PATROLLER

<u>IMPORTANT SAFETY INSTRUCTIONS</u>

This equipment is designed to comply with EN61010-1:2001 (Safety requirements for measurement, control, and laboratory use) - observe the following precautions:

- With exception of the battery packs there are no user serviceable parts inside the equipment - do not attempt to open the equipment, refer service to Palmer environmental or authorised distributor.

- All batteries supplied are rechargeable lithium ion part number ICR-18650H. Do not short-circuit these batteries. Any misuse may result in explosion or fire. They must not be used in any other application or used with any other equipment. Only batteries/ battery-packs supplied by Palmer Environmental or authorised distributor must be used.

   Disposal considerations for the battery pack: Do not incinerate, or subject cells to temperatures in excess of 70^0C. Such abuse can result in loss of seal, leakage, and/or cell explosion. Dispose of in accordance with appropriate local regulations.

   The sealed battery packs contain circuitry to prevent overcharging and over-discharging.

   If the system is going to be stored for any length of time, to ensure long life of batteries it is recommended that they are charged to approx. 1/4 of capacity.

- When charging the batteries in the equipment only use the 12V DC output charger supplied with the equipment. The charger must only be used indoors to charge the batteries in the equipment.

Note: Palmer Environmental Ltd. Shall not be liable for any consequential damages, losses, costs or expenses arising from the misuse of this equipment however caused.

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<u>Warnings</u>

<u>Patroller Unit</u>

When charging from a 12v vehicle supply, if the engine is switched off the unit must be disconnected prior to restarting the vehicle, failure to do this may result in permanent damage to the charge circuits. Once the engine is running, it is safe to reconnect the Patroller for charge.

The Patroller contains a lithium backup battery of which there is a real danger of explosion if this battery is incorrectly replaced. It should only be replaced with the same or equivalent battery type. Used batteries must be disposed of according the manufacturers instructions.

<u>Permalog® 3 and Permalog® Plus Sensor and Magnet Warning</u>

Both the Permalog® 3 and Permalog® Plus sensor can be seen from the bottom of the unit. Users must not attempt to unscrew this sensor as this may break internal components resulting in irreparable internal damage, sensor replacement is then the only option.

Any necessary repair or dismantling of the sensor must be carried out by an authorised distributor. Permalog® units have no user serviceable parts. The enclosure protects the user from electrical shock and other hazards. Servicing must be referred to competent personnel. If any unit does not appear to function correctly then it must be returned to an authorised representative.

<u>Important Safety Note:</u>

Both the Permalog® 3 and Permalog® Plus logger use a high strength magnet and should not be carried by anyone with a heart pacemaker. This magnet can permanently corrupt magnetic storage media such as floppy discs, hard discs and tapes etc… It can also damage TV and PC monitor screens and some watches.

Introduction

Permalog® Plus is the very latest in a highly successful line of permanent and semi-permanent leak noise loggers. This logger can be used as both a traditional leak noise logger, and as a "drive by" logger.

Permalog® leak noise loggers are deployed throughout the water distribution network to provide continuous surveying of leakage. Each Permalog® unit adapts itself automatically to its environment. If no leak is present a signal is transmitted to indicate normal background conditions, however, as soon as a possible leak is detected, the Permalog® unit enters an alarm state and transmits a signal to indicate a leak condition.

Following a rise in unaccounted for water, or at standard intervals, a leakage patrol is carried out in the area using the Permalog® Patroller module. Leak status information from the loggers is displayed on the PDA screen of the Patroller module and stored in the memory.

With no cables or hard installation, the Permalog® is simply fitted to a metal fixture within the chamber (usually a hydrant or valve) and left alone. Logging times, Patrol times and Transmission times are fully customisable ensuring the operator gets the most benefit from the system and can configure it to their advantage. With integrated Bluetooth technology, the Permalog® Plus logger offers easy management through the PDA and Patroller Interface Unit. Permalog® Plus loggers can be fully configured without having to be removed from the chamber.

Patroller II is compatible with both Permalog® 3 and Permalog® Plus loggers.

Permalog® PLUS
PATROLLER II

Benefits of Use

Operational Benefits

- 100% of distribution system permanently monitored.

- Finds more leaks more quickly than traditional methods.

- Responds rapidly to new mains bursts, improving service to customers.

- Automates and de-skills leak surveying, eliminating human error and finding leaks that would otherwise be missed.

- Eliminates "stop tap bashing" (surveying using listening sticks).

- Operates independently of the size, structure or integrity of the area being monitored.

- Completely non-invasive method with no detrimental effects on supply to customers (preferred alternative to step testing).

- Improves overall detection efficiency and motivation by enabling skilled staff to concentrate on finding "known" leaks and avoid wasting time in no-leak areas.

- Operates continuously for up to 5 years (dependant on configuration), enabling a low leakage level to be maintained easily.

- New Patroller is backwards compatible with Permalog® 3.

- Bluetooth and RF technology allow wireless configuration on site.

- Logging can be fully customised to fit customers requirements.

Economic Benefits

- Survey costs cut by >90% with elimination of surveying using listening sticks

- Dramatic productivity gain - one person can survey several DMA's (District Metered Areas) per day.

- Record low leakage levels

- Attainable and easily maintained.

- Low installation cost and no maintenance costs enable rapid payback, with increasing profits per year.

- No night work required for leak surveying.

- Highly attractive return on capital employed.

- Lower leakage level reduces cost of water into supply.

