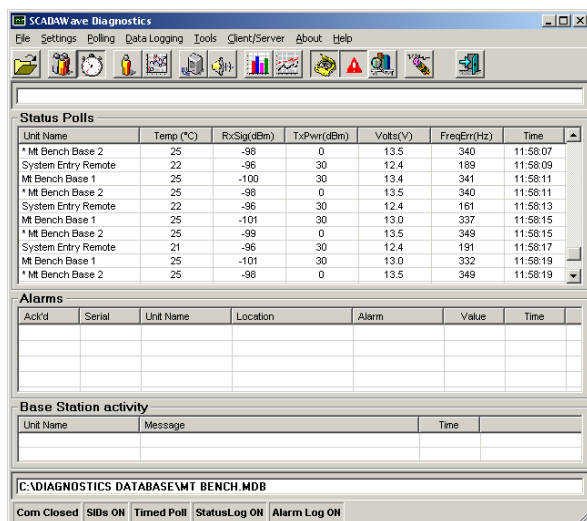
**Group Polling**

In Group Polling mode, all radios that are part of the Poll Group (See Settings - Poll Group select) are polled in succession. When diagnostics reaches the last radio in the poll group it returns to the top of the list.

Results are displayed in the "Status Polls" window along with the Unit Name and Time of the poll.

**Timed Poll**

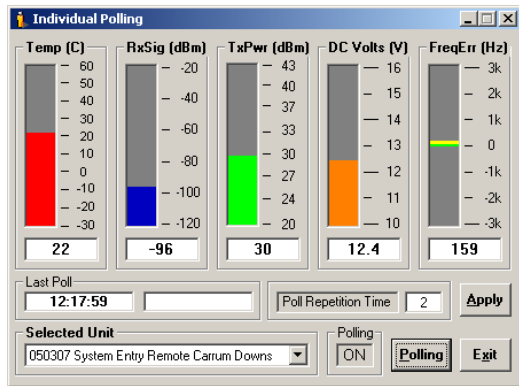
In Timed Poll mode, SCADAWave Manager Diagnostics waits until the specified Poll Time (see Settings - Polling Setup) and then performs a group poll as per above. If configured, the group poll will be repeated until done and then SCADAWave Manager Diagnostics waits for another 24 hours until the time expires again.



### Individual Poll

In Individual Poll mode, a specific unit is selected and polling (updating) can be manually controlled. Results are displayed in a bar graph and numerical format.

Individual polling may be performed simultaneously with Group or Timed polling is in progress.



### Data Logging

This menu item allows advanced analysis of diagnostics data.

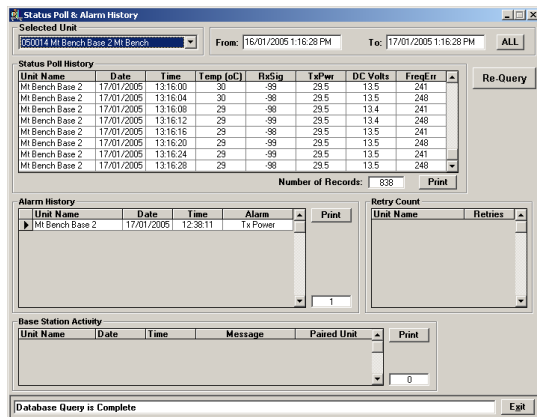
### Log Status Polls

When ticked, status poll results are stored in the Manager database.

### Log Alarms

When ticked, alarm results are stored in the Manager database.

### View History



The view history facility provides a facility to inspect diagnostics poll data for a specific unit.

### From To or ALL Fields

These fields determine the time span you wish to view. For example, if you have collected several months of data, and only wish to view a 24 hour period, then adjust the From: and To: fields accordingly and select the unit.

When the History window first appears, the From: and To: fields will contain the last 24 hours of data.

If "ALL" is selected it will display the start and end dates of the database. The Date/Time format will be as per the regional settings short date format.

Note: The smaller the time span you select, the faster the database search will be.

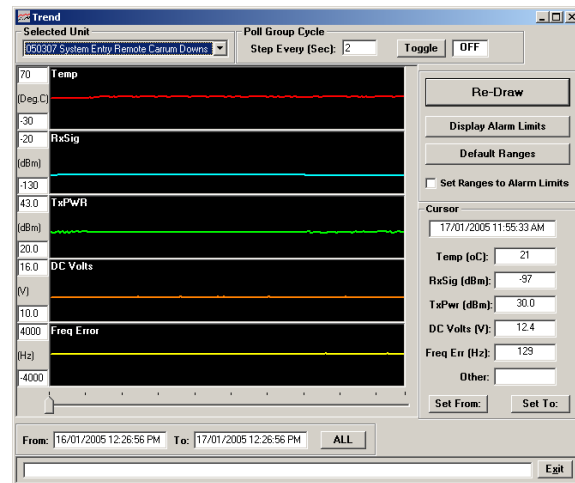
### Sorting

Each of these tables can be sorted in ascending order by: unit, date or poll parameter. To sort, just click on the required column header.

To show the full status of a single report in the "Alarm History" click on the box at the left by the unit name. Note this only works on valid poll results not "NoAck".

### Printing

A printout of each table is possible by clicking on the associated Print button. The table data will be sent to the default printer and formatted as per your default printer configuration set up.



### View Trend

The logged status poll data can be viewed in graph format, which allows viewing of status trends over selectable time spans. This provides a very effective and fast method of analysing a units' operating parameters over time.

Select "View Trend" under the Data Logging menu item or click the associated toolbar button.

Features available include:

- Scaling of graph(s).
- View individual poll results using the cursor.
- Automatically scroll through the group poll database, unit by unit at a selectable time interval.
- No Acknowledge messages are displayed by a gap in the graphed data and a "NoAck" in other on the Time Line.

The line above Status Polls is a "Processing Status Bar". It will display messages about errors, warnings and poll processing.

**Vertical Scale Setting**

- Manually set the vertical scales by simple typing in the new level(s), then either press “Enter” or click on the “Re Draw” button, or select a new unit.
- Click the “Default Ranges” button to set all the vertical scales back to the default levels.
- Click the “Set Ranges to Alarm Limits” button to set the vertical scale limits to the selected unit alarm limits.

**From: & To: Fields**

These fields determine the time span you wish to view. For example, if you have collected several months of data, and only wish to view a 24 hour period, then adjust the From: and To: fields accordingly.

When the Trending window first appears, the From: and To: fields will contain the last 24 hours of data.

If “ALL” is selected it will display the start and end dates of the database.

Note: The smaller the time span you select, the faster the database search and draw. This will also depend on the poll rate that was used during that time span.

