

XLEMS ENERGY MONITORING SOFTWARE

User's Manual



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Reference	Title or Description of Publication	Publication Reference
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Terms & Abbreviations

Term or Abbreviation	Definition
BDE	Borland Database Engine. A programming interface for database applications which abstracts much of the database implementation detail from the programmer
CD-ROM	Compact Disk Read-Only-Memory
CSV	Comma Separated Variable. A type of text file used to represent row/column data.
DB	Database
EGU	Ethernet Gateway Unit. A Terminal Server device that allows a Logger to communicate via an Ethernet network (Internet or Intranet).
FTP	File Transfer Protocol. An Internet Protocol used for transferring files.
GIF	Graphic Interchange Format. A proprietary image format used on Web pages.
IP	Internet Protocol
MD	Maximum Demand. Equal to twice the energy consumption in a half-hour period. Normal units kW or MW.
MLog	A PC-based data logging application available from SHM. It stores readings and timestamps from M-Bus or Modbus devices in a local database.
oBIX	Open Building Information Exchange. An HTTP-based protocol used to implement distributed control systems.
PC	Personal Computer
PDF	Portable Document Format. A proprietary format for distributing printable documents.
RS485	A serial data link format that uses asynchronous transmission with differential voltage levels.
TCP	Transmission Control Protocol. A connection-oriented family of Internet Protocols.
XML	Extensible Markup Language. A markup language that defines a set of rules for encoding documents in a format that is both human-readable and machine-readable.

1. Introduction

XLeMs is a software package for use with dataloggers from SHM Communications.

XLeMs is a full-function energy monitoring system that presents results in Microsoft Excel format. By using the familiar Excel environment, it leverages the user's Excel skills to produce high quality reports and graphs. This means that the "learning curve" for XLeMs is very short.

Because XLeMs reports are Excel workbook files, reports and graphs can easily be incorporated into other Microsoft Office applications. Currently XLeMs only supports Excel files in Excel 97-2003 format. However Excel 2007 onwards will open these files without any problems, and can be configured to save files in the earlier format. XLeMs is not designed to work with Open Office, although the Reports it generates can be opened by it. The sample Templates provided with XLeMs use some features which are not supported in Open Office, particularly with regards to the display of charts.

At the heart of XLeMs is a relational database. This stores both the system configuration information (channels, loggers and communication details) and the historical meter readings, which form the basis of the energy monitoring system.

- It collects meter readings stored in SHM Data Loggers (DL4, UL8, UL24, RL32) and stores them in a local database.
- It collects historic data from SHM J-Loggers (or any device supporting oBIX) using the oBIX protocol.
- It collects historic data from CSV files in various formats, including those exported by Northern Design CubelP meters using FTP, and Iskra SMS meters.
- It collects data from Databases maintained by SHM PC-based logging applications such as MLog.
- It provides tools to create and modify XLeMs Templates that describe the data required and how it is to be presented.
- Its new (version 2.0) "Instant Charting" feature (see section 6.4) displays raw channel data or Template-derived data as a chart (bar, line, area or point). These charts are easily copied and pasted into Office documents.
- It generates Reports as Excel workbooks. Reports are produced by specifying an XLeMs Template and the date/time range of the data required.
- Each Channel in the Report can have a Date Offset specified that allows comparisons between the latest data and previous data (eg. last year's data).
- It can also generate reports in CSV format to facilitate the exchange of information with other applications.
- The Quick Report feature allows the generation of Reports without requiring a user-designed Template. Quick Reports are produced by specifying the type of Quick Report, the date/time range and the Channel that will be the source of the data.
- It schedules the automatic collection of readings from the Data Loggers.
- It can schedule the generation of Reports at specific times, and optionally Email the Report, or automatically export any Charts in the Report to a Website using FTP, or print selected worksheets.

- It can export Reports (in Excel or CSV format) to an FTP Server.
- It can act as an oBIX Server, allowing all the readings in the Readings Database to be retrieved by any software that supports this protocol.
- XLeMs can also be configured as a Collection Engine to collect historic data from SHM Loggers and make it available to other applications via FTP or oBIX (see section [5.4.9]).

It consists of two applications, the Control Centre and the Scheduler.

The Control Centre is used to set up and maintain the Configuration Database, to create and modify XLeMs Templates, to run Reports and to perform database maintenance. The Control Centre can view readings, but does not collect the data.

The Scheduler can be programmed to execute Actions with hourly, daily, weekly, monthly or yearly frequency. Actions include collecting meter readings from Data Loggers, running Reports and doing Database Backups. It also acts as an oBIX Server. Although the Scheduler normally runs unattended, the user can manually collect data or run specific Actions "Now".

Refer to the SHM Website http://www.shmcomms.co.uk/tech_support/ for the latest manuals and application notes etc. relevant to XLeMs.

XLeMs is a desktop application, and does not run as a service under Windows.

2. Installation

You will need to be logged on as an Administrator to install and run the software. Desktop and Startup Menu shortcuts used to launch XLeMs are only created for the Windows user that installs the software.

XLeMs is installed by inserting the installation CD-ROM into the PC.

If the Installshield wizard does not start up automatically, then browse to the root directory of the CD-ROM and double-click on the **Setup** program.

You will need to accept the End User Licence Agreement before the software can be installed. Otherwise, just accept the defaults for each step.

A shortcut to the Scheduler application will be installed in the Startup folder, so that the Scheduler will start whenever someone logs in.

The BDE (Borland Database Engine) will also be installed, as this is required by XLeMs. A Control Panel application is installed to configure the BDE and permit management of database aliases and ODBC Data Source Names.

A number of utilities are also installed. See section 8.

2.1 Initial Setup

Immediately after Installation, you should run the Control Centre application before attempting to run the Scheduler. This will set up the Database that XLeMs uses. If running XLeMs for the first time, this will create a new blank Database. If you have installed XLeMs previously, then it will simply continue to use your existing Database.

If you have not previously installed a Licence, you must do this from the Control Centre (see section [6.9.3]). Licence files are normally sent to the user via Email. Without a Licence, XLeMs will only have limited functionality.

If you want the XLeMs Scheduler to automatically start every time the PC is switched on, see section [5.4.9].

2.2 Licences

XLeMs requires a software licence to run. This licence is issued as a Licence File, which must be imported using the Control Centre as described in section [6.9.3].

The Licence File contains the following information :-

- The Name and Company of the registered user
- Demo version or Registered version
- The expiry date (Registered versions normally never expire)
- The maximum number of Channels you can configure
- Which optional features are enabled

If you have no Licence, you are limited to 8 Channels, and the Scheduler will not collect data.

If you have a Demo Licence, it will normally have an expiry date. In addition, both the Control Centre and Scheduler applications will only run for a limited time (1 or 2 hours) before shutting down. You then have to manually restart the applications.

2.3 System Requirements

XLeMs was originally designed to run under Windows XP Professional Service Pack 2. It may run under earlier versions of Windows. It will also run on later versions of Windows (Vista and Windows 7).

XLeMs does not require large amounts of memory or disk space to run and should run satisfactorily on any Windows PC.

If you are collecting data from SHM Loggers via a direct serial connection, then the PC will need to have a Serial Port or use a USB Serial Port Adapter (for COM1, COM2, etc.).

If you are collecting data from SHM Loggers via a modem, then the PC will either need a built-in modem, or it can use an external modem connected to a serial port as above.

If you are collecting data from SHM Loggers via TCP/IP (Ethernet) then you will need a network connection. You may also require a network connection for other reasons (see Section 5.4.6).

For most functions, XLeMs does not require Microsoft Excel to be installed on the same PC, although you would normally have Excel installed.

However, if you wish to make use of any of the following features, you must have Excel installed on the PC :

- Exporting Charts as GIF files to an FTP Server (Scheduler)
- Printing Worksheets to the local printer (Scheduler)
- Detecting Alarm conditions (Scheduler)
- Opening Reports/Templates from within XLeMs (Control Centre)

3. XLeMs Concepts

3.1 LoggerWorld

The XLeMs view of the view of the world outside is governed by the Configuration Database, and for want of a better phrase, we will call it LoggerWorld.

LoggerWorld represents the Configuration Database, and is hierarchical. Access into LoggerWorld is via **Connections**. These represent communication access points from the PC running XLeMs into LoggerWorld.

Inside LoggerWorld, there are Loggers, Channels and Customers.

A **Connection** gives access to one or more **Loggers**. SHM Loggers can be connected up in a small network, using RS485 data transmission, hence more than one **Logger** can share a **Connection**.

Each **Logger** contains one or more **Channels**. A Channel is connected to a meter or transducer, and the Logger stores readings from the meter at regular intervals in the Channel. XLeMs subsequently reads out the stored meter readings and their associated timestamps from the Channel and stores this (the Historic Data) in its Readings Database.

LoggerWorld also contains **Customers**, although they are optional. If a **Channel** is assigned to a **Customer**, then Customer details (contact details etc.) are written into any Report that uses the Channel, and can then be used to generate an Invoice.

Thus in LoggerWorld, a **Connection** has one or more **Loggers**, a **Logger** has one or more **Channels**, and a **Customer** can own one or more **Channels**.

3.1.1 Connections

A Connection describes a point of communication into LoggerWorld, used to access one or more Loggers.

It can be one of the following types :-

1. A Local COM Port (used if Loggers are connected directly to the PC)
2. A Remote telephone Modem (a telephone number for the Remote Modem and a COM Port for the Local Modem are required)
3. A TCP/IP Connection using an Ethernet Gateway Unit or EGU (the IP Address and Port number of the EGU are required – the PC must be connected to a Network)
4. A local Database containing readings and timestamps, such as that produced by SHM's M-Bus/Modbus PC-based data logging application **MLog**. The collection of files exported by a CubelP meter or Iskra SMS Client software also represent a Database, if these files can be accessed locally by XLeMs.

3.1.2 Loggers

The Logger can be any one of the SHM range of Data Loggers (DL4, UL8, UL24 or RL32).

The Logger is a piece of hardware that collects readings from meters or transducers (eg. Electricity, Gas, Water, Temperature) and stores the readings in its memory at regular intervals (usually every 30 minutes).

The Logger stores the readings for each meter in a separate Channel.

These logged readings (the Historic Data) are read from the Logger's Channels and stored in the Readings Database by XLeMs.

In the case where the Logger's Connection refers to a Logging Database (eg. an **MLog** Database), then the "Logger" defines the Database Table where the readings are stored.

3.1.3 Channels

A Channel is the part of a Logger that stores a sequence of readings from a single meter or transducer.

A Channel can optionally be associated with a Customer for billing purposes.

3.1.4 Customers

A Customer can be defined (Name, Address, Contact Details etc.) and associated with one or more Channels.

When a Report is run, the Customer details are copied to the resulting Excel workbook.

3.2 Databases

XLeMs uses three relational databases, the Configuration Database (or LoggerWorld, see section [3.1]), the Readings Database and a Temporary Database. Refer to section [8] for details.

3.3 XLeMs Templates

An XLeMs Template is a special Excel workbook that contains the information required to enable XLeMs to produce a Report. It should not be confused with an Excel Template (*.xlt) file.

An XLeMs Template contains pairs of worksheets named **RecipeN** and **DataN** where **N** is a number 1 to 9. Most XLeMs Templates consist of a single pair of worksheets, **Recipe1** and **Data1**. You would normally only have more than one Recipe if you require data sets with different date ranges in the final Report.

XLeMs provides a Wizard to guide you through the process of generating a Template.

The **Recipe** worksheets contain the information required to fill in the **Data** worksheets :-

- Name, Description etc.
- The Start Date & Time
- The Span of the Data – first reading to last reading and the interval between readings.

- The End Data & Time (if not specified via the Span)
- The Channels to include
- The Function of the Historic Data to be written (Absolute, Differences, Average etc.)

The Data worksheets are filled in with readings from the Readings Database as specified by the corresponding Recipe worksheet. In addition, channel-related parameters (Description, Units, Customer details etc.) are copied from the Recipe sheet to the Data sheet.

You can customize an XLeMs Template by adding extra worksheets and charts. These extra sheets should get their data by referencing cells in the Data or Recipe sheets, and can be made to show the data in any required format (subject to the capabilities of Excel).

NB. You must not alter the Recipe or Data worksheets created and used by XLeMs.