- Demonstrates high technology benefits to regulator, customers, shareholders and international clients.

With over 50,000 units deployed world wide, its easy to see why the Permalog range is one of the most highly respected Leak Noise Loggers in the industry. Palmer Environmental, your gateway to the latest technology, solutions and services.

Patroller Equipment

The Patroller is supplied with all the cables and accessories required for normal operation.

The standard Patroller kit includes: -

- Patroller Bluetooth Interface Unit fitted with rechargeable battery pack
- 12V DC power cable with standard vehicle lighter adapter
- Mains powered charger unit
- Small antenna for portable use
- Mag-mount antenna with integral co-axial lead

The following equipment is not supplied as standard but may be supplied as optional accessories to the Patroller: -

- PDA
- PDA Hard Case
- PDA in-car charger and holder
- Cowl (for interrogating Permalog 3 loggers)
- Replacement battery pack
- Transit case

Please Note:

Only suitable PDA's are compatible. Please check with your distributor for a list of compatible PDA's for use with the Patroller system.

Patroller Features

The various features of the Patroller unit are identified below.

1) Charging Connection

2) Aerial Connection

3) Cowl Connection

4) LED Displaying Battery and Communications Status

5) On/Off Button

6) Carry Handle

7) Injection Moulded Casing

8) Battery Compartment

Permalog® Plus Features

The main features of the Permalog® Plus are listed below:-

1.   **Antenna**

2.   **LED**

3.   **Lifting Hook Insert**

4.   **IP68 Rated Housing**

5.   **Stainless Steel Accelerometer**

Permalog® 3 Features

The main features of the Permalog® 3 are listed below:-

1. **Antenna**
2. **LED and Infrared Communication Window**
3. **Lifting Hook Insert**
4. **IP68 Rated Housing**
5. **Stainless Steel Accelerometer**

250mm   114mm

62mm

Permalog® Logger Deployment Instructions

Ensure that both the screw thread on the aerial and the lower recessed screw hole in the Permalog® are clean, then screw the aerial into the lower screw hole firmly by hand. Ensure that the rubber washer is fitted to make a watertight seal. Remove the magnet keeper and store for later use.

Start/Reset the Permalog® by passing a magnet close to, and across, the top of the logger. Look to see a sequence red LED flashes 3 consecutive times and then green/red 3 times rapidly. If the LED does not flash, pass the magnet across the top again and look at the LED to verify.

This is the only way to reset the unit. Once reset, it will operate continuously for the life of the batteries. It can only be switched off using the Patroller. The guaranteed battery life depends on factory settings. Any medium strength magnet will reset the Permalog®; for convenience, the magnet on another Permalog® may be used. Do not attempt to remove the magnet from the bottom of any Permalog®.

Permalog® Plus loggers will retain the history even if reset. Permalog® 3 loggers once reset, do not store the information in memory and it is recommended they have their history downloaded via the Patroller Cowl prior to actual reset.

Attach the Permalog® to a metal pipe-fitting using the magnet on the base. Always ensure that the contact point is free from dirt so that the magnet makes a good contact. If an eye-hook (optional accessory) is used, this must be screwed into the top of the logger. For best performance, it is recommended that the Permalog® unit is deployed in a vertical/upright position.

Permalog® Logger Re-Deployment Instructions

Ensure you have sufficient keepers for the magnets. Removing keepers from logger magnets takes some effort. Insert a piece of thin card between the keeper and the magnet to make this job easier.

On retrieval, always grasp the main body of the logger. Do not pull loggers by the aerials. Ensure the magnet from one logger is kept more than 3 inches (8cms) away from the window of the nearest logger. If any magnet is held too close to the logger window, the logger will continually reset causing an incorrect internal clock setting and subsequent erroneous results.

Pairing Interface Unit to PDA (Bluetooth)

Pairing Bluetooth devices differs on each PDA model/make, please refer to your PDA manual for specific instructions.

The following is based on a Dell Axim X51 PDA unit:-

Turn the Patroller Interface Unit on by pressing the on/off button located on the front of the unit .

Turn the PDA on and navigate to "**settings**" and then "**connections**".

From the connections screen, open the Bluetooth connection settings. Ensure the PDA's Bluetooth is turned on.

Create a new partnership, this will search for any Bluetooth devices in range. Once it has found the Patroller Interface Unit (Patroller 2 xx.yy—where xx.yy are the last four digits of the Bluetooth identity) click next.

Enter a Passkey of 0000 (4 zeros) and click next.

You can rename the found device for ease of use, call it "**Patroller II**" and ensure the "**serial port**" box is ticked.

Click finish to finalise the pairing of the Patroller Interface Unit and the PDA.

Changing the PDA Power Settings

To stop the PDA going into standby mode whilst carrying out a patrol, you can configure the Power Saving options. The following is based on a Dell Axim X51 PDA unit:-

From the main PDA screen select "Start" then "Settings".

Click the "System" tab and click the "Power" icon. In the new window, select the "Advanced" tab. Ensure "**On Battery Power** Turn off device if not used for" is **unchecked** and click "OK".

To help conserve battery power you can adjust the brightness settings by selecting "Brightness" from the "System" tab in "Settings". Using the slide bar, adjust the brightness to an acceptable level **On Battery Power** and click "OK".