Use the ALL button to set the From: and To: fields to the maximum and minimum dates found in the data in the database.

**Poll Group Cycle**

When toggled ON, this will step through each radio in the poll group and display the trend graph. Set the step interval in the “Step Every (Sec)” field. Default = 2 seconds

Cursor: Use the slider control, found at the bottom of the display to move the cursor. The cursor box displays the parameter data of the status poll at the current cursor position.

Use the “Set From” button to set the From: field to the current cursor position.

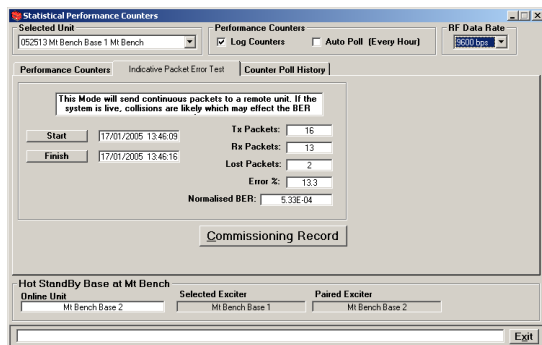
Use the “Set To” button to set the To: field to the current cursor position.

**Tools**

The tools menu provides useful system tools for trouble shooting and maintaining a radio network using SCADAWave Manager Diagnostics.

**Statistical Performance**

Under the statistical performance menu, three separate tools are provided.



**Indicative Packet Error Testing**

This tool provides a useful way to commission a radio modem communications link.

Indicative packet error testing works by sending a known packet of information to the selected unit and looking for a response. Each time a response is not heard the facility counts this as a lost packet. As soon as a response is heard from the remote unit, SCADAWave Manager Diagnostics sends another packet.

It is recommended that this test for at least 1000 packets in order to get a meaningful result that is statistically valid. Ensure no other data is being transmitted on the radio network during the test.

To use the indicative packet error test facility choose the unit you wish to test the link quality using the “Selected Unit” drop down box.

Activate the start button and the test will commence.

**Tx Packets**

This indicates the number of packets SCADAWave Manager Diagnostics has transmitted to the remote unit.

**Rx Packets**

This indicates the number of packets SCADAWave Manager Diagnostics has received from the remote unit.

**Lost Packets**

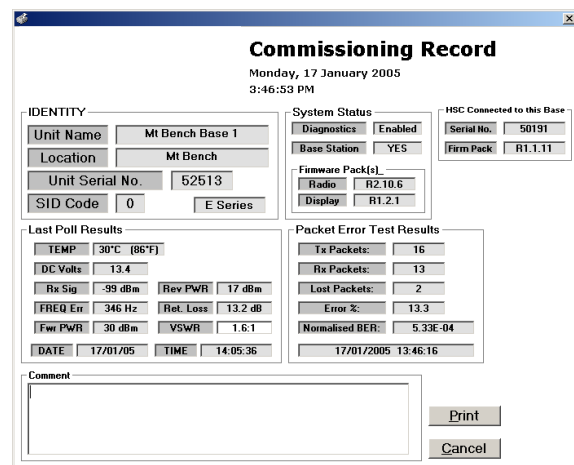
This indicates the number of packets SCADAWave Manager Diagnostics has declared as lost.

**Error**

This indicates the calculated Packet Error Rate in %. It is calculated from the ratio of Tx Packets to Rx Packets.

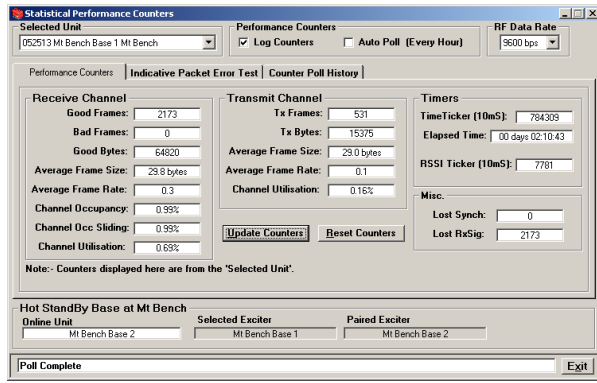
**Normalized BER**

This indicates the normalized BER (Bit Error Rate) based on the number of bits per packet assuming only one bit was corrupted. It is only an estimate since two errored bits in one packet will only be counted as one errored bit.



**Commissioning Record**

For system commissioning and future records it is recommended to print a commissioning record.



**Performance Counters (E-Series Only)**

Each E-Series radio stores packet statistics for later retrieval and analysis. They are:-

- Lost Synch
- Lost RxSig
- Good Frames
- Bad Frames
- Time Ticker
- RSSI Ticker

The SCADAWave Manager Diagnostics software uses these statistics to calculate network efficiency, bandwidth utilisation and radio link integrity. These network analysis features are an invaluable tool for larger networks.

**Update Counters**

This button updates the statistical performance counters by reading them from the currently selected unit.

**Reset Counters**

This button resets the statistical performance counters in the E-Series radio by performing a cold boot.

**RF Data Rate**

Select from the pull down menu 4800, 9600 or 19200 bps, depending on your system settings

**Status Bar**

Reports any poll processing in progress or errors that may have occurred.

**Auto Poll (Every Hour)**

When ticked, this option automatically updates the statistical performance counters every hour for the selected unit.

**Log Counters**

When ticked, this option logs the counters every time they are updated. These can be viewed on the “Counter Poll History” Tab.

Notes:

- The controller will attempt a series of polls when either resetting or retrieving the counters. You should monitor the status window to ensure that the poll process completes. If errors occur, they may be due to conditions like packet collisions on a busy network, diagnostic controller trying to perform too many poll functions (i.e. group polling, individual polling), etc.
- E-Series data radios have 32 bit counters and will count for 1 year, 4 months & 10 days if not reset occurs.
- If an HSC Base is selected, data will only be collected from that base, whether offline or online.

**Counter Poll History Tab**

This is a database viewing facility. When logging is enabled “Log Counters”, each time the counters are retrieved they will be written to the database. Adjust the From: & To: fields to view a specified time span or press ALL to obtain complete database period.

**Statistical Performance Formulae**

The following information can be used to interpret statistical performance results.