NB. XLeMs uses its own Excel read/write engine, and does not require Excel to be installed on the PC to generate Templates

3.3.1 Quick Templates

Quick Templates are supplied with XLeMs, and are stored in the Quick subdirectory. They are used to generate Quick Reports (see section [6.3.3]).

They have the same format as normal XLeMs Templates, but their name always begins with "Q" and they usually only contain one Channel, which is a dummy channel that is overridden when the Quick Report is run.

3.4 Reports

A Report is an Excel workbook that contains the range of data that you specify.

To run a Report you must select an XLeMs Template and the date/time span for the data you want to report on. Normally you only need to specify the Start date and time. XLeMs then extracts the relevant readings from the Readings Database, writes them to the Data sheet(s) of the Template and then saves the resulting Report as a new Excel workbook.

NB. When running a Report from the Control Centre, you manually specify the Start Date/Time for the report. However, when running an automatic Report from the Scheduler, there can be no manual intervention, and in this case, the Scheduler will use an appropriate Date/Time (see section 5.4.4).

NB. XLeMs uses its own Excel read/write engine, and does not require Excel to be installed on the PC to generate Reports

3.5 Reference Names

Internally, XLeMs uses a unique numeric **ID Number** for each record in the Configuration Database tables. These **ID Numbers** are generated automatically by XLeMs every time a new Database Record is created.

Since numbers are not easy to remember, you are required to enter a unique **Reference Name** for each new record (ConnRef, LoggerRef, ChanRef and CustRef). Whenever you need to

specify a particular Connection, Logger, Channel or Customer, XLeMs will prompt you for a **Reference Name**, rather than the unmemorable **ID Number**.

You can enter any alphanumeric string for the Reference Name, but it is better to avoid punctuation marks except for 'dot'. A good idea is to use a dotted notation containing an "Item Type" and a hierarchical location reference. The "Item Type" (if you want to include it) could go at either end :-

[Item Type] . [Location1]{ . [Location2]}

or :-

[Location1]{ . [Location2]} . [Item Type]

[Item Type] could be assigned as follows :-

Connections

C	Local COMM Port
M	Modem
EG	Ethernet Gateway (TCP/IP)
F	CSV File
H	HTTP (for oBIX)

Loggers

D4	DL4
U8	UL8
U24	UL24
R32	RL32

Channels

E	Electricity
WN	Non-potable Water
WP	Potable Water
G	Gas
H	Heat
CW	Chilled Water
O	Oil
T	Temperature

[Location] is a hierarchical location reference, separated by dots.

Eg. **London.Office** **Bham.Factory** **Bham.Office**

[Number] can be used if there is more than one equipment at a particular location.

So for a multi-site system with a site in Birmingham with two loggers in the factory and one in the office block, you might have :-

M.Bham.01	Modem for Birmingham site
Bham.Fac.U8.01	UL8 Logger no. 1 in factory
Bham.Fac.U8.02	UL8 Logger no. 2 in factory
Bham.Off.U8.01	UL8 Logger in Office
Bham.Fac.E.01	Electricity meter #1 in factory
Bham.Fac.E.12	Electricity meter #12 in factory
Bham.Off.E.01	Electricity meter #1 in office
Bham.Off.T.01	Temperature #1 in office
Bham.Off.T.02	Temperature #2 in office
etc.	

4. Getting Started

First install the software and Licence as described in section [2].

4.1 Configuring LoggerWorld

Start by entering the details of at least one Logger on your system. If your Loggers have not yet been commissioned, and the PC has Internet access then SHM have a demonstration logger that is connected to the Internet, and there is an application note that describes how to configure XLeMs to collect data from it if you want to trial the software. For details, email support@shmcomms.co.uk and ask for a copy of Application Note AN050.

Start with the Control Centre application.

First, create a new Connection (**New | Connection** from the menu). See section [0].

Then create a new Logger (**New | Logger** from the menu). See section [6.2.2]. Associate the new Logger with the Connection created above.

Next, create a new Channel (**New | Channel** from the menu). See section [6.2.3]. Associate the new Channel with the Logger created above. Create more channels if desired.

Make sure the new items above have the **Enabled** field set to **True**.

If you are going to use the Customers facility, create a new Customer (**New | Customer** from the menu). See section [6.2.4]. Associate it with one or more of the new Channels.

4.2 Collecting Data

Activate the Scheduler application.

Make sure the **Tools | Show Diagnostics** menu item is ticked. This will ensure that communications messages are shown in the Events Pane.

Try collecting the data "Now" using **Collect | Now** from the menu. If everything works OK, you should see communications messages in the Events Pane and the "Last Stored" field of the Channels being updated in the Channels Pane.

Next, create a Schedule Item to collect the data regularly. Select either Hourly, Daily or Weekly in the Scheduler Pane, then either right-click or use the Scheduler menu and select **New Item**. See section [7.2.2].

4.3 Creating an XLeMs Template

Go back to the Control Centre.

You can either create a completely new XLeMs Template or create one based on one of the samples installed with XLeMs.

4.3.1 Completely New Template

Select **Template | New** from the menu. This will launch the Report Recipe Wizard.

Start with something simple such as 'daily ½ hour'. Remember to set the **Reference Name** to something suitable, as it will become the name of the Template.

Select a Start Date for which you have 24 hours worth of data in the Readings Database.

On the 'Channels' tab, click 'Add Channel' and select one of the Channels for which you have data. Select a **Reading Type** of **Absolute** for Temperature channels, or **Difference** for Electricity, Gas or Water.

If you like, add more Channels, or the same Channel with a different 'Reading Type'.

Click the **Finish** button. When asked "Do you want to add another Recipe to the Template", click **No**.

Save the XLeMs Template with the given filename, or enter a new filename.

NB. XLeMs Templates are always stored in the XLeMs "templates" directory which is created automatically. The user is prevented from browsing to any other directory when loading or saving XLeMs Templates.

When asked "Do you wish to view this file now?" click **No**.

4.3.2 Template Based on Example

Select **Template | New from Existing** from the menu. This will launch the Report Recipe Wizard.

Select one of the Example templates provided. These all begin with **Xamp**.

You must change the **Reference Name** to something different. This name will be used as the name of the new Template, and will also form the file name prefix of all Reports generated using it. To avoid confusion, chose a name that doesn't begin with "Xamp".

Select a Start Date for which you have 24 hours worth of data in the Readings Database.

On the 'Channels' tab, select a channel and click 'Edit Channel'. The example template will probably not have a valid channel reference to start with, so you should select a Channel for which you have data. Repeat this for all Channels to ensure they are all set to a valid Channel in your system.

Click the **Finish** button. When asked "Do you want to add another Recipe to the Template", click **No**.

Save the XLeMs Template with the given filename, or enter a new filename.

When asked "Do you wish to view this file now?" click **No**.

4.4 Running a Report

From the Control Centre menu, select **Report | Run**. Select the Template file you created in section [4.3].

When prompted, select the desired Start date for the Report. Click the **Finish** button.

You will then be prompted to save the resulting Report. You can change the filename or directory if you wish.

When asked "Do you wish to view this file now?" click **Yes** (assuming you have Excel installed on the PC). The Report should open in Excel.

4.5 Customizing a Template

Open the XLeMs Template file created in section [4.3] in Excel.

NB. Do not attempt to modify the **Data1** and **Recipe1** worksheets. You should insert other worksheet(s) and then reference cell data from Data1 and Recipe1 on these new sheet(s).

Select the **Data1** worksheet. Select the cells containing the Date/Time values and Channel values.

Click the **Chart Wizard** button or use **Insert | Chart** from the Excel menu and create a suitable chart from the data. Insert it as a separate Chart Sheet. **Do not embed the Chart in a Worksheet.**

NB. If Excel get confused about the X-Axis, on the **"Axes"** tab (step 3 of the Wizard or "Chart Options"), set the Category (X) axis to **Category**, rather than **Automatic**.

If you want to create labels for the Chart that depend on the data, then you should insert a new worksheet (call it **Work1**) and create captions there. Chart labels can then reference cells in the Work1 sheet.

Tip: To convert Date/Times to a string use the TEXT function :-

=TEXT({Date cell ref},"dd/mm/yyyy hh:mm:ss")

Save the customized Template and close Excel.

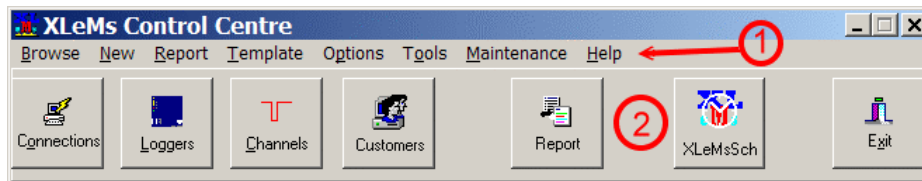
Now try **Run | Report** again, select the customized Template and a suitable Start Date and see the data appear as an Excel Chart in the Report.

5. Using XLeMs

5.1 Control Centre

A full description of Control Centre commands can be found in Section 5.4.11.

5.1.1 Screen Layout



The screen is broken up into the following areas, starting from the top :-

1. Menu Bar All commands can be accessed from the menus
2. Toolbar This has buttons to browse Connections, Loggers and Channels, run Reports and a button to launch the Scheduler.
3. Diagnostics This window is not normally visible but can be made to appear below the Toolbar by the **Options | Show Diagnostics** command.

5.1.2 Basic Operation

The Control Centre allows you to set up and maintain the Configuration Database, create XLeMs Templates and run Reports.

It also allows you to view the Historic Data for a Channel. Select **Browse | Channels**, select a Channel and click the **View Data** button. See section [0].

5.1.3 Help

Context-sensitive Help is available in most dialogs by pressing the F1 key or clicking the [Help] button.

5.1.4 Keyboard Shortcuts

Many dialogs have keyboard shortcuts. For a list of these, refer to the built-in Help. From the Contents tab, look under the Miscellaneous topic.

5.1.5 Logging Devices

XLeMs supports several different types of logging devices. The logging device is specified by the **Device Type** when you are creating a new Logger or editing an existing one (see section [6.2.2]). Depending on the type of device, you will need to specify different parameters for the

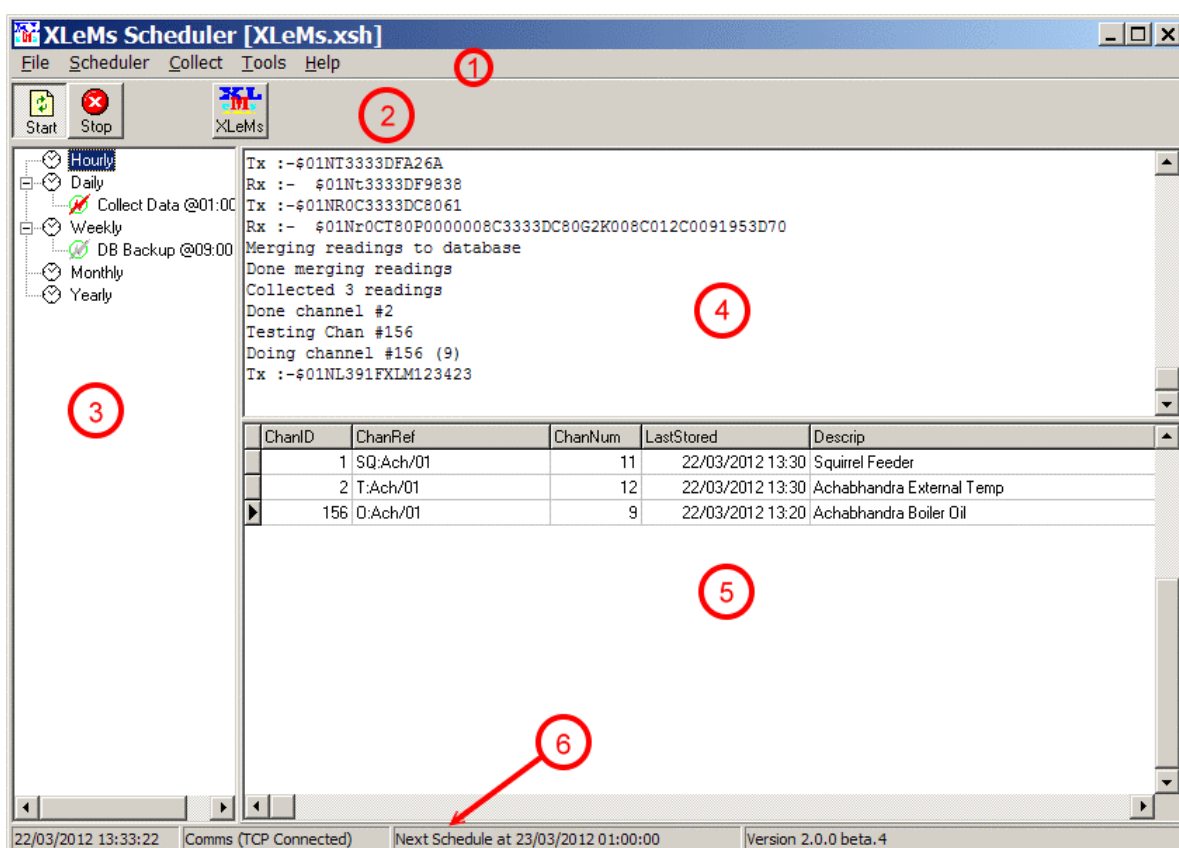
Logger, and also ensure that its Connection is the correct type for that device. The logging device type will also determine how you specify the Channel Identifier for its associated Channels.