The Patroller Icons
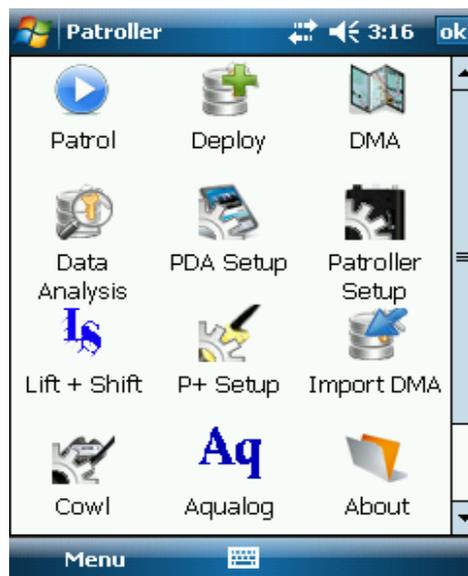
Patrol - Main screen for carrying out patrol.

Deploy - Deploy single and multiple Permalog's.

DMA - Add, edit and delete DMA information.

Data Analysis - View logger information and status.

PDA Setup - Select Patroller unit being used.

Patroller Setup - Configures the Interface unit.

Lift + Shift - Configures Lift + Shift Mode.

P+ Setup - Configures Permalog Plus options.

Import DMA - Imports previously saved DMA information.

Cowl - Configures Permalog 3 options.

Aqualog - configures Aqualog Mode.

About - Displays current software version.

Service - In-house diagnostic tools and information.

The Patroller Software

The Patroller uses on-screen icons and menus for it's operational functions.

Press the power button on the front of the Interface unit to switch the unit on. The system will automatically initialise Bluetooth communications.

Start the PDA Patroller application.
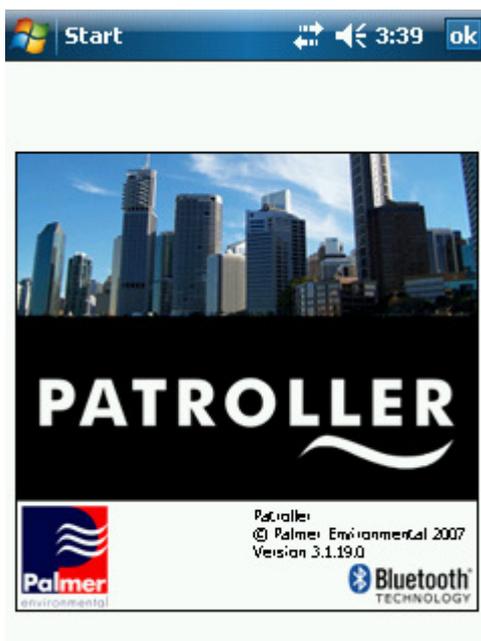
For ease of use, click on the icons to quickly access the relevant function. Classic users can still use the "Menu" to access the same functions. From the main screen (below), click the icon or select the required menu option to launch the required function.

Settings

You can configure the PDA, Permalog's and the Interface Unit via the icons from the main screen (below) or via the Setup menu.
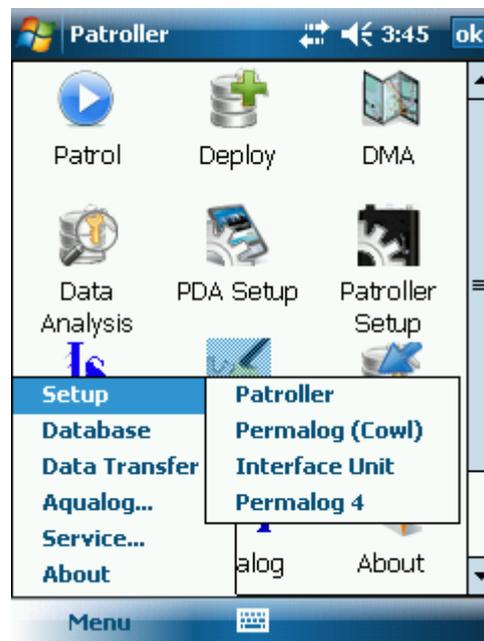
Clicking each option will open a new window:

*PDA Setup Icon or **Menu - Setup - Patroller:**
Select the Patroller (Bluetooth Device) being used on the PDA.

*Cowl Icon or **Menu - Setup - Permalog (cowl):**
Configures Permalog 3 loggers using a cowl via the Interface Unit.

*Interface Setup Icon or **Menu - Setup - Interface Unit:**
Configures the various Interface Unit options.

*P+ Setup Icon or **Menu - Setup - Permalog Plus:**
Configures Permalog Plus loggers options.

*These are discussed in greater detail on pages 18, 19, 20, 21 and 22.

Database

The "**Database**" options are where you can setup and view the logged data, create and edit DMA data and deploy single and multiple loggers.

Clicking on each option will open a new window.
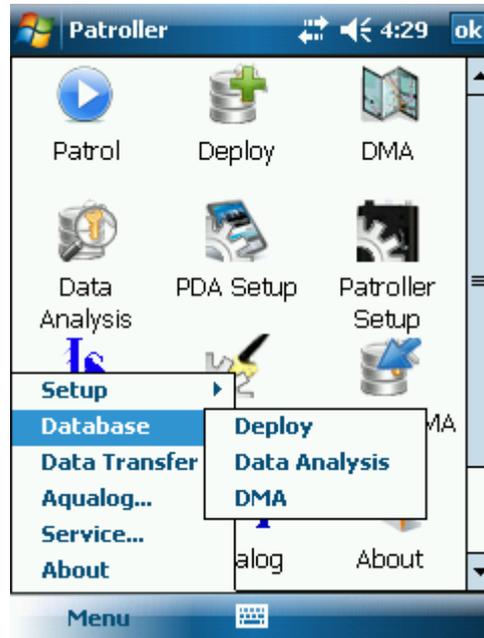
*Deploy Icon or **Menu - Database - Deploy:**
Allows individual loggers to be added.