**Receive Channel:**

- Good Frames: = Good frames received by modem. The frame CRC was correct.
- Bad Frames: = Bad frames received by modem. The frame CRC was incorrect.
- Good Bytes: = Good byte received [from good frames].
- Average Frame Size: = GoodByteCnt / GoodFrameCnt
- Average Frame Rate (mSec): = (GoodFrameCnt + BadFrameCnt) / RTT \* 0.01
- Channel Occupancy (%): = RSSIgoodTicker / RTT \* 100

**Transmit Channel:**

- Tx Frames: = Number of Tx HDLC frames.
- Tx Byte: = Number of Tx bytes
- Average Frame Size: = TxByteCnt / TxFrameCnt
- Average Frame Rate (mSec): = TxFrameCnt / RTT \* 0.01
- Channel Utilisation (%): = (TxByteCnt \* 8) / (RTT \* RFChannelBitRate) where RFChannelBitRate is 9600 or 4800 Bits per sec.

**Timers:**

- Time Ticker (10mS): (RRT) = timer that increments by one every 10mSec
- Elapsed Time: = Total elapsed time in hh:mm:ss from reset calculated from RRT
- RSSI Ticker (10mS): = timer that increments by one every 10mSec when RxSig present. (Virtual connection to RxSig LED)

### Hot Standby Base/Repeater Controller (HSC)

The E-Series range of Hot Standby Repeater controls and base stations implement a specific set of features and controls that can be accessed via this menu system.

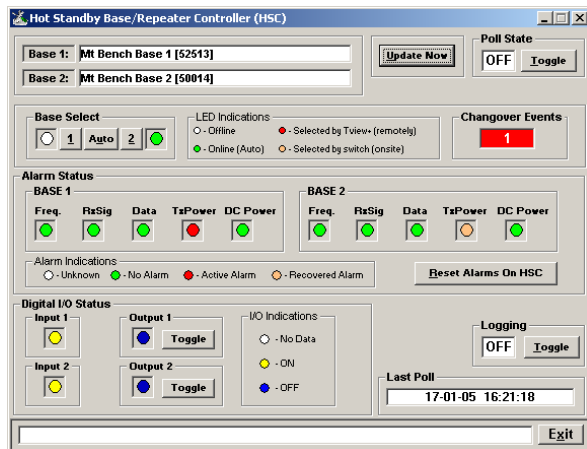
When this option is selected the SCADAWave Manager Diagnostics software shows a list of available Hot Standby Controllers available :



Select the Hot Standby Controller you wish to access using the drop down selection box.

On entering the screen shown in above, an attempt will be made to communicate with both bases, in order to determine the status of the HSC. If the attempt is successful with either of the bases (only one base needs to respond), then the diagnostic controller determines which base is connected to the HSC “Base 1” port and which to the “Base 2” port. When entered in the database, Base 1 and Base 2 will initially appear on this screen in alphanumeric order.

This might not be the true state of the physical connection and the true state will be corrected (if necessary) in the Base 1 and Base 2 display boxes.



#### Update Now

Pressing this button will immediately initiate a status poll sequence and on successful receipt of a status poll the display will update.

#### Poll State Toggle Button

- Switches automatic status polling ON or OFF. The poll rate is set via the Setup -> Poll Settings menu item.
- The poll rate is dependent on the number of HSC windows that are actively polling.

#### Base Select

This indicates the online status of each unit.

LED colour	Switch Select State
Off	Channel not selected (Offline)
Green	Online (Automatic). Automatic changeovers will be actioned by the HSC in response to alarm conditions.
Green Blinking	Change Over Pending. Waiting for one minute time-out period before switching to offline base.
Red	Selected by SCADAWave Manager Diagnostics (Remotely). Auto changeovers will not occur.
Amber	Selected by Switch on HSC (On Site). Auto changeovers will not occur.

Providing either of the bases is not forced online by the switch, the user can force either of the bases online remotely by pressing Base Select button 1 or 2. The user can revert back to Automatic mode by clicking on the Base Select Auto button.

If the user attempts to switch bases within one minute of a base changeover event, the change pending indication will appear (i.e. Online Unit LED Blinking Green). The user should then wait until the change over event occurs.

#### Change Over Events

This is a counter which indicates the number of automatic change over events initiated by the HSC due to alarm conditions.

#### Alarm Status

The current alarm status (since the last alarm status poll) for the attached Base units is displayed below.

LED colour	Error Status
Off	Unknown. The test hasn't been performed.
Green	No Alarm. Tests passed.
Red	Active Alarm. Test failed
Amber	Recovered Alarm. Test failed previously but has since recovered.

#### Reset Alarms on HSC

Pressing this button will clear the change over event counter and the alarms displayed by both the HSC and the diagnostics controller.

#### Digital I/O Status

Displays digital I/O input and output status.

**Digital I/O Toggle Buttons**

Clicking these buttons will toggle the associated output state. Toggling the outputs of a HSC is a good way to determine if the HSC has failed. If the toggled output state doesn't change, this will be indicated in the status message bar at the bottom of the HSC window.

**Logging Toggle**

When logging is ON, all status data including digital I/O is stored in the database.

**HSC Status Messages**

Status Messages	Comments
<b>No Acknowledge</b>	Attempts to communicate with the HSC have failed. In most cases, both bases are tried 3 times each (as configured in database).
<b>Re-Booted</b>	The online Base connected to the HSC has been re-booted.
<b>Unit is a remote</b>	The Unit has been entered in the database as a Base, but is factory set as a Remote.

**Unknown Error. Check Error Log**

Unforeseen error events are captured, with any relevant data stored in the 'Error.log' file.

**<Base Name> [<Serial>] is Forced Online by switch**

When a base is forced online by the switch, remote switching of bases is not possible using SCADAWave Manager Diagnostics.

**Base1/Base2 already forced online**

An attempt was made to force a base online that has already been forced online remotely by SCADAWave Manager Diagnostics.

**Already in Auto mode**

The Auto button was pressed when the HSC was already in automode.

**Output Toggle Process Failed. HSC may have failed.**

When attempting to toggle an output on the HSC, the output state didn't change. This would indicate that the HSC has failed.

**Changeover Pending. Wait up to one minute.**

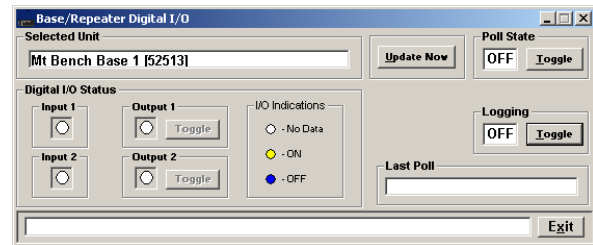
A change over attempt has been made by either the HSC or a remote SCADAWave Manager Diagnostic controller within one minute of a previous change over event. A change over to the offline unit will not occur until the one minute time period has expired.