5.2 Scheduler

A full description of Scheduler commands can be found in Section 7.

If the Scheduler is minimized, it runs as Tray Application. The normal view can be restored by double-clicking on the tray icon, or right-clicking the icon and selecting "Show". To shut it down, use the Tray Menu (see section 7.5).

5.2.1 Screen Layout



The screen is broken up into the following areas, starting from the top :-

1. Menu Bar All commands can be accessed from the menus
2. Toolbar This has three buttons - Start & Stop (Scheduling) plus a button to launch the Control Centre.
3. Scheduler Pane (Left). Shows the Schedulers and their Schedule Items as a tree structure.
If an item in this pane is selected then commands can be run on it from a right-click popup menu, or from the main Scheduler menu.

- Hover the mouse cursor over a Schedule Item to see its Next Due time.
4. Events Pane(Top Right). This displays Scheduler Events (which are also written to the Events Log), and optionally Diagnostics.
Scheduler Events include Starting & Stopping, Running Schedule Items and Errors.
 5. Channels Pane (Bottom Right). This is used while Data Collection is in progress, and shows the Channels of the Logger that is being read.
 6. Status Bar This shows Mode, date/times and software version number

5.2.2 Basic Operation

To use the XLeMs Scheduler, you first need to set it into "Configuration Mode" and set up the Schedules.

Once the Scheduler has been configured, it can be set into "Scheduling Mode" to start scheduling. The Scheduler will normally enter Scheduling Mode automatically whenever it is executed (after a 10 second startup delay).

5.2.3 Configuration Files

The XLeMs Scheduler obtains its list of Schedule Items from a Configuration File. The Configuration File is a text file, but should not be edited by the user. The Configuration File is updated every time XLeMs runs a Scheduled Item.

The default Configuration File name is **XLeMs.xsh**, in the directory where the EXE file is located.

The name of the configuration file used by XLeMs is stored in the Windows Registry, and so will be reloaded automatically next time XLeMs is run.

All other program Options are stored in the Windows Registry.

5.3 Backing up and Restoring

It is good practice to configure the Scheduler to make regular backups of the database. The backup files should ideally be on an external device, eg. a file server or external hard drive.

There are two scenarios for restoring XLeMs from a backup :-

1. To revert to a previous copy of the database, because there is a problem with the current database.
2. To move your XLeMs installation from one PC to another.

Restoration uses a separate application that is installed alongside XLeMs.

5.3.1 Backing Up

Assuming you wish to have a weekly backup, you should create a "Weekly Schedule" item for the Scheduler and set it to "Backup Database" (see section 7.2.2.2). You need to set up :-

- The Result Directory (where the backups will be stored). Preferably on an external device.
- The File Name Suffix. Choosing "Week of Year" will create 52 unique backup sets.

Every time this is run, this will create two files (**nn** is the week-of-the-year suffix) :-

XLeMs-nn.zip	This contains the Configuration and Readings databases
XLeMsSys-nn.zip	This contains all your Templates, your Licence file, the Scheduler configuration file, and an Options file.

5.3.2 Restoring

To ensure a clean restoration of the XLeMs database and settings, you **must** shut down both the Scheduler and Control Centre first. You can then run the special XLeMs Restoration Utility that is installed in the "Tools" sub-directory :-

`[InstallDir]\Tools\XLM_Restore`

Explore for this file and double-click to launch it.

Click the **[Restore Database]** button and you will be prompted to browse for Zip file (XLeMs-nn.zip) and the Database will be restored.

Click the **[Restore Templates]** button and you will be prompted to browse for Zip file (XLeMsSys-nn.zip). This will restore Templates etc. Note for versions before 1.3.0, this will not restore the Scheduler Options (see section 7.4.1). You will need to have a note of these and restore them manually.

To move an XLeMs installation to a new PC :-

1. Install XLeMs on the new PC
2. Run the Control Centre to create a default database.
3. Run XLM_Restore and restore the latest backup files from your existing system.

5.4 Advanced Topics

5.4.1 Time & Date Constraints

Time and Date Constraints are a powerful feature of XLeMs Templates that help you get the right Span of readings in the Report.

If a Constraint is active, then when you select a date or time for a Report, it will 'snap' to a specific date or time. For End Month, End Year and End Day Constraints it will 'snap' to a later date or time. For all other Constraints, it will 'snap' to an earlier date or time.

By setting a Constraint, you can make sure your Report always runs from 00:00, or always runs from a Monday through to Sunday.

Normally you only need to constrain the Start Date in a Template; the End Date will be determined by the Span.

An exception to this is when you want a Report that runs for one or more calendar months. A one-month Report can be generated as follows using the Template Wizard (see section [6.5.1]) :-

1. Constrain the Start Date to **Start Month** and Start Time to **Start Day**.
2. Set the Span Method to **Total Interval**.
3. Use the **Quick Set** button to set the Total Interval to **32 days** (46080 minutes).
4. Now click the **End Date** tab and constrain the End Date to **Start Month** and End Time to **Start Day**.

By making the Total Interval more than one month, you ensure that the End Date is in the correct month. You then simply constrain it to the start of the month, and the original Total Interval (32 days) is overridden to give a Span of 1 calendar month.

5.4.2 Interval Between Readings

The interval between readings of the data in the Readings Database depends on the logging interval that has been configured on the Logger. It is typically 30 minutes, but SHM Loggers can be configured for logging intervals of 1, 2, 5, 10, 15, 30 and 60 minutes.

When generating an XLeMs Template to use for running a Report, you do not need to use the same interval between readings. However, it is not sensible to oversample the data (have an interval less than the logging interval) as XLeMs will just repeat readings (eg. if using a 5 minute Report interval with a 30 minute logging interval, each logged value would be repeated 6 times).

If the Report Interval is longer than the Logging Interval, then you can use **Reading Types** of Average, Sum, Max, Min etc. and XLeMs will use the appropriate function on all Readings Database samples within the Report Interval and write the result to the Report.

When using anything other than "Absolute" for the **Reading Type**, the resulting data value is given the timestamp of the start of the period. Ie. the Difference in absolute readings from 12:00 to 12:30 would be assigned to 12:00.

When using Half-hour MD or Half-hour MD time, the Span should be set so that the Interval Between Readings is 1 day, for the results to be meaningful.

5.4.3 Missing Readings

The Readings Database consists of timestamped readings read from Data Loggers. Normally there will be a regular sequence of readings (eg. every 30 minutes), but there can be out-of-sequence readings and missing readings.

An out-of-sequence reading can occur if the logger has been switched off or switched on. SHM Loggers store an additional channel reading at the point of switch-off or switch-on.

If the Logger has been switched off for any length of time, then there will be a gap in the normal sequence of readings.

If a Report is run for a Span that has some missing readings, then the last reading before the start of the gap will be repeated until the first reading after the end of the gap.

However, if the gap starts before the first timestamp in the Report, then blanks will be written to the Report until the first reading after the end of the gap. Similarly, if a gap is encountered in a Report, and the last timestamp in the Report is still within the gap, then blanks will be written from the reading after the start of the gap until the end.

XLeMs does not attempt any interpolation of readings – it just uses the previous known reading.

5.4.4 Scheduled Report Date/Time

When a Report is run from the Control Centre, you are prompted to manually enter a Start Date/Time.

When a Report is run from the Scheduler, the date range is normally selected automatically so that the End Date/Time occurs before the scheduled time.

However, you can optionally choose to have the Start Date/Time based on the scheduled time.

Consider the case of a daily Report. Daily Reports have a Start Time constraint set to "Start-of-day" so that they always begin at 00:00.

Normally you would want a whole day's data, so you would schedule the Report to run some time after midnight each day (and after a "Collect Data" Action has been run), eg. 01:00. By default, the Scheduler would set the End Date/Time to be before the time the Action is scheduled, so in this case the Report would be for 00:00 the previous day to 00:00 on the current day, ie. all the previous day's data.

However, suppose you want to produce a "day so far" Report. You might want to schedule this several times a day, or perhaps every hour. To do this you would specify that you want the Scheduler to set the Start Date/Time based on the time the Action is scheduled, so in this case the Report would be for 00:00 "today" to 00:00 "tomorrow", ie. you would only get data from 00:00 until "now", with blanks after that.

Similar considerations apply to Hourly, Weekly or Monthly Reports.

Note that when running a Report manually using the **Run Now** command, you can specify a different scheduler date/time (the default is "now") so that you can re-run an earlier Report using the data for that date/time.

5.4.5 Customizing Templates

It is very important not to modify the worksheets **Data1** or **Recipe1** (or any **DataN** or **RecipeN** worksheet) or the Report may not be generated correctly.

A good technique is to add a new worksheet for intermediate calculations called **Work1** (or any other name will do). The cells in this sheet can make reference to cells in the Data1 and Recipe1 sheets and perform calculations on them.

You can build title strings for charts by concatenating text from the Data1 worksheet using the Excel function CONCATENATE(). To incorporate the date or time of the report data, you need to first convert it to text using the Excel TEXT() function (Eg. TEXT(Data1!R[C],"dd mmm yyyy hh:mm").

Remember to allow for possible blank cells or variable number of rows in the Data1 sheet. This can happen for example if the Report is not based on a fixed length of time (eg. a calendar month).

5.4.6 Alarms

You can create an XLeMs Template that will detect Alarm conditions when run by the Scheduler, and will Email the Report if there is an Alarm.

To detect the Alarm, you must create a named cell in the XLeMs Template called **Alarm** and place an Excel Boolean formula in the cell that evaluates to TRUE if there is an Alarm condition (based on the data in the Report). When the Scheduler runs the Report, it will check the result of this Boolean formula, and if TRUE will Email the Report to the recipient. If the result is FALSE, the Report will not be Emailed.

If you also create a named cell called **AlarmSubject** and place a text string in it, then this string will be used as the Email Subject when the Report is Emailed.

For this to work, you must also specify **Email if Alarm** in the Action Parameters dialog for the scheduled Report (see section 7.2.2.2), and have Alarms enabled in your Licence.

5.4.7 FTP Export

The Scheduler can be configured to export Reports at regular intervals to an FTP Server. To do this, you need to schedule both the generation of Reports, and the actual export.

1. First, you must create a directory that the Reports to be exported will be stored in.
2. Next you create one or more **Run Report** Schedule Items that will generate the reports. The **Result Directory** for each item should be the directory created in Step 1.
3. Finally you create an **FTP Export** Schedule Item that will export the Reports at a suitable time after the Reports have been generated.

By default, the files are deleted from the directory after they have been successfully exported. Should the export process fail (for example because the FTP Server is temporarily off-line) then the files remain, and should get exported next time an FTP Export is scheduled and succeeds.

If you specify **Save files after Export** when creating the FTP Export Schedule Item, then the files will be moved to a sub-directory named **Exported** instead of being deleted. This directory will be created automatically if it does not exist.

If you need to export to more than one FTP Server, then you can do this by creating several FTP Export Schedule Items with different credentials, and possibly several directories to store the Reports to be sent. If you are exporting the same files to all servers, you can do this by not deleting the files, and then exporting the **Exported** sub-directories in a cascade.