*Data Analysis Icon or **Menu - Database - Data Analysis:**
Shows logged data.

*DMA Icon or **Menu - Database - DMA:**
Add, Edit and Delete DMA information.

*Import DMA Icon or **Menu - Database - Import DMA:**
Allows user to import previously created DMA data**.

*These are discussed in greater detail on pages 24, 25 and 26.
**Patroller II is able to import DMA data from original Patroller/Permalog 3 PC Software.

Service

The **Service** menu option is for build and fault diagnostics only. There are no end-user options. This password protected menu is intended for in-house diagnostic purposes only.

Import

Allows user to import previously saved DMA settings from the original Patroller PC Software. After the file has been copied from the PC to the PDA, select the CSV file you wish to import. This will import the DMA and logger details for that DMA.

About

The "**About**" menu option displays the current software build. Click the "**X**" to close this window and return to the main screen.

PDA Setup

From this screen, you can select the Patroller Interface Unit (*Bluetooth Device*) being used. This must be done prior to anything else.
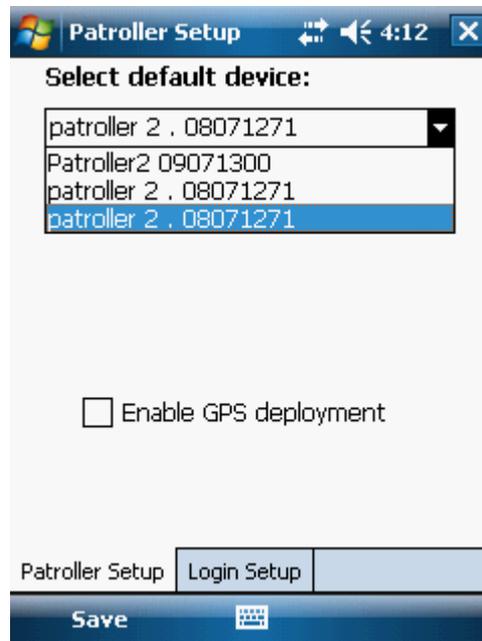
Ensure the "**Select default device**" is set to "**Patroller II**" (if instructions have been followed on page 12).

Click "**Save**" to save any changes and then click the "**X**" to close the window. The system will return to the main screen.

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Setup Permalog Cowl (General Tab)

Before connecting the Permalog 3 Cowl to the Interface unit, ensure the com-
munications window on the logger is clean and free from debris. Place the Cowl
over the communications window and ensure a good seal is made.

Select the "**Cowl**" icon or click "**Menu - Setup - Permalog Cowl**" to enter the setup
screen (below). Click "**Connect**" prior to selecting a menu command. On the
"**General**" tab, select from the drop down menu the command you wish to use and
click "**Send**".
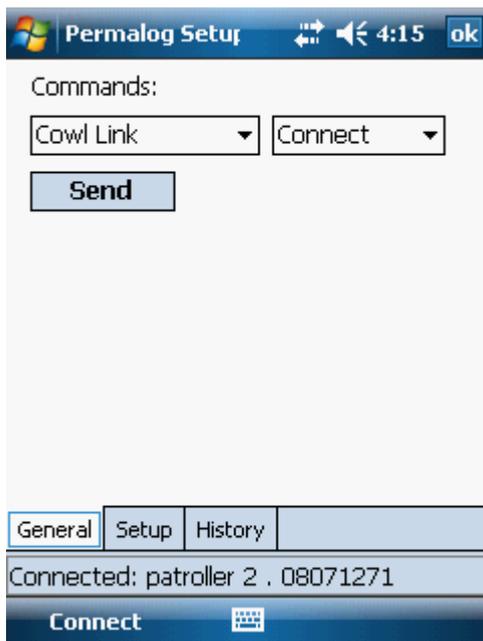
Specific Commands are:

Cowl Link:

Allows user to establish cowl communications

Firmware Data:

Shows current version of the Permalog firmware

Monitor Noise:

Displays current noise heard by logger.

Set Standby:

Allows the user to send the Permalog to sleep.

Pipe Material:

Select from Metal or Plastic.

Display Histogram:

Shows the history of the logger in a graphical format.

Read Logger:

Displays current logger settings and status.

Click the "**X**" to close this window and return to the main screen.

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Setup Permalog Cowl (Setup Tab)

Click the "**Setup**" tab to configure the Permalog. Click "**Read**" to view the current configuration settings of the Permalog.

Please ensure you have clicked "**Connect**" and the system is showing "**Connected**" before you make any changes. Clicking the "**Read**" button displays the current setup of the logger.

From here you can change the serial number of the logger as well as:-

Synchronise the Permalog Date and Time with the PDA Date and Time. (Please ensure your PDA's Date and Time is correct).

Change the Tx rate for Leak and No Leak modes. This increases or decreases the transmission frequency of data.

Select which days you would like to log data.

To save the settings, click the blue arrow button to the right of the option being changed.

Click the "**X**" to close this window and return to the main screen.