**Base 1 and Base 2 connection state corrected. (Note names display).**

Up until the first time an HSC is communicated with, the Diagnostic controller doesn't know which of the paired bases in connected to HSC ports One and Two. So the paired Bases are displayed in alphanumeric order. The display is corrected on reception of the first message from either Base.

**Base/Repeater Digital I/O**

The base/repeater digital I/O window operates in a similar manner to the HSC window.



## Interpreting Poll Results

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### General

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The results returned by the poll requests give an indication of system performance. When a new modem is added to the database, default values are assigned for the limits of the returned results. The user can assign different values to these limits as required, which is determined by the fault tolerance level of their systems.

### RSSI

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The default RSSI limits are set at -30 to -105 dBm (-110 dBm for Base/Repeater Station). Above -30 dBm the front end of the receiver will saturate and it is unlikely that signal levels much higher than this will ever be reported.

RSSI Alarm Limits should be set for all radios based on the commissioning report. If during commissioning a remote site was found to have a signal strength of -75dBm, then it would be a sensible idea to set the alarm limits to -70dBm and -80dBm.

There is generally no point in setting tight Alarm Limits for radios which receive signals from many remote sites, such as Base/Master/Repeater radios.

### Transmitter power

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The transmitter power limits are set at between 0mW and 20,000mW. The modems will normally be operating at a power level of 1 watt. The above limits are set to  $\pm 3$ dB of the nominal (3dB represents a factor of 2 for power measurements).

In the modem the reported transmit power measurement is given from a measurement made of the last transmission made by the modems. When the PTT is ON a periodic measurement is made of the transmit power. The modem stores this away and reports it when requested.

If no transmission has occurred since power up or reset, then the modem will report 0dBm.

### Temperature

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Alarm Limits for this option may be configured to meet the individual requirements for each site, but in general it is recommended to set an upper limit that matches the maximum acceptable temperature.

The temperature alarm limit may also be set based on an air-conditioned environment, and should the air conditioning fail an alarm would be triggered when the radio exceeds the temperature specified in the alarm limit.

### Supply Voltage

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The DC supply voltage alarm limits should be set according to the operating range of the modem and the DC power supply in use. For details on the operating range of each modem consult the appropriate data sheet (which can be found towards the end of the User Manual).

The lower DC Supply Voltage alarm limit can also be set such that when mains power fails at a site with battery backup, diagnostics will warn the user via an alarm.

### Frequency (E-Series Only)

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The frequency limits are set to  $\pm 3000$ Hz. This is basically the difference between the different ends of a data link. If the difference gets much greater than this, data errors may occur (the modem will have a degree of long term frequency drift of 1ppm / annum due to the physical properties of internal components).



**Open Database Connectivity (ODBC)**

Open Database Connectivity is a programming interface that enables programs to access data in database management systems that use Structured Query Language (SQL) as a data access standard. The SCADAWave Manager database system adheres to this standard.

SCADAWave Diagnostics Software uses the Microsoft Jet Database Engine, which is a Database management system that retrieves data from and stores data in user and system databases. The Microsoft Jet database engine can be thought of as a data manager component with which other data access systems, such as Microsoft Access, Visual Basic and SCADAWave Manager Diagnostics, are built.

The .mdb file created by SCADAWave Manager Diagnostics for logging data is a Microsoft Access file, which can be directly accessed using Microsoft Access, Excel and most other Microsoft products.

Accessing SCADAWave Manager Diagnostics' logged data from another application or platform via ODBC is easy provided the application has an ODBC interface component.

**Configuring ODBC in Microsoft Windows**

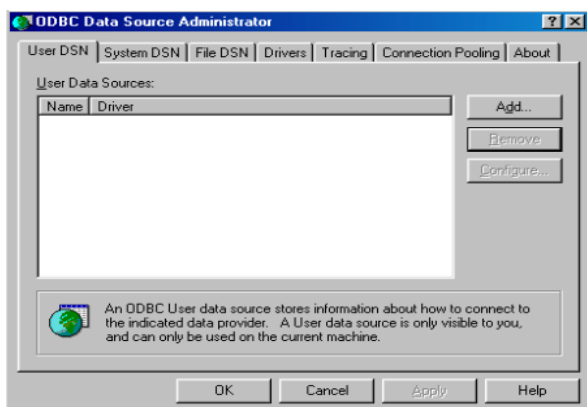
**Using Data Sources (ODBC)**

You can use Data Sources ODBC to access data from SCADAWave Manager Diagnostics' database management system. To do this you must add software components called drivers to your system. Data Sources ODBC helps you add and configure these drivers. SCADAWave Manager Diagnostics requires the Microsoft Access Driver (.mdb).

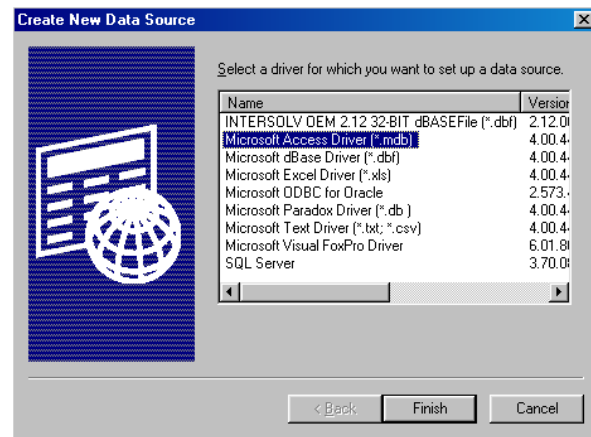
In the Windows 98 and NT operating systems, Data Sources can be accessed via the Control Panel. Choose the ODBC Data Source (32bit) icon.

In the Win2000 and XP operating systems Data Sources is accessed via Administrative Tools. Choose the Data Sources (ODBC) icon.

The ODBC Data Source Administrator window will appear:

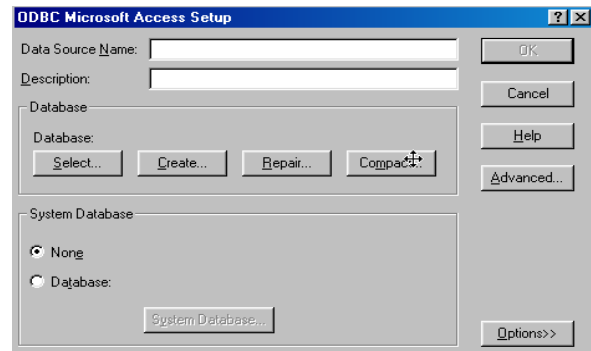


**Add Data Source Name (DSN)**



Click on the 'Add...' button, to Add a Data Source Name (DSN) and the associated Microsoft Access Driver.

The 'Create New Data Source' driver selection box appears.