5.4.8 oBIX Server

The Scheduler can act as an oBIX Server (only while in Scheduling Mode) to allow data in the Readings Database to be read by other applications that support oBIX Histories.

oBIX is an HTTP and XML-based Web Services protocol that provides a normalized representation of three elements that are required to implement control systems – Points, Alarms and Histories. XLeMs only supports oBIX Histories.

You need to enable the oBIX Scheduler and specify the TCP Port that will be used by the server (the default is 80) via the **Tools | Options** command (see section 7.4.1). It is important that the TCP Port is not being used by any other Server on the PC.

You can use a Web Browser on the XLeMs PC to browse the oBIX Server. Enter the following URL :-

<http://127.0.0.1/obix>

or

<http://127.0.0.1:8080/obix>

... if your TCP port (in this case 8080) is not the default. If browsing from a different PC, replace “127.0.0.1” with the IP address of the XLeMs PC. You should see something like this :-

[/o](#)

```
<obj href="http://127.0.0.1/obix/" is="obix:Lobby" xsi:schemaLocation="http://obix.org/ns/schema/1.0 /obix/xsd">
  <ref name="histories" href="histories/" display="com.tridium.history.db.ELocalHistoryDatabase" icon="/icons/x16/historyDatabase.png"/></ref>
</obj>
```

This shows the XML data returned for the oBIX Lobby, which is the start point for accessing all oBIX Servers. You will notice that “histories” is the only element supported by the XLeMs oBIX Server. If you browse down the “histories” tree, you will get a list of the Channels in the Readings Database, for example :-

[/o](#)

```
<obj href="http://127.0.0.1/obix/histories/XLeMs/T%3AAch%2F01/" display="javax.baja.history.BHistoryDevice" icon="/icons/x16/device.png" xsi:schemaLocation="http://obix.org/ns/schema/1.0 /obix/xsd">
  <ref name="S%3AAch%2F01" href="S%3AAch%2F01/" is="obix:History" display="com.tridium.history.db.ELocalDbHistory" icon="/icons/x16/history.png"/></ref>
  <ref name="T%3AAch%2F01" href="T%3AAch%2F01/" is="obix:History" display="com.tridium.history.db.ELocalDbHistory" icon="/icons/x16/history.png"/></ref>
  <ref name="E%3AAch%2F01" href="E%3AAch%2F01/" is="obix:History" display="com.tridium.history.db.ELocalDbHistory" icon="/icons/x16/history.png"/></ref>
  <ref name="T%3AAch%2F01" href="T%3AAch%2F01/" is="obix:History" display="com.tridium.history.db.ELocalDbHistory" icon="/icons/x16/history.png"/></ref>
  <ref name="T%3AAch%2F02" href="T%3AAch%2F02/" is="obix:History" display="com.tridium.history.db.ELocalDbHistory" icon="/icons/x16/history.png"/></ref>
</obj>
```

The history “names” correspond to the XLeMs Channel Refs, but with non-alphanumeric characters escaped using %xx codes (in the above %3A replaces ‘:’ and %2F replaces ‘.’).

By further browsing an individual channel you can extract its historic data, for example :-

[/o](#)

```
<obj href="http://127.0.0.1/obix/histories/XLeMs/T%3AAch%2F01/~historyQuery/" is="obix:HistoryQueryOut">
  <list name="data" of="#RecordDef obix:HistoryRecord">
    <obj>
      <abstime name="timestamp" val="2012-03-21T00:00:00.000+00:00"/></abstime>
      <real name="value" val="8.50"/></real>
    </obj>
    <obj>
      <abstime name="timestamp" val="2012-03-21T00:05:00.000+00:00"/></abstime>
      <real name="value" val="8.50"/></real>
    </obj>
    <obj>
      <abstime name="timestamp" val="2012-03-21T00:10:00.000+00:00"/></abstime>
      <real name="value" val="8.50"/></real>
    </obj>
    <obj>
      <abstime name="timestamp" val="2012-03-21T00:15:00.000+00:00"/></abstime>
      <real name="value" val="8.50"/></real>
    </obj>
    <obj>
      <abstime name="timestamp" val="2012-03-21T00:20:00.000+00:00"/></abstime>
      <real name="value" val="8.50"/></real>
    </obj>
  </list>
</obj>
```

Note that the XLeMs oBIX Server places a maximum limit of 5000 records on the historic data retrieved by a single oBIX query. A full description of oBIX Histories is beyond the scope of this manual.

NB. If browsing for the oBIX Lobby fails, then this could be due to a Firewall blocking access to the TCP Port or preventing the XLeMs Scheduler from working as a Server.

5.4.9 Collection Engine

It is possible to use XLeMs as a simple Collection Engine to collect data from SHM loggers and make the historic data available to other applications. The Scheduler would be configured to collect data regularly.

Historic data can be obtained in two ways :-

1. 'Pushed' by generating CSV reports using the Scheduler and exporting them via FTP
2. 'Pulled' by enabling the oBIX Server and interrogating XLeMs via the network

Method 1 is best if the application does not support oBIX or if firewalls make access into the oBIX Server difficult. Method 2 gives better data integrity and copes better if there are data collection problems.

SHM have an application note giving full details of using XLeMs as a Collection Engine.

5.4.10 PC Auto Logon

To make the PC automatically log on and start the XLeMs Scheduler every time it is switched on, perform the following steps.

1. Run Regetd32
2. Select key :-
HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows NT\CurrentVersion\Winlogon
3. Add a new String **AutoAdminLogin** and set it to "1"
4. Set up the parameters (they may already exist) **DefaultUserName** and **DefaultPassword** to the desired user/password.
5. Place a shortcut to XLeMsSch.exe in the Default User's folder :-Default User's folder :-

Start Menu\Programs\Startup

5.4.11 Invoices

XLeMs provides some features that help in generating Invoices/Bills from the stored readings. To do this, all channels used for billing must be associated with Customers.

To produce invoices, you should do the following (see subsequent sections for details) :-

- Create a Billing Report Template.
- Generate a unique Invoice Number for each Channel in the Template if you want this.

- Add one or more Invoice Worksheets to the Template. Customize the layout of these to your own design.
- Run the Report. Specify the End Date (typically start or end of the month).
- Review the Report. Once you are satisfied with the invoices, set the Last Billing Date of the relevant Customers to the End Date of the new Invoices.

5.4.11.1 Billing Reports

When XLeMs generates a Billing Report, it has a different format to other types of Report.

To create a Billing Report using the Wizard, first specify **Bill (two dates)** as a Short-cut in the General tab (see section 6.5.1.1). Then when adding Channels to the Report in the Channels tab (see section 6.5.1.5), specify a **Reading Type** of **Billing Data** or **Billing Data 2**.

It is also a good idea to check the **Enable Named Cells** box in the General tab.

When the Reading Type is **Billing Data**, the resulting Report is different from all others (which contain a column of readings for each channel, corresponding to timestamps in the Date/Time columns) in that 6 cells per channel are filled in, and the Date/Time columns on the Report are not relevant. These 6 cells per channel are :-

Function	Explanation	Cell Name
Start Date	Start Date for the bill	XMLnnnStartD
Date of Start Reading	The Date/Time of the Start Reading. This should always be the same as the Start Date	XMLnnnRdg1D
Start Reading	The Start Reading for the bill as an Absolute value	XMLnnnRdg1
End Date	End Date for the bill	XMLnnnEndD
Date of End Reading	The Date/Time of the End Reading. This should always be the same as the End Date	XMLnnnRdg2D
End Reading	The End Reading for the bill as an Absolute value	XMLnnnRdg2

The bill can thus be calculated from the difference between End Reading and Start Reading.

When the **Reading Type** is set to **Billing Data**, the Start Date and End Date of the Billing Data are derived from data related to the Customer that is associated with this Channel :-

The **Start Date** will be set to the Customer's **Last Billing Date**(if specified), unless the Customer's **Move In Date** falls between the Start and End dates, in which case the Start Date will be the **Move In Date**.

The **End Date** will be set to the Report's End Date (specified when the user runs the Report), unless the **Move Out Date** falls between the Start and End dates, in which case the End Date will be the **Move Out Date**.

If the Customer dates are null, then the Start and End dates default to the Start and End dates of the Report.

Thus XLeMs can select the appropriate readings when a tenant moves in or out in the middle of a billing period.

When the **Reading Type** is set to the simpler **Billing Data 2**, the Start Date and End Date are equal to the dates in the Report; the Customer dates are ignored.

5.4.11.2 Invoice Worksheets

You can add your own Invoice Worksheets to the Report so that billing data is presented as an invoice. The layout can be customized to your own design. To show customer data you would link cells in the Invoice to cells in the Data1 worksheet, such as Start Date & Reading, End Date and Reading, Customer Name, Customer Address etc.

This works OK for a single Invoice, based on a single Channel in the Report. However, you will normally want to have several Channels in the Report, and produce a separate Invoice worksheet for each (or perhaps combine several Channels eg. Electricity, Gas and Water). You can copy your first Invoice sheet, but then you need to edit all the Cell References so that they point to a different Channel.

Editing Cell References can be tedious if they are entered in the normal row/column format. However, if the **Enable Named Cells** option has been selected for the Template, then all cells that you are likely to reference have names. The format of the names is :-

XLMnnnCellName

Where **nnn** corresponds to the Channel column of the data (001, 002, 003 etc). For Billing Data, the CellName is shown in the table above. For other fields the name is self-explanatory (eg. XLM001Units). If you use named references in your first Invoice sheet, then you can change the references in a copy of this sheet using Excel's "Replace" function. For example by replacing **XLM001** with **XLM002**, you would make the invoice show data for the second Channel in the list.

5.4.11.3 Invoice Numbers

XLeMs provides a method of creating a unique (incrementing) number when generating Reports that are to be used for Invoices.

If a Channel is added to the XLeMs Template with the **Generate Invoice Number** box checked (see section [6.5.1.5]), then whenever data for that channel is written to a Report, an Invoice Number will be written to the Report for that Channel in the **Last Invoice** row (see section [8.2.6.2]). In this case, the Channel must also be associated with a Customer.

The invoice number assigned to the Channel is also written to the **Last Invoice No** field of the Customer that owns the Channel.

See section [6.7.2] for setting the next Invoice Number that XLeMs will use.

5.4.11.4 Setting Last Billing Date

NB. This only applies if you are using Reports with a Reading Type of **Billing Data**. If you are using the simpler Reading Type of **Billing Data 2** then you do not need to set the Last Billing Date.

Normally, a Billing Data Report produces meter readings for the Customer's **Last Billing Date** to the End Date of the Report. This allows subsequent bills to carry on from the End Date of the previous bill. However, the **Last Billing Date** is not set automatically, since you should review any Bills/Invoices before sending them out, and you may need to run the Report more than once before everything is correct.

Once you are satisfied with the bills generated, you should then set the **Last Billing Date** to the "End Date" of the new bills. While this could be done using the Edit Customer function (see section 6.2.4), a special command (see section 6.7.1) allows you to set this date for multiple customers.

6. Control Centre Commands

This section lists the commands available to the XLeMs Control Centre application.

6.1 Browse menu

6.1.1 Connections

The Browse Connections dialog shows the contents of the Connections table of the Configuration Database in the form of a grid. Only the major fields of each record are shown.



The Navigator Bar (above) can be used to navigate around the grid. The buttons are (left to right) :-

- First record
- Prior record
- Next record
- Last record
- Insert record
- Delete record
- Cancel edit
- Refresh data

Click the **New Filter** button to launch the Filter dialog (see section [6.1.1.1]). If a filter has been specified and the **Filter On** box is checked, only records matching the filter criterion will be shown in the grid.

You can edit parameters within the grid. For the **Enabled** field, you only need enter the abbreviations 't' or 'f' for True and False.

You can only edit the major fields within the grid. To edit all the parameters of a record, click the **Edit Connection** button to launch the Edit Connection dialog (see section [0]).

To view all Loggers assigned to a given Connection, select the desired Connection in the grid and click the **Browse Loggers** button. This will launch the Browse Loggers dialog in split-screen mode.

6.1.1.1 Filter Criterion

This dialog is used to select a Filter for displaying various database tables.

Use the **Select Field Name** drop-down to select the database Field you want to filter on.

If it is a numeric field, you will be presented with options to select a numeric range.

If it is a text field, you will be prompted to enter the text to match. Checking the **Partial Match** box will select all Records that start with the given **Match text**. Text matching is not case-sensitive.