Setup Permalog Plus

Please ensure you have clicked "**Connect**" and the system is showing "**Connected**" before you make any changes.
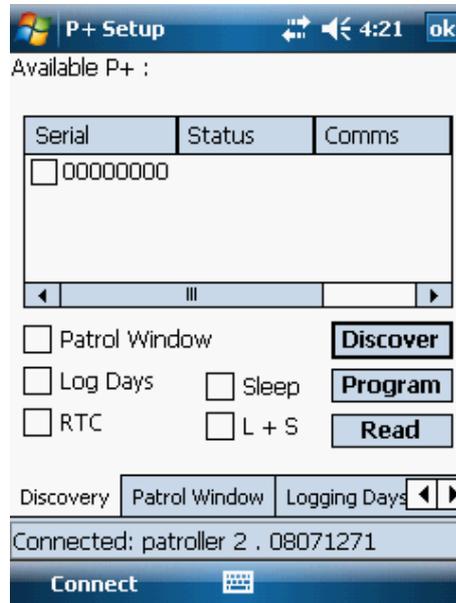
Once connected, click "**Discover**" to search for loggers in range. Any loggers within communication range will be listed.

To put a logger to sleep, highlight the relevant logger and press the "**Sleep**" button. Confirmation will be displayed at the top of the screen.

To edit a logger, highlight the logger and press the "**Edit**" button. Using the tabs, edit the logger to your requirements. Use the small arrow buttons to scroll through tabs not shown on screen. Configuration tabs include:

Patrol Window:
Select the days to carry out a patrol. Configure and click "Send" to save changes.

Logging Days:
Select the days and time the logger will record data.

Time:
Change the loggers real time clock. Sync with PDA clock.

Utility:
Sensor Check, Sensor Bar Chart, RF Test and Histogram.

Select the command you wish to use and click "**Send**". Clicking "**X**" closes the window and returns the user to the main screen.

Patrol Screen

This is the screen for carrying out a patrol. Once connected, click "**Start**" to initialise the patrol.

As loggers are detected they will appear in the list. The information given is logger Serial Number, Leak Status, Level & Spread, the time it reported in and a colour bar denoting leak (red) or no leak (green).

To clear the current list of loggers, click "**Clear Logs**". This will remove the list of loggers being displayed. This will not remove the data itself as this is stored in the database.

Click "**Stop**" to stop the patrol. Click "**X**" to close this window and return to the main screen.

Patroller Setup (Setup Interface Unit)

Please ensure you have clicked "**Connect**" and the system is showing "**Connected**" before you make any changes. Once connected, select the command you wish to use and click "**Send**". Clicking "**X**" closes the window and returns the user to the main screen.

Specific Commands are:

Get Version:

Displays current firmware version of the Interface Unit.

Set Time:

Set the time and date for the Interface Unit.

Get Time:

Displays the current time and date set in the Interface Unit.

Main Battery:

Displays the Temperature, Voltage and Charge Status of the Interface Unit Battery.

Set Sounder:

Option to change settings on the sounder (see page 27 for more details).

Radio Power:

Set Radio Power high or low.

UK Radio:

Set Radio to UK frequency.

USA Radio:

Set Radio to USA frequency.

Deploy Screen

The deployment screen allows you to view, add and edit loggers in the database.

To add new or additional loggers to the database click "**New**". In the new window, fill in the text boxes with the required information. Click "**X**" to close the window and return to the main deploy screen. Click "**Save**" to save the changes to the database.

To edit an existing logger, highlight the relevant logger, in the new window, click "**Edit**" then change the details as required. Click "**OK**" to close this window and return to the main deploy screen. Click "**Save**" to save the changes to the database.

To delete a logger, highlight the logger to be deleted, in the new window, click "**Delete**". Click "**Save**" in the main window to permanently save the changes.

To filter loggers within a particular DMA, use the drop down box and select the DMA you wish to view. This will display all loggers assigned to that DMA.

To show all loggers regardless of DMA, select "**ALL**" from the drop down box.

Clicking "**X**" closes this window and returns you to the main screen.

NOTE: You must have a DMA setup prior to adding loggers to a DMA in the Deploy screen.

<u>Data Analysis</u>

The database screen allows you to interrogate the database information. Filter options are: Leak Only, Serial Number, Missed loggers and All.
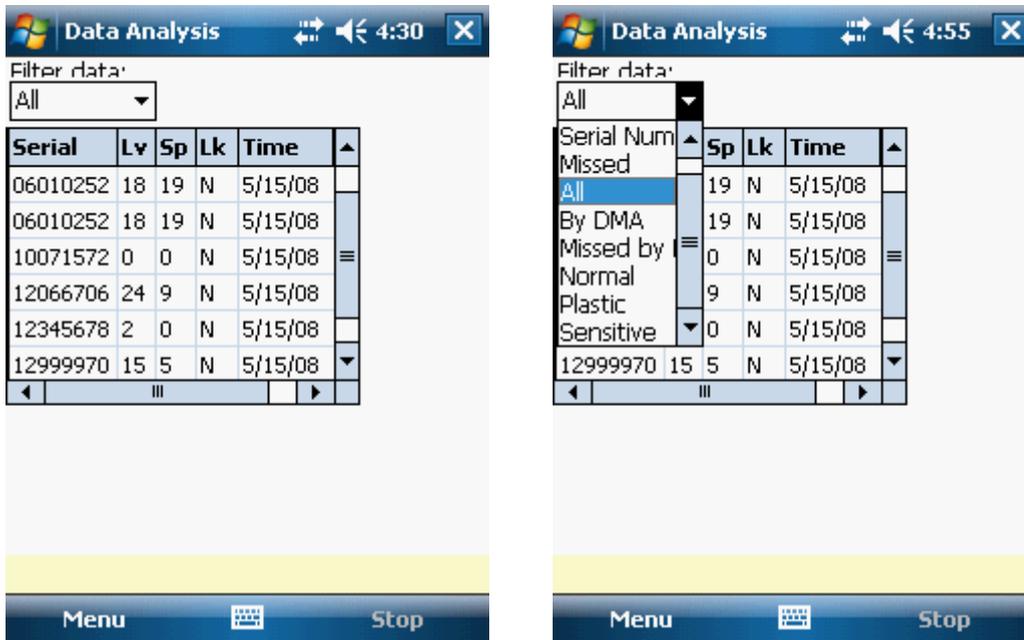
Selecting "**Leak Only**" will display only those loggers that are reporting in Leak mode.