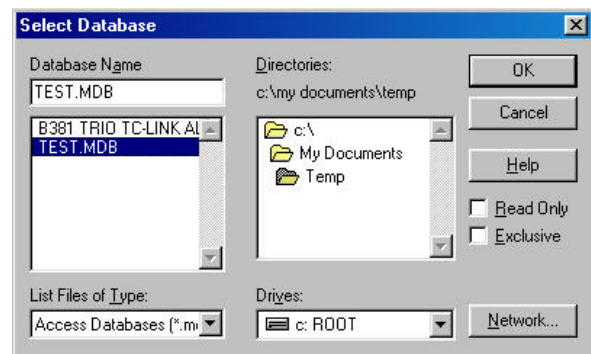
Select the Microsoft Access Driver (\*.mdb) then click Finish.

The ODBC Microsoft Access Setup window appears:

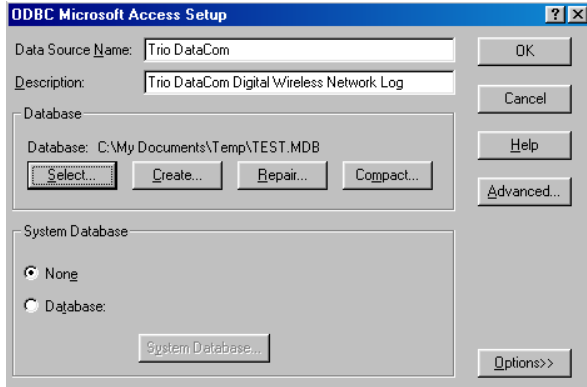
Enter a Data Source Name (DSN):

For example, enter SCADAWave

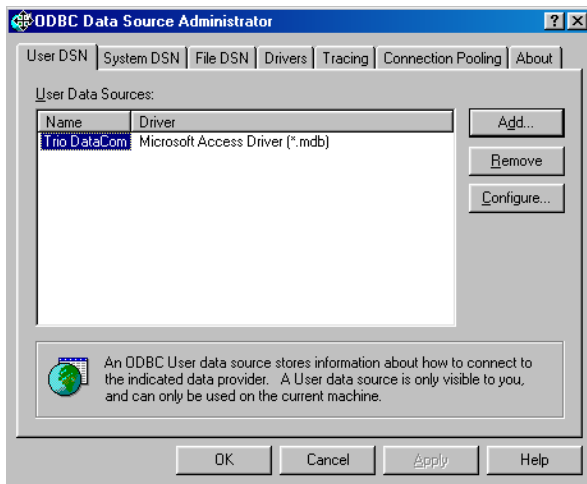
Enter a Description:



For Example, enter SCADAWave Digital Wireless Network Log. Click on the 'Select...' button, to select an existing database file:



The Select Database window appears: Select the .mdb log file created by SCADAWave Manager Diagnostics then press OK.



You are returned back to the ODBC Microsoft Access Setup window: Click OK to accept the settings. The ODBC Data Source Administrator window will re-appear as follows: The ODBC driver setup for SCADAWave Manager Diagnostics is now complete.

The next step is then to configure you application to connect to the SCADAWave Manager Diagnostics database via this DSN. As this process may vary from application to application you should follow the instructions provided for your application.

To construct SQL statements to access SCADAWave Manager Diagnostics data, you need the SCADAWave Manager database structure. The database structure is provided in Appendix D.

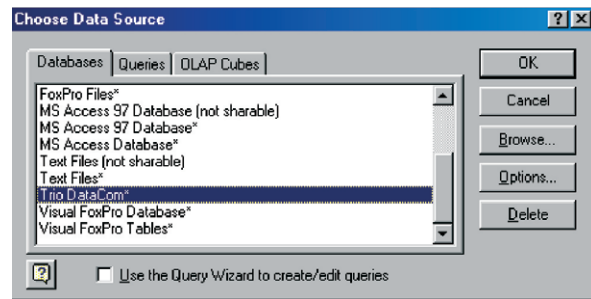
Note: If you are using Microsoft applications such as Access and Excel you can access the data directly without the need to use ODBC.

### Microsoft Excel Database Query Example

This query will list status data (i.e. Temperature, Volts, Rx Signal Strength, Rx Frequency Error, Tx Forward Power, and Tx Reverse Power) for a specified serial number occurring between specified date ranges.

Two database queries will be required. The first; to retrieve one record from the RadioTable containing the radio name and location for the specified serial number. The second; to retrieve a range of records from the StatusPoll table for the specified serial number, between and including the specified dates.

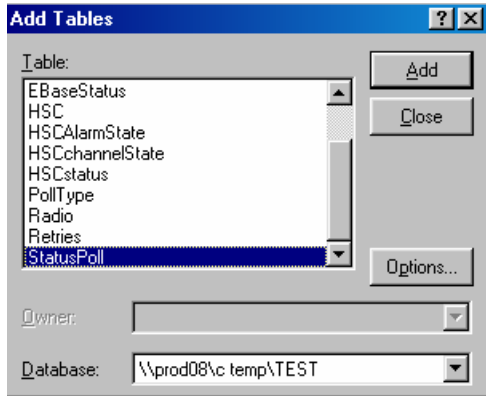
1. Open a new workbook in Excel.
  2. In cell A1 enter the following text: "Serial Number"
  3. In cell A2 enter a serial number that exists in the database: e.g. 20061
  4. In cell A4 enter the text: "Start Date:"
  5. In cell A5 enter the text: "End Date:"
  6. Highlight cell B4 and B5 and set the number format to: "dd-mm-yy hh:mm:ss"
  7. In cell B4 enter a suitable start date, e.g. 23-04-03 14:57:00
  8. In cell B5 enter a suitable end date, e.g. 23-04-03 15:00:00
- The date range fields are intended to limit the query result to a manageable number of rows. In this case the query result will contain records between and including the dates 23-04-03 14:57:00 to 23-04-03 15:00:00.
9. From the Data Menu, select 'Import External Data —> New Database Query..'



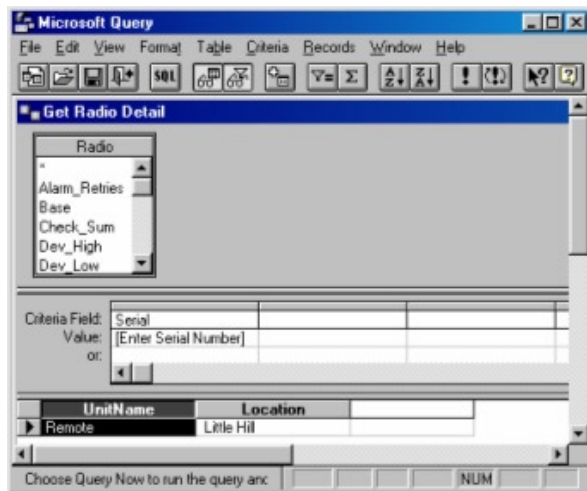
The Choose Data Source window will appear:

10. Uncheck the 'Use the Query Wizard to create/edit queries' box.
11. Select the DNS 'SCADAWave', which was created in Data Sources earlier.