6.1.2 Loggers

The Browse Loggers dialog shows the contents of the Loggers table of the Configuration Database in the form of a grid. Only the major fields of each record are shown.

Split screen mode can be selected by setting the **By Connection Ref** radio button. In this mode, the upper half of the window lists the Connections in the form of a grid. The bottom half of the window shows only the Loggers that are associated with the Connection selected in the upper grid.

Click the **New Filter** button to launch the Filter dialog (see section [6.1.1.1]). If a filter has been specified and the **Filter On** box is checked, only records matching the filter criterion will be shown in the grid.

You can edit parameters within the grid. For the **Enabled** field, you only need enter the abbreviations 't' or 'f' for True and False.

You can only edit the major fields within the grid. To edit all the parameters of a record, click the **Edit Logger** button to launch the Edit Logger dialog (see section [6.2.2]).

To view all Channels assigned to a given Logger, select the desired Logger in the grid and click the **Browse Channels** button. This will launch the Browse Channels dialog in split-screen mode.

6.1.3 Channels

The Browse Channels dialog shows the contents of the Channels table of the Configuration Database in the form of a grid. Only the major fields of each record are shown.

Split screen mode can be selected by setting the **By Logger Ref** radio button. In this mode, the upper half of the window lists the Loggers in the form of a grid. The bottom half of the window shows only the Channels that are associated with the Logger selected in the upper grid.

Click the **New Filter** button to launch the Filter dialog (see section [6.1.1.1]). If a filter has been specified and the **Filter On** box is checked, only records matching the filter criterion will be shown in the grid.

You can edit parameters within the grid. For the **Enabled** field, you only need enter the abbreviations 't' or 'f' for True and False.

You can only edit the major fields within the grid. To edit all the parameters of a record, click the **Edit Channel** button to launch the Edit Channel dialog (see section [6.2.3]).

To view the readings data for a given Channel, select it in the grid and click the **View Data** button. You will be prompted to enter Start and End date/times, and the selected readings will be shown on the View Data dialog (see section [0]).

To display a chart of the raw data for a given Channel, select it in the grid and click the **Chart Data** button. You will be prompted to enter Start and End date/times, and the selected readings will be shown on the Chart Data dialog (see section [6.1.3.2]).

6.1.3.1 View Data

This dialog shows the readings for the requested Channel and Date Range in a read-only grid.

The Navigator buttons on the left allow you to navigate up and down the grid.

The **TimeStamp** column is shown in Local or "GMT" (Standard) time, depending on the state of the **Use GMT Time** Option (see section [6.6.2]).

The **Exceptions** column may be blank (no exceptions), or any combination of the following letters :-

- 0 **Power off** event. This is the reading when the logger was powered off.
- 1 **Power On** event. This is the reading when the logger was powered on.
- W **Watchdog** event. This is the reading when the logger has watchdogged.
- a An **Alarm Condition** has occurred on this channel since the previous reading was logged. SHM Loggers can be programmed to generate Alarms on certain channels.
- c A **Configuration Change** has occurred on this channel since the previous reading was logged.
- i An **Interrogation** has occurred on this channel since the previous reading was logged.
- p A **Mains Power Failure** has occurred on the logger since the previous reading was logged. If the Logger has a UPS battery, this will not cause a loss of readings.

The arrow buttons beside the Start and End dates can be used to change the time span to an earlier or later block of readings. The shortcut key sequences Alt+E (Earlier) and Alt+L (Later) can also be used.

Clicking the [Export] button will save the displayed raw data as an Excel file.

6.1.3.2 Chart Data

This dialog shows the readings for the requested Channel and Date Range as a Chart.

The Timestamps are shown in Local or "GMT" (Standard) time, depending on the state of the **Use GMT Time** Option (see section [6.6.2]).

The arrow buttons beside the Start and End dates can be used to change the time span to an earlier or later block of readings. The shortcut key sequences Alt+E (Earlier) and Alt+L (Later) can also be used.

By clicking the [Chart Titles] button, you can modify the chart and axis titles. Note however that selecting a different date range will create a new chart title.

The **Plot Delta Values** checkbox is ticked by default to show the difference between each pair of readings, which is most appropriate for meter energy registers. Un-tick the box to display the actual readings.

You can select the most appropriate chart type from the drop-down list. Available types are Bar, Line, Area and Point.

Click the [Copy to Clipboard] button to copy the chart area to the Windows Clipboard for subsequent pasting into a document. Clicking the [Save Chart] button will save the chart area as a file. You can choose between WMF (Windows Meta File) and Bitmap formats in the Save File dialog.

You can zoom in on an area of the chart by dragging a rectangle (top left to bottom right) with the left mouse button. Drag any rectangle from bottom right to top left to zoom back to the original size.

You can re-size the dialog box to vary the size of the Chart area.

6.1.4 Customers

The Browse Customers dialog shows the contents of the Customers table of the Configuration Database in the form of a grid. Only the major fields of each record are shown.

Click the **New Filter** button to launch the Filter dialog (see section [6.1.1.1]). If a filter has been specified and the **Filter On** box is checked, only records matching the filter criterion will be shown in the grid.

You can edit parameters within the grid.

You can only edit the major fields within the grid. To edit all the parameters of a record, click the **Edit Customer** button to launch the Edit Customer dialog (see section [6.2.4]).

6.1.5 Constants

The Browse Constants dialog shows the contents of the Constants table of the Configuration Database in the form of an editable grid.

Click the **New Filter** button to launch the Filter dialog (see section [6.1.1.1]). If a filter has been specified and the **Filter On** box is checked, only records matching the filter criterion will be shown in the grid.

You can edit parameters within the grid.

This dialog defines Named Constants as (Name, Value) pairs that can be used in Templates and Reports. Some sample constants are automatically generated when XLeMs is installed, and are used in some of the sample Templates.

Named Constants are useful for information in your Reports that is liable to change, such as company address information, VAT rates, electricity prices etc. Without Named Constants, you would need to edit your Templates every time this information changed. With Named Constants, you only need to change the information in one place (in XLeMs) and subsequent Reports will incorporate the new data.

When generating a Template, you can specify if you want a Constants Worksheet included. If so, this sheet will be automatically inserted with the name **Constants1**. The Names and Values defined in the Constants table are written to cells on the worksheet every time a Report is run. The cells containing the Value are formatted as Excel Named Cells with the corresponding name.

So assuming you have a Named Constant **#VatRate**, you can use this value anywhere in the Template as part of a formula. For example :-

=B4*VatRate

Three types of Value are supported, depending on the first character of the Name

- Numeric Name prefixed by #
- Date Name prefixed by @
- Text Name starts with letter or number

NB The prefix characters do not form part of the Excel Name. Thus a Named Constant defined as **#VatRate** in XLeMs, will have the name **VatRate** in Excel, and be formatted as a numeric cell.

6.2 New menu

All the dialog boxes have **Copy** and **Paste New** buttons.

The **Copy** button makes a copy of the current set of parameters. Clicking the **Paste New** button creates a new entry using the copied parameters. The "Ref" field in the new record is modified so as not to produce two records with the same Ref.

6.2.1 Connection

This dialog is also used for the "Edit Connection" function.

You must assign a **ConnRef** to the Connection. It should be a meaningful reference – see section [3.5] for some guidelines.

Data will not be collected from this Connection by a "Collect All" operation unless the **Enabled** box is checked. However, data can still be collected by a "Collect Single Connection" operation even if it is disabled.

The **Connection Type** drop-down should be set appropriately. This controls which other parameters are available for editing. The following Connection Types are supported :-

COMM Port

Set the **Comm Port** number to the COM port number (range 1 to n).

Set the **Baud Rate**, **Parity**, **Data Bits** and **Stop Bits** (eg. 9600, N, 8, 1).

Modem Port

Set the **Comm Port** number to the COM port number (range 1 to n) that controls the Local Modem.

Enter the telephone number of the Remote Modem in the **Dial String** box.

Set the **Baud Rate**, **Parity**, **Data Bits** and **Stop Bits** (eg. 9600, N, 8, 1).

TCP Connection

Set the **TCP Port** number to the TCP Port number used by the remote device (eg. 4001).


Enter the Host Name or IP Address of the remote device in the **Hostname / IP Address** box (eg. 192.168.0.234).

Database

Set the **Database Alias** to that of the database (for retrieving data from SHM's MLog application, this should be **alsMlogDB**).

Database Aliases can be managed using the BDE Administrator application that is installed automatically with XLeMs. It is available in the Windows Control Panel.

File Directory

Set the **File Directory** to a path where the files to be read are stored. You can click the adjacent browse button  to select an accessible directory.

For a CubelP meter, this should be the directory on the FTP server where the files are stored.

For Iskra SMS meters, this should be the directory where the exported files are stored.

HTTP Connection

Set the **URL** to that required by the device. For devices supporting the oBIX protocol, this should be the URL of the oBIX Lobby, eg. :-

`http://mydevice.tzo.com/obix`

If the device's HTTP port is not the default (80) then encode the port number in the URL in the usual way, eg. :-

`http://mydevice.tzo.com:8080/obix`

6.2.2 Logger

This dialog is also used for the "Edit Logger" function.

You must assign a **LoggerRef** to the Logger. It should be a meaningful reference – see section [3.5] for some guidelines.

A valid Connection must be assigned to the Logger by selecting one from the **ConnRef** drop-down list.

Data will not be collected from this Logger unless the **Enabled** box is checked.

XLeMs supports several different types of logging devices. The logging device is specified by the **Device Type** which must be selected from the drop-down list. Selecting the Device Type automatically displays the relevant editable parameters for that device, which are described in the following sections. You will need to ensure that the associated Connection is the correct type for the device. The **Device Type** will also determine how you specify the Channel Identifier for the associated Channels.

The various logging devices and how to configure them are described in the following sections.

6.2.2.1 UL Series Loggers

The Device Type **UL Series** comprises SHM dataloggers DL4, UL8, UL24, RL32 and ML32.

The **Connection Type** of the associated Connection must be one of :-

- Comm Port
- Modem Port
- TCP Connection

The following device-specific parameters must be set up in the New/Edit Logger Dialog :-

- **Logger Address** LLN of the Logger (Range 1 .. 254)
- **Serial Number** Leave blank to allow automatic update when data next collected.
- **Password** Numeric password to collect data (normally 0)
- **Time Controller** Tick to keep the RTC in sync with the PC.

Associated Channels must have the **Channel Number** field set 1..4 for a DL4, 1..8 for a UL8 etc.

It is important to set the **Logger Address** box to the correct LLN for this Logger. The Logical Logger Number is a number in the range 1 to 254 that is programmed into the Logger when it is commissioned. It is possible to have several loggers connected together by an RS485 loop, forming a small network. In this case, every logger in the loop must have a different LLN. This information can be obtained from the Logger Commissioning Records (LCRs) produced by SHM for your system.

The **Serial Number** field should be left blank. It will be filled in automatically the first time the Logger is contacted.

Data will not be collected from the Logger unless the **Enabled** box is checked.

If the **Time Controller** box is checked, then the Scheduler will attempt to keep the Logger's real-time clock synchronized to the PC's clock. It does this by altering the rate of the Logger's clock each time it collects data, pulling it fast or slow as appropriate. In this way, the Logger's clock is gradually brought back into line without having to force a jump in time.

NB Even if the PC's clock is on Daylight Saving Time, the logger will be synchronized to Standard Time (GMT).

The **Password (numeric)** field should normally be set to zero, as SHM Loggers have null (zero) passwords by default, which disables passwords. However, if you have used the SHM Utility UCOMM to set nonzero passwords in the logger, you will need to enter the appropriate password here.

If the **Time Controller** box is checked, then you will need to enter the Logger's Time Controller password. Otherwise you will need to enter its Read Data password. Note that the Logger can have different Read Data passwords for each channel, but XLeMs does not support this. You must set the Read Data passwords for each channel to be the same (NB. The Logger has only one Time Controller password that applies to all channels).

6.2.2.2 CSV File

The Device Type **CSV File** supports a variety of file formats. A special CSV Decoder file specifies the supported Meter Types and how to extract the data from them. The supported meter types include :-

- Cube IP Files exported via FTP by Cube IP Meter
- Iskra LP Iskra Load Profile files generated by Iskra SMS Client
- Iskra REGS Iskra Registers files generated by Iskra SMS Client
- XLeMs CSV CSV Reports generated by XLeMs

The **Connection Type** of the associated Connection must be :-

- File Directory pointing to the directory where the files are.