"**Serial Number**" allows you to search for a specific logger via its serial number.

"**Missed**" displays any loggers that have not been accounted for during a patrol.

"**All**" shows all loggers regardless of its state.

Click "**Menu—Database Maintenance**" then "**Delete Logs**" to clear the list of loggers from the PDA*

Click "**Menu - Create CSV**" to create a CSV file for **All** loggers or a particular **DMA**. This can then be exported for reporting information.

*NOTE: This does not delete the information from the Patroller Interface Unit, only the PDA database.

Click "**X**" to close this window and return to the main screen.

DMA

This screen shows the list of DMA's in the database. DMA's (District Metered Areas) make multiple logger deployment a lot easier. With most operators covering several large DMA's it can be easy to lose track of where each logger is situated. Creating DMA's prior to logger deployment helps take care of this.
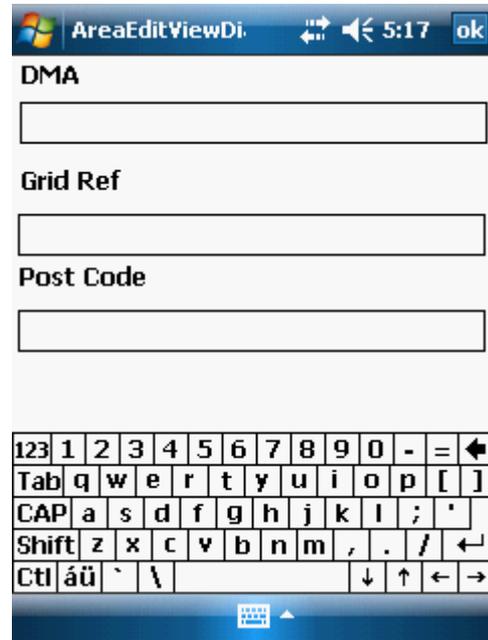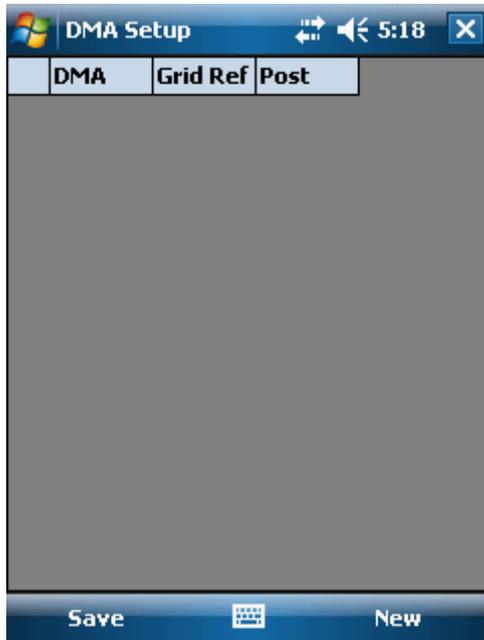
Add a DMA

To add a new DMA, click "**New**". This will open a new window where you can enter the DMA name, Grid Reference and Post Code. Once the DMA, Grid Reference and Post Code (optional) have been entered, click "**OK**" in the top right corner. This will return you to the main DMA screen (above). To save the changes, click "**Save**".

Edit a DMA

To edit an existing DMA, click the DMA to be edited and click "**Edit**" in the new window. Edit the information and click "**OK**". Once returned to the main DMA screen, click "**Save**" to permanently save the changes.

Delete an existing DMA

To delete an existing DMA, from the main DMA window (above), select the DMA to be deleted. In the new window click "**Delete**". The screen will automatically return to the main DMA window, click "**Save**" to permanently save the changes.

Click the "**X**" to close this window and return to the main screen.

Data Capture

Aqualog

This mode allows a defined set of P+ loggers to continuously log Level and Spread data over a set time period. Individual loggers are selected by serial number and con-figured in Aqualog setup then data is downloaded as required. Aqualog data is then displayed in graphical form, this can then be saved to file.

Aqualog Setup: **Aq** Aqualog

Select Aqualog mode then connect to interface unit

Then click '**Discover**' to display a list of available log-gers. select a logger to setup.

 Click '**Setup**'. The System then displays the setup screen, and the selected serial number on the screen. Select start day/time..

 Select **log duration**.

 Select **log interval**.

 Select number of logs per day.

 Select how many days to log over from a pre-calculated selection.

 System then   **Aq**   calculates and displays the projected end time.

Then click   Aqualog '**Upload Setup'**. Then System uploads Aqualog setup via interface unit.