- Click OK. The Microsoft Query Application appears, with the Add Tables selection box on top.

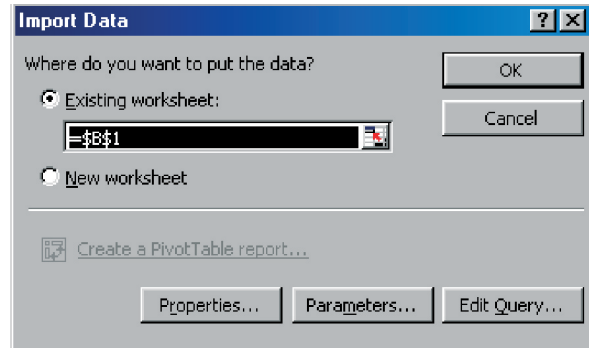


- Select and Add the 'Radio' table. The Radio Table will appear on the Microsoft Query screen.
- Click on the Close button.
- In the Radio table, find the 'UnitName' field and double click on it to add this field to the query.
- Similarly, add the 'Location' field to the query.
- From the view menu select 'Criteria', to view the criteria window.
- In the criteria field of the first column, enter field name 'Serial' (use the pull down selection list).
- In the value field, enter the following text: "[Enter serial Number]". When the query is run, a prompt will appear containing this message. You need to enter an existing serial number for the query to work.

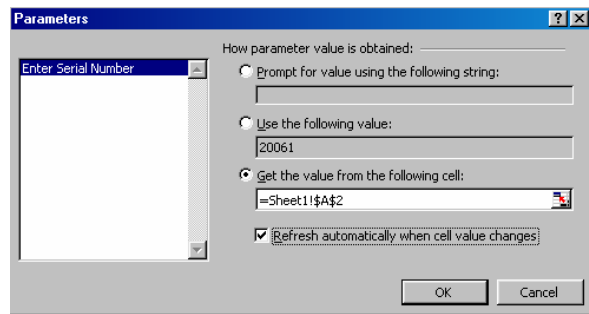


- From the Records menu choose 'Query Now' to run the query. Your screen should appear something like this:

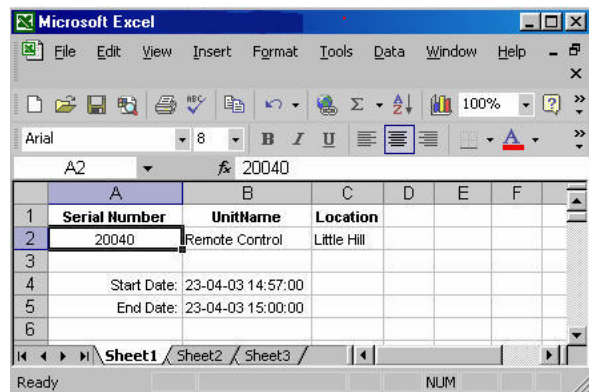
- Save the query as 'Get Radio Detail.dqy'
- From the File menu select 'Return Data to Microsoft Excel'
- Back at the spreadsheet, an 'Import Data' window appears prompting for a cell location. Put the cursor in cell B1.
- Click on the 'Parameters' button.



- Click on the 'Get the value from the following cell button.
- Place the cursor on the serial number in cell A2.



- Make sure the 'Refresh automatically when cell value changes' check box is ticked, then press OK.
- Press OK on the 'Import Data' window. The Spreadsheet should appear something like the following:

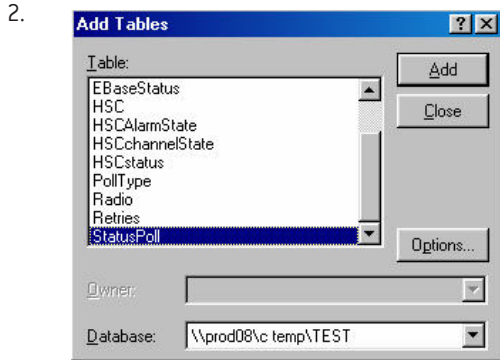


You can do another query with a different serial number simply by changing the number in cell A2. The Unit Name and Location data will automatically update.

**Query StatusPoll data**

The next Query will list the status data for the unit serial number in A2, occurring between and including the dates specified in cells B4 and B5.

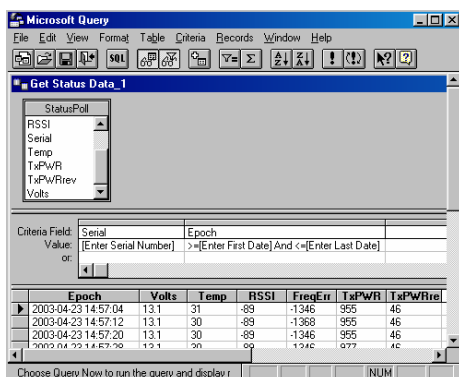
- To query the StatusPoll table, return to step 9 and follow each step until you have completed step 12, then return here. The Microsoft Query Application appears, with the Add Tables selection box on top.



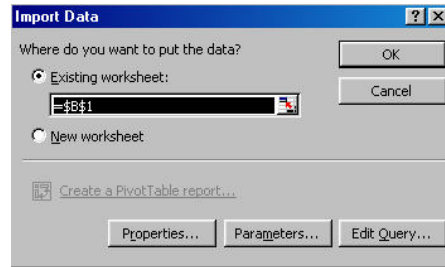
Select and Add the 'StatusPoll' table. The StatusPoll Table will appear on the Microsoft Query screen.

- Click on the Close button.
- In the StatusPoll table, find the 'Epoch' field and double click on it to add this field to the query.
- Similarly, add the Volts, Temp, RSSI, FreqErr, TxPWR and TxPWRrev fields to the query.
- From the view menu select 'Criteria', to view the criteria window.
- In the criteria field of the first column, enter field name 'Serial' (use the pull down selection list).
- In the value field, enter the following text: "[Enter Serial Number]".
- In the criteria field of the second column, enter field name 'Epoch'
- In the value field under Epoch, enter the following text: ">=[Enter First Date] AND <=[Enter Last Date]"
- From the Records menu choose 'Query Now' to run the query. You will be prompted for an existing serial number, start date, and end date.