The following device-specific parameters must be set up in the New/Edit Logger Dialog :-

- **Meter Type** Select from list (see above)
- **Meter Identifier** Set to the Device Identifier needed to decode the CSV files (eg. 12-digit MAC Address for a Cube IP)
- **Delete Old Files** Tick to remove files that have been processed.

Depending of the **Meter Type**, associated Channels must have either the **Channel Number** or **Channel Name** field set appropriately :-

For a Cube IP meter, the **Channel Number** represents the column number (range 1..20) in the CSV File of the parameter to be logged.

NB. Cube IP Energy registers require two parameters in the CSV file, which must be consecutive. Three energy registers are supported, occupying the first 6 columns of the file. The Channel Numbers for these are 1, 3 and 5.

If the Logger represents an Iskra SMS meter Load Profile, then the **Channel Number** represents the channel number in the Load Profile.

If the Logger represents an Iskra SMS meter Register file, then the **Channel Name** represents the Register Name in the file (eg. "1.8.0" for "A+ all phases energy total").

For an XLeMs CSV file, the **Channel Number** represents the column number (range 1..n) in the CSV File of the parameter to be logged.

If the **Delete old files** checkbox is checked, then the Scheduler will automatically delete all the files it has processed after reading the data. Otherwise the files will remain on the FTP Server and might eventually need to be deleted to avoid taking up space on the Server.

6.2.2.3 DB Table

The Device Type **DB Table** corresponds to a Database maintained by SHM's MLog software.

The **Connection Type** of the associated Connection must be :-

- **Database** Its **Database Alias** should be **alsMLogDB**

The following device-specific parameters must be set up in the New/Edit Logger Dialog :-

- **DB Table** Name of the Table in the Database (**tblMbusLogs**)

Associated Channels must have the **Channel Number** field set to correspond to a Database Field. For an MLog database, Channel 1 corresponds to the R1 field, Channel 2 to the R2 field etc.

6.2.2.4 oBIX

The Device Type **oBIX** corresponds to an SHM J-Logger or other oBIX compatible device.


The **Connection Type** of the associated Connection must be :-

- **HTTP Connection**

The URL of the above connection must point to the oBIX Lobby. If the device's HTTP Port is not the default (80) this must be specified in the URL, eg :-

http://192.168.0.205:8080/obix

The following device-specific parameters must be set up in the New/Edit Logger Dialog :-

- **oBIX Station** Name of the Station on the device. Click the adjacent browse button  to see a list of Stations (this takes several seconds and the device must be accessible via the network).
- **oBIX User** If the device needs a login, specify a valid User Name
- **Password** If the device needs a login, specify a valid Password

NB If clicking the Browse button produces a "302 Moved Temporarily" error, this usually indicates that the device needs a password. Enter a valid user name and password and try again.

Associated Channels must have the **Channel Name** field set to correspond to one of the Histories on the device. In the New/Edit Channel Dialog, click the adjacent browse button  to see a list of Histories (this takes several seconds and the device must be accessible via the network).


6.2.3 Channel

This dialog is also used for the "Edit Channel" function.

You must assign a **ChanRef** to the Channel. It should be a meaningful reference – see section [3.5] for some guidelines.

A valid Logger must be assigned to the Channel by selecting one from the **LoggerRef** drop-down list.

Depending on the associated Logger's **Device Type**, there will be a box to enter either a numeric **Channel Number** or a **Channel Name**. Refer to Section 6.2.2 for information on how to set these up for the various devices.

In the case of an oBIX Logger, a browse button  will appear next to the **Channel Name** box. Click this to see a list of Channel Names on the device (this takes several seconds and the device must be accessible via the network).

The **Readings Multiplier** and **Readings Offset** fields (default values 1.0 and 0.0) are applied to each raw Channel reading before it is stored in the Readings Database :-

$$\text{Stored} = (\text{Raw} \times \text{Multiplier}) + \text{Offset}$$

Data will not be collected from this Channel unless the **Enabled** box is checked.

The **CustRef** field is optional, and can be set to associate a Customer with the Channel.

You do not normally need to change the **Last Stored** field. When the Scheduler collects data, it only collects readings from a Channel that has timestamps after **Last Stored**. You can set this field to a date in the past to force re-collection of readings next time the Scheduler collects data.

6.2.4 Customer

This dialog is also used for the "Edit Customer" function.

You should enter a meaningful **CustomerRef** for the Customer.

You must fill in at least **Contact Name**, **Address1**, **Town / City** and **Postcode**.

The **Last Invoice** No field is filled in automatically when a Report is generated for one of this Customer's Channels with an automatically generated invoice number.

The **Last Billing Date**, **Move In Date** and **Move Out Date** fields are used to generate billing data reports (see section 5.4.6).

6.3 Report menu

6.3.1 Run

You will first be prompted to select a XLeMs Template file to base the Report on.

You are then presented with the Report/Template Wizard. Normally you only need to specify the Start Date, and possibly time and then click the **Finish** button (the **Next** button is greyed).

If the Report span is based on two dates, then the **Next** button will be enabled, and will take you on to the End Date page.

If the XLeMs Template contains more than one Recipe, then the Wizard will be activated for each Recipe.

The Save Report File dialog will then be shown. You can browse to another directory or change the assigned file name if you like.

You will then be asked "Do you wish to view this file now?". Click **Yes** to open the file in Excel (assuming Excel is installed on the PC).

6.3.2 Re-run

If you have already run a Report, then this command will work the same as Run Report except that it will not prompt for an XLeMs Template, but use the previously selected one.

6.3.3 Quick

Quick Reports are very similar to Reports, but are used to view data from any Channel in a variety of pre-defined formats.

Whereas Reports are based on your own Templates, which may contain several Channels (eg. Main Incomer, Lighting, HVAC), Quick Reports are based on separate SHM-supplied Templates which only contain a single Channel.

Types of Quick Report include :-

- 1-Day Chart - half-hour consumption graph from 00:00 to 24:00
- 7-Day Chart - half-hour consumption graph for 7 day period
- Calendar Month Chart - Daily consumption chart for 1 calendar month
- 31-Day Surface Plot - 31 Day half-hour consumption chart with time-of-day and date axes
- Simple Bill - Example bill for any customer between any two dates
- Monthly MD Chart - Calendar month chart showing daily Maximum Demand and time of MD

When running a Quick Report from the menu, you are first asked to select the required Quick Template from the drop-down list. You are then prompted to select a Start Date and Time for the Quick Report. Finally, you are asked to pick a Channel.

The Save Report File dialog will then be shown. You can browse to another directory or change the assigned file name if you like.

You will then be asked "Do you wish to view this file now?". Click Yes to open the file in Excel (assuming Excel is installed on the PC).

6.4 Instant Chart Menu

These menu commands allow you to instantly display data in chart form without having to go via Excel. The time/date range, interval and Channels are controlled by a Template structure (as for Reports). These Charts are easily copied and pasted into Office documents or saved to file as graphic images.

Unlike the charting of raw data (see section 6.1.3.2) these Charts can have multiple Channels, and you can process the data before display (Absolute, Difference, Min, Max, Average etc.).

6.4.1 From Template

This command allows you to select an existing Template to determine the range of data and Channels to be included.

You can edit the Template parameters (span, interval, add/delete channels etc.) to get the exact Chart you want, but these changes **will not change the underlying Template file**.

The operation of the Instant Charting function is otherwise identical to the New Chart command described in the next section.

6.4.2 New Chart

This command activates the Chart Wizard with a blank Template. The operation of the Chart Wizard is identical to the Report Wizard described in section 6.5.1.

In the [General] tab you can specify the Chart Title that will be used. The [Start Date] and [Span] tabs control the time/date range of the data and the interval between chart points on the X-axis.

The [Channels] tab controls which Channels will be included in the Chart and the appropriate function of the channel data (Absolute, Difference, Min, Max, Average etc.). Each Channel can be configured to plot against either the Left or Right Y-axis.

Click the [Finish] button to display the Chart.

Clicking the [Revise Chart] button re-activates the Chart Wizard allowing you to modify what is displayed.

By clicking the [Chart Titles] button, you can modify the chart and axis titles. Note however that revising the chart will create a new chart title.

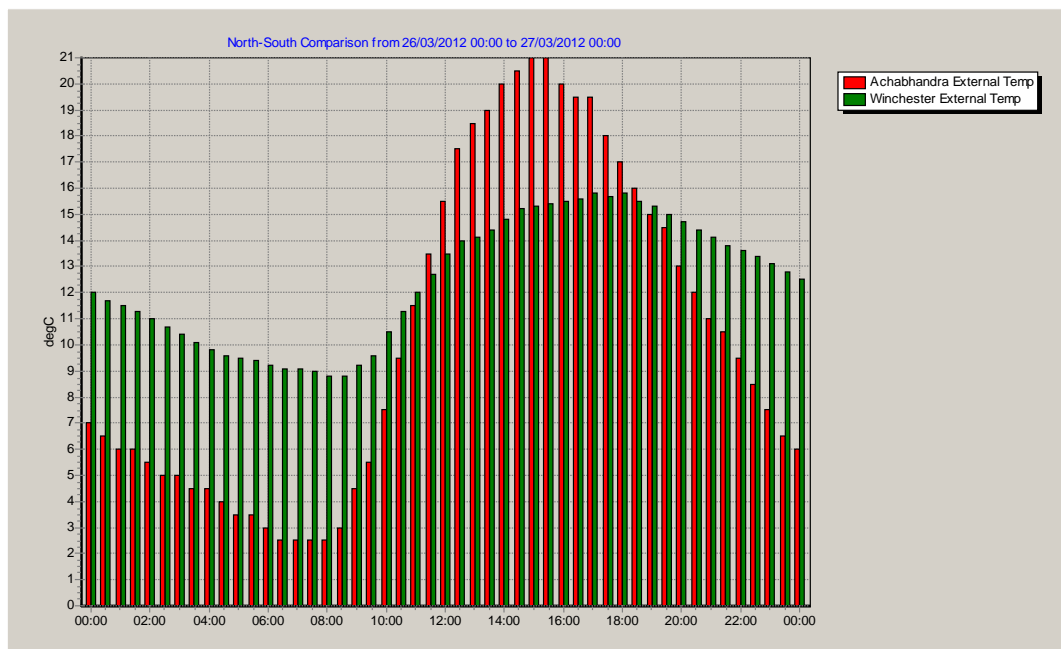
You can select the most appropriate chart type from the drop-down list. Available types are Bar, Line, Area and Point.

Click the [Copy to Clipboard] button to copy the chart area to the Windows Clipboard for subsequent pasting into a document. Clicking the [Save Chart] button will save the chart area as a file. You can choose between WMF (Windows Meta File) and Bitmap formats in the Save File dialog.

You can zoom in on an area of the chart by dragging a rectangle (top left to bottom right) with the left mouse button. Drag any rectangle from bottom right to top left to zoom back to the original size.

You can re-size the dialog box to vary the size of the Chart area.

A typical Chart is shown below :-



6.5 Template menu

6.5.1 New

The Report Recipe Wizard dialog will be shown.

A wizard will guide you through the steps to generate an XLeMs Template, selecting the range of date/times and Channels.

There are five possible steps in the Wizard :-

- General
- Start Date
- Span
- End Date
- Channels

These are described in detail in the following sections.

Use the **Next**, **Back** and **Finish** buttons to navigate through the Wizard.

If the **Multiple Recipes** option has been enabled (see section 6.6.3), you will then be prompted "Do you want to add another Recipe to the Template?". You can have up to 10 Recipes in the Template. You would normally only need more than one Recipe if you require more than one Date/Time span. From version 1.3.0 onwards, the default is to have only one Recipe per Template.

6.5.1.1 General Tab

You must enter a short **Reference Name** for the Template. This will form the default filename of the Template, and also be the filename prefix for Reports generated using this Template.

If you check **Use GMT Time**, then the timestamps written to any Report will be the same as those stored in the Logger (which does not adjust its clock for Daylight Saving Time). Otherwise, timestamps will be written in Local Time (adjusted for Daylight Saving).

You should check the **Enable Named Cells** box if you are generating invoices from a 2-date Bill Report. This gives the cells containing readings and dates for each bill a unique name, which makes creating invoice sheets for different channels easier. See section 5.4.6.