 Setup successful message displayed to the user on completion.

Aqualog download:

Select   Aqualog and confirm connection to interface unit.

Click '**Discove**r' to display a list of available loggers.

Then select a logger from the list (by serial number).

click '**Download**' to initiate the download of Aqualog data.

 The system communicates with the selected logger via the interface unit requesting Aqualog data.
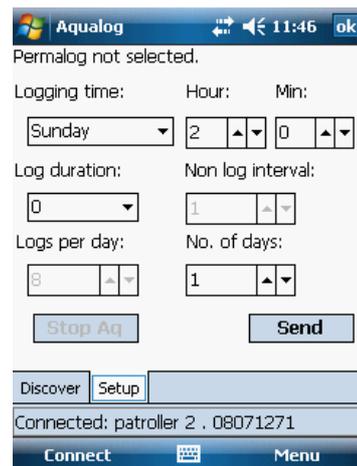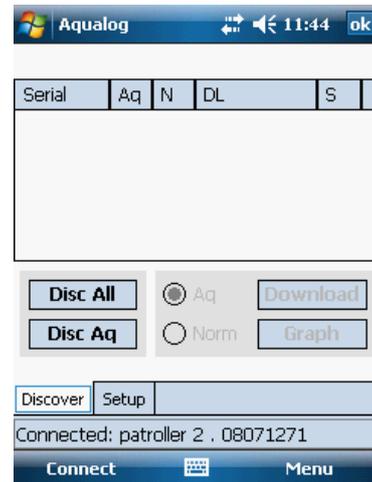
Data Capture

Lift and Shift

Lift and shift mode is where non-permanently deployed Permalogs are moved on a daily basis. Typically this consists of a set of between 50 and 100 Permalogs+ and a patroller. Each day the Permalogs are collected from the deployed locations, read, and later that day re-deployed to a new location. Therefore history stored in the Perma-log+ is irrelevant as the location changes
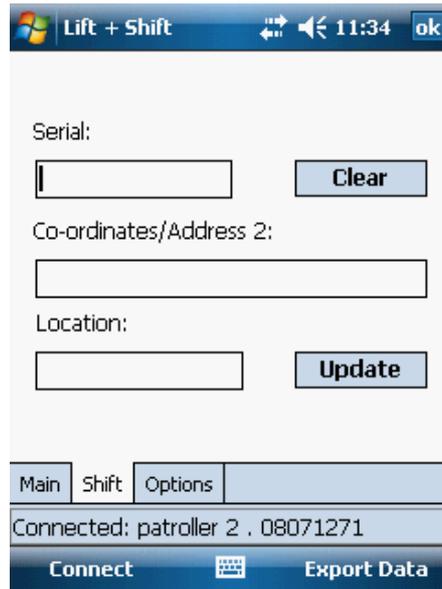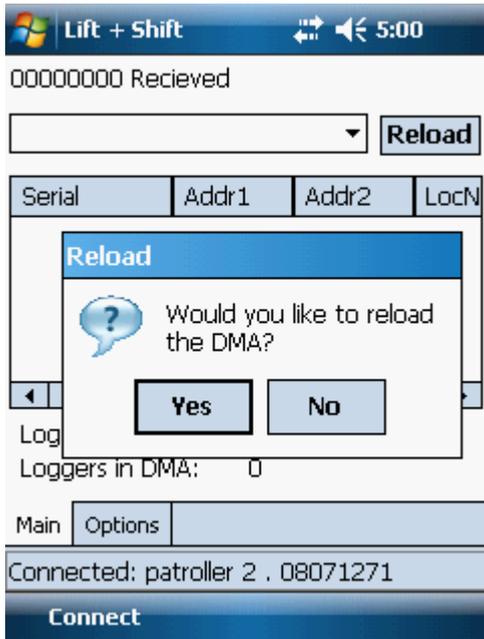
Lift and Shift Setup:

Select Lift and Shift   Lift + Shift   click '**Reload**'

'**would you like to**   **reload the DMA**' will then be displayed

Click 'yes'

Click '**Setup**'. The System then displays the setup screen, and the selected serial number on the screen. Select start day/time..

Select **log duration**. Then

Select **log interval**.

Select number of logs per day.

Select how many days to log over from a pre-calculated selection.

System then calculates and displays the projected end time.

A User can choose to close tab.
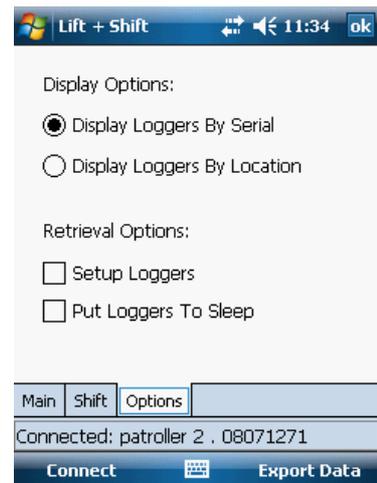
Drive Mode