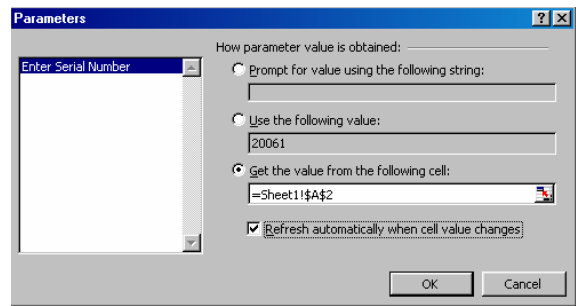
Your screen should appear something like this:



- Save the query as 'Get Status Data.dqy'
- From the File menu select 'Return Data to Microsoft Excel'
- Back at the spreadsheet, an 'Import Data' window appears, prompting for a cell location. Put the cursor in cell D1.



- Click on the 'Parameters' button.
- Select 'Enter Serial Number' from selection list box.
  - Click on the 'Get the value from the following cell.'
  - Place the cursor on the serial number in cell A2 and select.



- Select 'Enter First Date' from selection list box.
  - Click on the 'Get the value from the following cell.'
  - Place the cursor on the date in cell B4 and select.
- Select 'Enter Last Date' from selection list box.
  - Click on the 'Get the value from the following cell.'
  - Place the cursor on the date in cell B5 and select.
- Make sure the 'Refresh automatically when cell value changes' check box is ticked for each field, then press OK.
- Place the cursor in cell D1, then press OK.

The Spreadsheet should appear something like the following:

Serial Number	UnitName	Location	Epoch	Volts	Temp	RSSI	FreqErr	TxPWR	TxPWRrev
20061	Central Base1	Big Hill	230403 14:57:00	13.3	34	-90	249	6457	89
			230403 14:57:08	13.3	34	-91	270	6457	89
	Start Date: 23-04-03 14:57:00		230403 14:57:16	13.3	34	-90	270	6457	89
	End Date: 23-04-03 15:00:00		230403 14:57:24	13.3	33	-91	240	6457	89
			230403 14:57:32	13.3	34	-90	270	6457	89
			230403 14:57:40	13.3	34	-90	279	6457	89
			230403 14:57:48	13.3	33	-90	210	6457	89

Changing the Serial Number in cell A2 will automatically update all the displayed data. Similarly, changing either the Start or End Dates will automatically update the Status Poll Data.

In the figure below, you will note that the columns have been averaged using the spreadsheet AVERAGE function, and an additional query has been included.

The new query selects the last received poll for the specified serial number and displays the associated data.

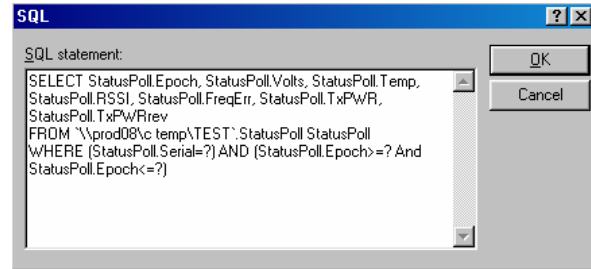
The Max query function is used on the Epoch field to get the last poll date. This query has been configured to refresh every minute.

An additional element has been added to the spreadsheet, which calculates the VSWR from the last poll data.

Serial Number	UnitName	Location	Epoch	Volts	Temp	RSSI	FreqErr	TxPWR	TxPWRrev	
20061	Central Base 1	Big Hill	230403 14:57:00	13.3	34	-90	249	6457	89	
			230403 14:57:08	13.3	34	-91	270	6457	89	
	Start Date: 23-04-03 14:57:00		230403 14:57:16	13.3	34	-90	270	6457	89	
	End Date: 23-04-03 15:00:00		230403 14:57:24	13.3	33	-91	240	6457	89	
			230403 14:57:32	13.3	34	-90	270	6457	89	
			230403 14:57:40	13.3	34	-90	279	6457	89	
			230403 14:57:48	13.3	33	-90	210	6457	89	
			<b>Average:</b>	<b>13.3</b>	<b>33.7</b>	<b>-90.3</b>	<b>255.4</b>	<b>6457.8</b>	<b>89.8</b>	
			<b>Epoch</b>	<b>Volts</b>	<b>Temp</b>	<b>RSSI</b>	<b>FreqErr</b>	<b>TxPWR</b>	<b>TxPWRrev</b>	<b>VSWR</b>
			<b>Last Poll:</b>	250403 13:07:22	13.3	33	-82	249	6457	89
										1.27

To fine tune, or to generate more complex queries you can display and edit the SQL statements corresponding to the queries previously created in Microsoft Query by selecting 'SQL' from the view menu.

This figures shows the SQL select statement corresponding to the query described in steps 29 to 40.



**Client Server Mode Operation**

To initiate a Client/Server session:

**Server**

1. Start SCADAWave Manager Diagnostics on the Server PC.
2. Open the required SCADAWave Manager Diagnostics Database.
3. Start polling radios (using Individual, Timed or Group Poll)
4. Under Client/Server Menu, ensure "Server Mode" is ticked
5. The server will now send each Client diagnostics responses as specified by the rules in the Client/Server setup.

**Client**

1. Start SCADAWave Manager Diagnostics on the Client PC.
2. Under Client/Server Menu, ensure "Client Mode" is ticked
3. Diagnostics response data as received on the Server will now be mirrored on the Client (depending on Group rules)

## Part C - Appendices - Microsoft Access (.mdb) Structure

### Table Definitions

Table 1.0 - Radio		
Field Name	Type	Comments
Serial	Long Integer	Unique Serial Number
UnitName	Text (20)	
Location	Text (20)	
SID_Code	Byte	Stream Identification number
Pair_Mode	Yes/No	Yes = Hot Standby
Pair_Unit	Long Integer	Unit serial number to which this unit is paired, if in hot standby configuration
Poll_Resp_Time	Single	Time to wait for response before time-out
Poll_Group	Yes/No	Yes = In Status Poll Group
Alarm_Retries	Yes/No	No longer used
Temp_High	Integer	Degrees Celsius
Temp_Low	Integer	Degrees Celsius
RSSI_High	Integer	dBm
RSSI_Low	Integer	dBm
TxPWR_High	Integer	Milli Watts
TxPWR_Low	Integer	Milli Watts
Volts_High	Single	Volts
Volts_Low	Single	Volts
Freq_High	Integer	Hz
Freq_Low	Integer	Hz
Dev_High	Integer	Not used
Dev_Low	Integer	Not used
Check_Sum	Yes/No	Yes = E-Series radop Checksums ON.
Base	Yes/No	Is this a Base Unit?