If you check **Generate CSV Report** then a CSV File will be generated containing only the channel data and timestamps, instead of an Excel-format file.

If you check Include Constants then a **Constants1** worksheet will be included, containing values from the Constants Table (see section [6.1.5]).

A number of Short-cuts are available to pre-set the Span to various common combinations.

6.5.1.2 Start Date Tab

The calendar and digital clock can be used to specify the Start Date and Time.

When generating an XLeMs Template, it is a good idea to select a Start Date for which there is some data in the Readings Database, otherwise there will be no sample data to use when customizing the template.

If you specify a **Date Constraint**, you force the Date to 'snap' a particular day, based on the Constraint :-

- Start of Month
- End of Month
- Start of Year
- End of Year
- A day of the week (Sun..Sat)

If you specify a **Time Constraint**, you force the Time to 'snap' a particular time, based on the Constraint :-

- Start of Day (00:00)
- End of Day (23:59)
- Midday (12:00)
- On the Hour
- On the Hour or Half-hour

6.5.1.3 Span Tab

There are three **Span Methods** :-

- **Number of Readings.** You specify the total number of readings and the interval between readings.
- **End Date.** You specify both the Start and End dates and the interval between readings.
- **Total Interval.** You specify the total interval and the interval between readings.

Intervals are shown in minutes. Use the **Quick Set** buttons to set a specific number of minutes, hours or days.

NB. If you specify an Interval Between Readings that is less than the interval at which readings are logged (oversampling), then this will produce repeated readings when the readings are written to the Report.

NB. If you set the Interval Between Readings to zero, then only two readings, corresponding to the Start and End Dates, will be written to the Report.

Normally the interval between readings is fixed, but there is an option to use an interval on one calendar month (which is a varying interval). This feature can be enabled by checking the **Interval = 1 Calendar Month** box. However, using an interval of one calendar month is only allowed (ie. the check box is only enabled) if the Span Method is **Num Readings**.

6.5.1.4 End Date Tab

The calendar and digital clock can be used to specify the End Date and Time.

Normally the End Date is determined by the Span, but if the span is based on two user-selected dates, you must select an End Date.

If you specify a **Date Constraint**, you force the Date to 'snap' a particular day, based on the Constraint :-

- Start of Month
- End of Month
- Start of Year
- End of Year
- A day of the week (Sun..Sat)

If you specify a **Time Constraint**, you force the Time to 'snap' a particular time, based on the Constraint :-

- Start of Day (00:00)
- End of Day (23:59)
- Midday (12:00)
- On the Hour
- On the Hour or Half-hour

6.5.1.5 Channels Tab

Use the **Add Channel** button to add a channel specification to the list.

Select a channel from the list and use the **Edit Channel** or **Delete Channel** buttons to edit or remove it.

When adding a Channel, you must select a **Channel Ref** from the drop-down list.

The **Heading** name will be written to the Template, and appear as the name in the Channels list. You can include Dynamic Parameters (eg. Channel Ref, Description) in the Heading that will automatically be updated when the Report is run (see section 6.5.1.6).

The **Reading Type** drop-down selects what function of the Reading will be written to the Report :-

Absolute	The value stored in the database.
Difference	The difference between the absolute reading for this data point and the next data point in the Report.
Average	The average of all readings between this data point and the next data point in the Report.
Sum	The sum of all readings between this data point and the next data point in the Report.
Max	The maximum value of readings between this data point and the next data point in the Report.
Min	The minimum value of readings between this data point and the next data point in the Report.
Earliest Advance	This gives the timestamp of when the earliest advance in reading occurred between this data point and the next data point in the Report.
Latest Advance	This gives the timestamp of when the latest advance in reading occurred between this data point and the next data point in the Report.
Half-hour MD	This gives twice the maximum rise in absolute reading in any 30-minute period between this data point and the next data point in the Report.
Half-hour MD time	This gives the time of day of the maximum rise in absolute reading in any 30-minute period between this data point and the next data point in the Report.
Billing Data	This gives 6 readings per channel, the Start Date, Date of Start Reading, End Date, Date of End Reading and End Reading. See section 5.4.6.
Billing Data 2	This is a simpler version of Billing Data, where the report dates are not overridden by dates from the associated Customer.

NB. The resulting data value is assigned to the date/time of the start of the period. Ie. the difference in absolute readings from 12:00 to 12:30 would be assigned to 12:00.

NB. When using Half-hour MD or Half-hour MD time, the Span should be set so that the Interval Between Readings is 1 day, for the results to be meaningful.

The **Date Offset** boxes allow you to specify a negative (in the past) offset from the main Report date range for comparison purposes. This offset can be specified in Days, Weeks, Months,

Years or "Years Same Day" which chooses the nearest date that has the same day of the week as the main date range. The default offset is None, which means the Channel data uses the main Report date range.

When the Report is run, the date/time of the first data item is written in the header column of the Data1 worksheet.

Checking **Generate Invoice Number** will generate a unique number in the 'Invoice' field of the channel data written to the Report.

The **Right-hand Chart Axis** checkbox determines which axis the Channel will be plotted against for Instant Charting. It is not relevant when running Reports.

6.5.1.6 Channel Headings – Dynamic Parameters

Channel Headings can be made dynamic by incorporating "Dollar" parameters in the text. When the Report is generated, these "Dollar" parameters are substituted with the actual value.

For example a heading of **\$R \$D** will produce a Heading consisting of the Channel Ref followed by the Channel Description. You can mix normal text and "Dollar" parameters, eg. **Company \$C**.

The following parameters are defined (NB these are case-sensitive) :-

\$	Use this if you just want a Dollar sign in the Heading
\$A	Address line 1 of the associated Customer
\$a	Address line 2 of the associated Customer
\$C	Company Name of the associated Customer
\$D	Channel Description
\$E	Email address of the associated Customer
\$F	Fax number of the associated Customer
\$I	Channel ID number
\$N	Contact Name of the associated Customer
\$P	Postcode of the associated Customer
\$p	Phone number of the associated Customer
\$R	Channel Ref
\$r	Customer Ref
\$T	Town of the associated Customer
\$U	Channel Units
\$Y	Date of the first data item (DD/MM/YYYY)
\$Y(format)	Date of the first data item formatted according to the pattern in brackets

The date formatting codes for \$Y() are YY, YYYY for year, MM, MMM, MMMM for Month and DD, DDD, DDDD for Day.

6.5.2 New from Existing

This generates a new XLeMs Template based on an existing one.

You must change the **Reference Name** on the General tab of the Wizard to avoid confusion with the original Template.

The process is otherwise similar to generating a New Template.

6.5.3 Modify

This modifies an existing XLeMs Template allowing you to change the settings or add more Recipes.

The process is otherwise similar to generating a New Template.

NB. Avoid modifying the example templates installed with XLeMs – they all have a name beginning with **Xamp**. Use the **New from Existing** command with these Templates.

6.6 Options menu

6.6.1 View Diagnostics

This menu command toggles the state of the Option.

When the menu item is checked, a scrollable Diagnostics Window appears below the Control Centre buttons.

NB. Diagnostics are always written to a Log File, regardless of the state of this Option.

6.6.2 Use GMT Time

This menu command toggles the state of the Option.

When the menu item is ticked, all Timestamps will be shown as stored in the Logger (which does not adjust its clock for Daylight Saving Time). Otherwise timestamps will be shown in Local Time (adjusted for Daylight Saving).

6.6.2.1 Timezones

Timezones vary with Longitude and have a positive or negative offset in hours and minutes from GMT (usually an exact number of hours, but can have a 30 minute offset). In addition many Timezones vary the offset by 1 hour between summer and winter. These two offsets are known as "Standard Time" and "Daylight Saving Time".

XLeMs stores historic data in its Readings Database using timestamps based on the date and time read from the Logger - it does not take note of the Timezone that the logger is in.

It is assumed that the Loggers are always on their local "Standard Time" and do not switch between Standard and Daylight Saving during the year.

If the program Option "Use GMT Time" is ticked, then all Report timestamps will use "Standard Time" (ie as stored in the database), even if the timestamp is within "Daylight Saving Time". If the option is not ticked, then Report timestamps will use Standard or Daylight Saving time depending on the time of year of the timestamp. The transition dates between Standard and Daylight Saving times are based on the Timezone of the PC that is running XLeMs.

6.6.3 Multiple Recipes

This menu command toggles the state of the Option.

The default for this is unchecked, in which case you are not prompted to add another Recipe when editing a Template. Versions of XLeMs prior to 1.3.0 always asked to add another Recipe, but this feature is rarely (if ever) needed.

6.7 Tools menu

6.7.1 Set Billing Date

This command allows the **Last Billing Date** for one or more customers to be set to a particular date.

If you are using a Billing Report to generate invoices, then once you are satisfied with the invoices/bills you have generated, you need to update the **Last Billing Date** for all the customers you have invoiced.

The date to use is the **End Date** of the bills you have just produced.

The next time you generate a Billing Report, the **Start Date** will be set to this date, and thus carry on from the previous bill.

See section 5.4.6 to find out how to generate invoices using XLeMs.

6.7.2 Edit Invoice Number

For each Channel in a Report, it is possible to request XLeMs to generate a unique (incrementing) number and write it to a particular cell each time the Report is run. This number can be used as an Invoice Number if desired.

This menu command allows you to specify the next Invoice Number that will be used.

6.7.3 Manual Readings

This command is used to manually store individual readings in a channel, and should be used with care to avoid overwriting legitimate data collected from the loggers.

Select the **Channel** and **Timestamp**. If a reading already exists, it will be shown in the **Reading Value** box. Otherwise the value in the box will remain unchanged.

Click the [**Store Reading**] button to store the new value. Manually entered readings are tagged in the Readings Database by an **M** in the Exceptions field.

6.7.4 Delete Records

This command deletes records from the Readings Database. It is useful if the Database gets too large and starts to slow down performance.

You are first prompted to enter a 'From' and 'To' date/time. By default, these times are 1 year ago, to help avoid accidental deletion of current records.

You are then prompted to specify either **All Channels** or select a particular channel.

XLeMs then calculates the number of records that would be deleted and gives a final prompt to confirm deletion.

6.8 Maintenance Menu

6.8.1 Check Config

This command performs a 'Sanity Check' on the Configuration Database.

The Diagnostics Window is opened (see section [6.6.1]), and the results of the check are shown there.

The following checks are made :-

- Orphaned Loggers (no valid Connection)
- Orphaned Channels (no valid Logger)
- Unknown Customer IDs in Channel records
- Duplicate Channels (same Logger ID and Channel No.)
- Duplicate Loggers (same Connection ID and Logger Address)

Click anywhere on the Diagnostics Window to close it.

6.8.2 Pack Database

This is a Database housekeeping utility that is not required in normal use.

This command packs the Readings Database, eliminating unused storage.

6.8.3 Regen Indexes

This is a Database housekeeping utility that is not required in normal use.

This command regenerates the Indexes for the Readings Database.

It can be useful if a Report for the current day is not showing all (or any) readings, even though you know they have been stored in the Database.

6.8.4 Regen VAL Files

This is a Database housekeeping utility that is not required in normal use.

This command regenerates the VAL (Validation) files for the Configuration Database.

This command may be required after restoring a Database, if XLeMs reports that the VAL files are out-of-date.

6.9 Help menu

6.9.1 Contents

This opens Help for the XLeMs Control Centre.

6.9.2 Licence Info

This displays information about the current XLeMs Licence.

6.9.3 New Licence

This command is used to activate a new Licence (see section [2.2]).

You must browse to the new Licence File and click the **Open** button. XLeMs makes a copy of the Licence File, so it does not matter if it is subsequently deleted.

If the Licence File is valid, it will be installed as the new Licence.

After installing a new Licence, you should shut down both the Control Centre and Scheduler and restart them for the Licence to take effect.

6.9.4 About

Displays version number and copyright information.

7. Scheduler Commands

7.1 File menu

7.1.1 Open

This command opens a Configuration File. The name of the current Configuration File is shown in the Title Bar.

This file stores the configured Schedule Items for each Scheduler, along with the Date/Times when they are next due.

The file is continuously updated by the Scheduler with new Next Due times every time a Schedule Item is run.

7.1.2 Save

This command saves the current Configuration File. The name of the current Configuration File is shown in the Title Bar.