With Patrol ▶ selected it is possible, by clicking right on the PDA's 4 way navigational keypad to enlarge the display details of the currently high-lighted P+ logger and then the display the latest received logger leak information.
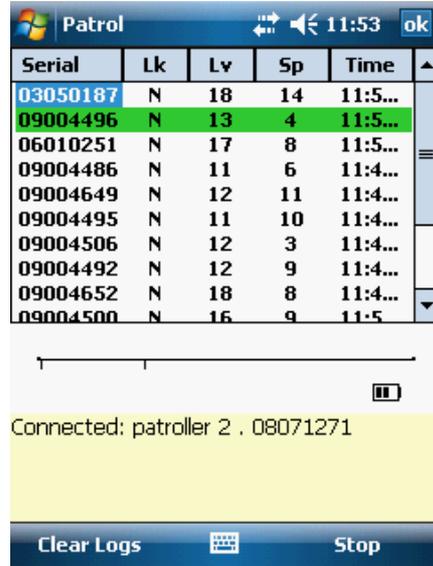
To return back to the previous display state click left on the keypad, this may be toggled at will.
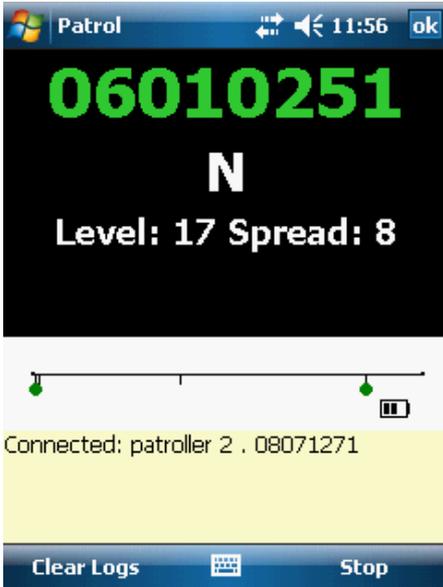
Also by Following the Deploy instructions on page 25, it is possible to enter the details of an individual logger, thus displaying them in Drive Mode. see below
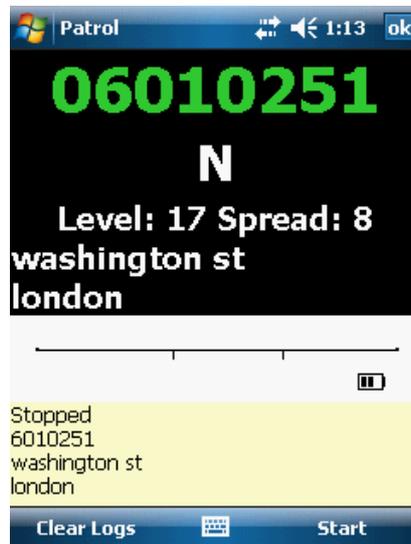
Battery Installation

The Patroller is powered by a rechargeable battery pack located in the underside of the unit. To install the battery pack, use a screwdriver to undo the two panel screws a quarter turn. Remove the panel, connect the battery and Patroller connectors together then fit the battery ensuring the leads will not become trapped or snagged when refitting the back panel.

WARNING:

Do not allow any metal objects to connect the two battery terminals on the connector as this will cause a short circuit resulting in permanent damage to the unit.

You can check the battery status via the menu options in the Patroller software. Nominal battery voltage is 7.5V, when the battery voltage drops to 6.5V the Patroller will start to issue low battery warnings. When the voltage drops to 6.0V the unit will power off automatically and cannot be used until the battery is recharged, or an external power supply is connected.

In the event of a battery failure, a backup battery maintains the data stored in the Patroller for up to one year.

Note that it is very important **not** to store your battery at full charge. A Li-ion battery stored at 40% charge will last many times longer than one stored at 100% charge, particularly at higher temperatures. If a Li-ion battery is stored with too low a charge, you run the risk of allowing the charge to drop below the battery's low-voltage threshold, ending up with an unrecoverable dead battery. Once the charge has dropped to this level, it cannot be recharged.

Storing a Li-ion battery at the correct temperature and charge makes all the difference in maintaining its storage capacity.

Important Information on Use

Mishandling the logger could result in damage to the antenna (if incorrectly used to lower or raise the logger) or the sensor (connecting the logger to, or removing it from, the fitting). Such damage is not covered by warranty and customers are warned that damage to the sensor in particular is unlikely to be economic to repair.

During handling and transportation of Permalog® units from site to site, care must be taken not to bring the communications window into the magnetic field of a medium or strong strength magnet. Continuous exposure to a magnetic field can result in variation in the Permalog® internal clock, which will lead to an increased possibility of false alarms.

Particular care must be taken to avoid packing Permalog® units "head to tail". Remedial work required to correct loggers that have been affected in this way is not covered by warranty and will be charged.

Due to the strength of the magnet used with Permalog®, large quantities of Permalog® units should not be carried by staff with heart pacemakers.

The magnet keeper fitted to Permalog® loggers should be left attached to the magnet until the unit is ready to be placed in its logging position. If the unit is to be moved for any reason the keeper should be refitted to the magnet. All Permalog® units should be transported with the keeper attached to the magnet.

Please Note:

Only suitable PDA's are compatible. Please check with your distributor for a list of compatible PDA's for use with the Patroller II system.

Sounder Options:

Set Sounder can be used with the following numbers entered:

0 to disable all beeps

16 to beep when data signals are received from Permalog's in leak mode only

48 to beep when data signals are received from Permalog's in any mode

20 to beep when signals of any kind are received from Permalog's in leak mode only

60 to beep when signals of any kind are received from Permalog's in any mode

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Note

Palmer Environmental reserves the right to change products, services or specifications without notice.

Patents

The Permalog® system is patented in the United Kingdom:

GB2335041, GB2361062, GB2361319, GB2361540 & GB2361541

Patents pending in Europe, United States and Japan.

Permalog® is a Registered Trademark of Palmer Environmental.