Table 2.0 - StatusPoll		
Field Name	Type	Comments
Epoch	Date/Time	Time and date received
Serial	Long Integer	–
Temp	Integer	Degree Celsius
RSSI	Integer	dBm
TxPWR	Integer	milli Watts
Volts	Single	Supply Volts
FreqErr	Integer	Hz
TxPWRrev	Integer	milli Watts

Table 3.0 - Alarm		
Field Name	Type	Comments
Epoch	Date/Time	Time received
AlarmCode	Byte	See AlarmCode table contents
Serial	Long Integer	–
Value	Single	Value in error

Table 4.0 - AlarmCode		
Field Name	Type	Comments
AlarmCode	Byte	See Table 4.1 – Alarm Code
AlarmCodeName	Text {20}	–

Table 4.1 - AlarmCode		
Alarm Code	Alarm Code Name	Comments
0	Temp	Temperature out of Alarm limits range
1	Rx Sig	Received Signal out of Alarm limits range
2	Tx PWR	Tx Power out of Alarm limits range
3	DC Volts	DC supply volts out of Alarm limits range
4	Freq Err	Rx Frequency Error out of Alarm limits range
5	No Ack	Failed poll attempt three times
7	Switch Base	HSC change over event has occurred
8	Deviation	Not used
9	Diags Not Installed	Diagnostics has not been installed on the unit being polled
10	Re-Boot	Radio has been re-booted since the last received status poll [E-Series]
11	Ports Halted	Radio is in Halted state. User ports will not function
12	Not Remote	Radio has been entered in the database as a remote but appears to be a base
13	Not Base	Radio has been entered in the database as a base but appears to be a remote

Table 5.0 - Retries		
Epoch	Date/Time	Time Received
Poll Type	Byte	Refer Table 5.1 – Poll Type
Serial	Long integer	–

Table 5.1 - Poll Type	
PollType	PollTypeName
65	Assert Param
66	Warm Boot
67	Calib
70	Set Synth
71	GetParam
72	Halt
76	Learn PCW
77	Port Mode
80	Param Set
81	SR UART Version
82	Param Read
83	Status
84	Watch Dog
85	SR UART
86	GetRev
87	Param Write
100	Power Up



**Table 6.0 - Poll Type**

Poll Type	Byte	Refer Table 5.1 – Poll Type
Poll Type Name	Text (20)	Refer Table 5.1 – Poll Type

**Table 7.0 - Counter**

Field Name	Type	Comments
Epoch	Date/Time	Time received
Serial	Long Integer	–
RealTicker	Long Integer	Real time (centi-seconds)
RSSITicker	Long Integer	RSSIGoodTicker (centi-seconds)
TxFramCnt	Long Integer	Number of Frames Tx'd
TxByteCnt	Long Integer	Number of Bytes Tx'd
BadFrameCnt	Long Integer	Number of Bad Frames Rx'd
GoodFrameCnt	Long Integer	Number of Good Frames Rx'd
GoodByteCnt	Long Integer	Number of Good Bytes Rx'd
LostSynchCnt	Long Integer	Synchronisation Lost count
LostRSSI	Long Integer	RSSIU Lost count

**Table 8.0 - HSC**

Field Name	Type	Comments
Serial	Long Integer	HSC serial number
Base1_Serial	Long Integer	Base1 serial number
Base2_Serial	Long Integer	Base2 serial number

**Table 9.0 - HSCAlarmState**

Field Name	Type
State	Byte
Description	Text (20)

**Table 9.1 - HSCAlarmState**

State	Description	Comments
0	No Data	Test not yet performed
1	Active Alarm	An alarm has occurred and is still current
2	No Alarm	No Alarms have occurred
3	Recovered Alarm	An alarm has occurred but has recovered

**Table 10.0 - HSCchannelState**

Field Name	Type
State	Byte
Description	Text (20)

**Table 10.1 - HSCchannelState**

State	Description
0	Unknown
1	Base 1 Online (Auto)
2	Base 1 Selected by SCADAWave Manager (Remotely)
3	Base 1 Selected by Switch (Onsite)
4	Base 1 Online (Auto)
5	Base 1 Selected by SCADAWave Manager (Remotely)
6	Base 1 Selected by Switch (Onsite)

**Table 11 - HSCstatus**

Field Name	Type	Comments
Serial	Long Integer	HSC serial number
Epoch	Date/Time	Time received
Channel	Byte	See HSCchannelState table
ChangeCount	Long Integer	Changeover counter
ChangePending	Yes/No	Changeover to occur in up to a minute
UserInput1	Yes/No	Yes = Transistor ON
UserInput2	Yes/No	Yes = Transistor ON
UserOutput1	Yes/No	Yes = Transistor ON
UserOutput2	Yes/No	Yes = Transistor ON
Base1 Supply	Byte	See HSCAlarmState table
Base1 TxPower	Byte	See HSCAlarmState table
Base1 Data	Byte	See HSCAlarmState table
Base1 RxSig	Byte	See HSCAlarmState table
Base1 Freq	Byte	See HSCAlarmState table
Base2 Supply	Byte	See HSCAlarmState table
Base2 TxPower	Byte	See HSCAlarmState table
Base2 Data	Byte	See HSCAlarmState table
Base2 RxSig	Byte	See HSCAlarmState table
Base2 Freq	Byte	See HSCAlarmState table

**Table 12.0 - EBaseStatus**

Field Name	Type	Comments
Serial	Long Integer	HSC serial number
Epoch	Date/Time	Date/Time received
User Input 1	Yes/No	Yes = Transistor ON
User Input 2	Yes/No	Yes = Transistor ON
User Input 1	Yes/No	Yes = Transistor ON
User Input 2	Yes/No	Yes = Transistor ON

## Part D – Support Options

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### Website Information

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The Control Microsystems website support contains links to e-mail and telephone support, technical notes, manuals, software updates.

Please go to [www.controlmicrosystems.com](http://www.controlmicrosystems.com).

### E-mail Technical Support

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E-mail your questions to [support@controlmicrosystems.com](mailto:support@controlmicrosystems.com)

When e-mailing questions to our support staff, make sure you tell us the exact model number (and serial number if possible) of the Control Microsystems equipment you are working with. Include as much detail as possible about the situation, and any tests that you have done which may help us to better understand the issue. If possible, please include your telephone contact information should we wish to further clarify any issues.

### Telephone Technical Support

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Technical support is available from 8:00 to 18:30

(North America Eastern Time Zone)

**1-888-226-6876.**

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