The Configuration File is rewritten every time a Schedule Item is run (to update the "Next Due" time), so the only time you might need to use this command is after editing, adding or deleting a Schedule Item.

7.1.3 Save As

This command prompts the user to save the current Configuration File under a new name. The name of the new Configuration File is shown in the Title Bar, and the new file is used from then on.

7.1.4 Shutdown

This command causes the Scheduler to exit. You are prompted to confirm that you really want to shut down, as data collection etc. will cease if the Scheduler closes.

Note that clicking the Close [X] or Minimize [_] buttons on the title bar will simply minimize the Scheduler to the System Tray, and not shut it down.

7.2 Scheduler menu

Some commands in the Scheduler menu will be greyed (disabled), depending on whether the currently selected item in the Scheduler Pane is a Scheduler (Hourly, Daily, Weekly, Monthly or Yearly) or a Schedule Item.

These commands are also available as a pop-up menu by right-clicking the Scheduler Pane.

7.2.1 Start/Stop

The Scheduler only checks the Schedules and runs the Schedule Items if it is in Scheduling Mode (Start button down). Otherwise, it is in Configuration Mode (Stop button down).

On startup, the XLeMs Scheduler counts down 10 seconds before entering Scheduling Mode. This action can be aborted by clicking the Stop button or selecting Scheduler | Stop from the menu.

7.2.2 New Item

This activates the New Item dialog, which is divided into two.

The Schedule Parameters (right-hand) determine when the Schedule Item's Action is run.

The Action Parameters (left-hand) determine the Action that is carried out.

7.2.2.1 Schedule Parameters

Enabled must be checked if the Scheduler is to run the item.

Run If Missed is only relevant for "Run Report" actions. Suppose you have a Report that is scheduled to run Daily at 01:00, but the Scheduler has been switched off over the weekend (Saturday and Sunday), and is not run up again until 09:00 Monday. If Run If Missed is checked, then when the Scheduler starts on Monday, it will run the missed Reports (Saturday, Sunday and Monday) with the appropriate data.

The other Schedule Parameters depend on which of the 5 Schedulers own the item :-

Hourly	Minutes past the Hour (0 to 59)
Daily	Time of Day (00:00 to 23:59)
Weekly	Time of Day (00:00 to 23:59) Day of Week (Mon to Sun) Every Nth Week (1 to 53)
Monthly	Time of Day (00:00 to 23:59) Day of Month (1 to 31)
Yearly	Time of Day (00:00 to 23:59) Day and Month

NB. If the **Every Nth Week** parameter is set to a value greater than 1, then the Report will only be run every Nth week, where the week number counts from zero on 31st December 1899 (Excel Date Zero).

7.2.2.2 Action Parameters

You should set Action Name to something meaningful. It is the name displayed in the Scheduler Pane.

The other parameters depend on the Action selected from the drop-down list :-

Collect Data

- **Connection** Select a Connection to collect data from using the drop-down list. The default is **All Connections**.

Run Report

- **Template** Click the [...] button to select an XLeMs Template to use for the Report.
- **Result Dir** Browse for a Directory where the resulting Excel Reports are to be written.
- **File Name Suffix** Select an optional file suffix from the drop-down list that will be based on the start date of the Report.
- **Email Addr** Specify the address of an Email Recipient for this Report (if required).
- **Email if Alarm** If this box is checked, then the Report will only be Emailed if it indicates an Alarm Condition. Alarms are described in section [5.4.6].
- **GIF Export Sheets** If you wish to export one or more Charts as GIF files, specify the Excel chart sheet name (end with '*' for more than one, eg. 'Chart*'). You will also need to set the FTP Server parameters in the **Options** menu (section 7.4.1).
- **GIF File Suffix** Select an optional file suffix from the drop-down list that will be based on the start date of the Report.
- **Print Sheets** If you wish to print one or more worksheets on the local printer (see section 7.4.1 to set up the printer), specify the Excel sheet name (end with '*' for more than one, eg. 'Invoice*').
- **Report Date** Normally, the Scheduler sets the Report End Date so that it is earlier than "Now" (ie. when the Report is scheduled). This ensures that the Report contains a complete set of data. However, if you want to generate a report with incomplete data (eg. "the day so far") then you should select the **Start Date** button, and the Scheduler will set the Start Date based on "Now". See section 5.4.4.

NB. When a Report is run from the Control Centre, you are prompted to manually enter a Start Date/Time.

When a Report is run from the Scheduler, the date range is selected automatically so that the End Date/Time (or optionally the Start Date/Time) occurs before the scheduled time. See section 5.4.4 for more details.

Backup Database

- **Result Dir** Browse for a Directory where the resulting ZIP file is to be written.

- **File Name Suffix** Select an optional file suffix from the drop-down list that will specify the date of the Backup.
For a Weekly backup "Week of Month" is most useful.

The Configuration Database and Readings Database are zipped up into a single file and stored on disk.

The Licence & Template directories and Schedule file are also zipped up into a separate file and stored in the same location.

Prune Database

- **Delete records older than** Select the number of months to keep. Records older than this will be deleted.
- **Keep one record per day** If checked, readings at 00:00 GMT will be kept, thus maintaining older data but with reduced resolution (one reading per day).

FTP Export

- **Source Directory** Browse for the directory where the Report files for export are stored.
- **FTP Server** Specify the Host Name or IP Address of the FTP Server that will receive the files.
- **Login** Specify a valid User Name for logging in to the FTP Server.
- **Password** Specify the Password for logging in to the FTP Server.
- **Server Directory** Specify the destination directory on the FTP Server that will store the exported files.
- **Save Files Checkbox** If you tick this checkbox, exported files will not be deleted from the PC.

Section 5.4.6 gives details of how to export Reports via FTP.

7.2.3 Edit Item

This allows the selected Schedule Item parameters to be changed. It operates similarly to New Item (see section [7.2.2]).

7.2.4 Delete Item

This deletes the selected Schedule Item.

7.2.5 Enable/Disable Item

The Scheduler will only run a Schedule Item if it is Enabled. Otherwise, it is ignored. The item's icon in the Scheduler Pane is shown greyed if it is Disabled.

7.2.6 Run Now

This command will run the selected Schedule Item now. It will only work if the item is Enabled.

By default, a "Run Report" Schedule Item is based on the current time and date (ie. "Now"). However the user is prompted to change this time and date, so that a "missed" Report can be generated using an earlier date.

7.3 Collect menu

7.3.1 Now

This command will collect historic data from all enabled Channels immediately, even if the Scheduler is in Configuration Mode.

For a Channel to be collected, the following conditions of the Configuration Database must be satisfied :-

- The Channel must be Enabled
- The Channel's Logger must be Enabled
- The Logger's Connection must be Enabled

7.3.2 Single Connection

This command will collect historic data from all enabled Channels for a given Connection immediately, even if the Scheduler is in Configuration Mode, and even if the Connection is Disabled.

For a Single Connection to be collected, the following conditions of the Configuration Database must be satisfied :-

- The Channel must be Enabled
- The Channel's Logger must be Enabled

7.4 Tools menu

7.4.1 Options

This command shows a dialog where the following Scheduler parameters may be configured :-

Email Sender	When XLeMs sends an Email, this will be the From Address
Email BCC Recipient	When XLeMs sends an Email, this address is put into the Blind Carbon Copy field. It is useful to point this to a special Email account that is used to keep an audit trail of all messages sent automatically by XLeMs.

Email SMTP Server	This is the name or IP Address of the SMTP Server used for outgoing mail on your network.
Email SMTP Login	This is needed if your SMTP Server requires a Login (most don't). Otherwise, leave it blank
Email SMTP Password	This is needed if your SMTP Server requires a Login/Password. Otherwise leave it blank
Printer Name	Select a Local Printer Name from the drop-down list. This is used if the "Print Sheets" option for running Reports is enabled.
FTP Server	This is the name or IP Address of an FTP Server, where exported GIF files are to be sent.
FTP Login Name	This is the Login Name required for the FTP Server.
FTP Password	This is the Password required for the FTP Server.
FTP Directory	This is the directory (relative to the FTP Server root) where exported GIF files are to stored.
NB These FTP Server settings are only for the export of charts as GIF files as part of a Run Report action (see section 7.2.2.2). For exporting complete Reports, refer to section 5.4.6.	
oBIX Server Port	This is the TCP Port number that the Scheduler's oBIX server will listen on. The default is 80. This must not be a port that is already in use on the PC.
Enable oBIX Server	Tick this box to enable the oBIX server to run.

7.4.2 Show Diagnostics

This menu command toggles the state of the Option.

When the menu item is checked, diagnostic data is shown in the Events Pane.

NB. Diagnostics are always written to a Log File, regardless of the state of this Option.

7.4.3 Use GMT Time

This menu command toggles the state of the Option

When the menu item is checked, all Timestamps will be shown as stored in the Logger (which does not adjust its clock for Daylight Saving Time). Otherwise, timestamps will be shown in Local Time (adjusted for Daylight Saving).

7.5 Tray Menu

This menu is obtained by right-clicking the Scheduler icon in the System Tray.
Menu items are :-

- Show
- Minimize
- Shutdown

Double-clicking the icon with the left mouse button is equivalent to Show.

7.5.1 Show

This command makes the Scheduler window visible if it has been minimized to the System Tray.

7.5.2 Minimize

This command minimizes the Scheduler to the System Tray and removes it from the Task Bar.

7.5.3 Shutdown

This command causes the Scheduler to exit. You are prompted to confirm that you really want to shut down, as data collection etc. will cease if the Scheduler closes.

7.6 Help menu

7.6.1 Contents

This opens Help for the XLeMs Scheduler.

7.6.2 Licence Info

This displays information about the current XLeMs Licence.

7.6.3 About

Displays version number and copyright information.

8. Reference

8.1 General

8.1.1 Multiple Instances of XLeMs

Both the Control Centre and Scheduler will only allow a single instance of the application to be run on a PC.

Any attempt to run a second copy will bring the existing application to the front.

8.1.2 Multi-user XLeMs

XLeMs is not designed to be a multi-user network application, but is a single-user application. However there are some techniques that can be used to share information with others over a network.

The PC on which XLeMs is installed will need to be connected to a network (intranet or internet) if any of the following features are required :-

- Collection of data from SHM loggers via TCP/IP (Ethernet)
- Export of Excel Charts to an FTP Server by the Scheduler
- Emailing of Reports by the Scheduler
- Export of Reports to an FTP Server by the Scheduler
- Running an oBIX Server to allow other applications to access the database

If you want to share XLeMs Reports with others, then you can do one of the following :-

- Enable Sharing of the folder where you store Report files on the XLeMs PC
- Set the folder (directory) where you store Report files to be a shared folder on the network
- Export the Reports via FTP to a central Server

It is possible to run a second copy of the XLeMs Control Centre on a different PC and use it to manage the configuration and generate reports manually, although use in this way is not supported by SHM. To do this, you must perform the following steps :-

1. Install XLeMs on the main PC. Configure it and run the Scheduler so that it is collecting data.
2. Enable Sharing on the folder where the XLeMs database is stored (usually **C:\BDB\XLeMs** - see section 3.2).
3. On the second PC, map the above shared folder as a drive on this PC (eg. Z:).
4. Install XLeMs on the second PC, and run the Control Centre once.
5. Using the BDE Administrator on the second PC, (from Windows Control Panel) edit the alias alsXLeMsCfg and alsXLeMsRdg to change the PATH parameter to the corresponding shared directories on the main XLeMs PC.
6. Start XLeMs control centre on the second PC, and check that you can see the remote XLeMs database.

7. NEVER run the XLeMs Scheduler on the second PC. Delete the file XLeMsSch.exe to preventing it being run accidentally.

8.1.3 Installation Directory

Versions 1.4 and above install by default in :-

C:\SHM\XLeMs

Versions of XLeMs prior to 1.4 installed by default in :-

C:\Program Files\SHM\XLeMs

8.2 Control Centre

8.2.1 Database Checks

On startup, XLeMs checks certain settings for the local database, and will take corrective action if there is a problem.

These checks are :-

1. The directory where the local Configuration Database is stored. If it doesn't exist, then the directory is created.
2. The Paradox database block size. If it isn't 16384, then the correct block size is set.
3. The BDE Configuration Database alias. If this doesn't exist, then a new alias is created.
4. The tables of the Configuration Database. If any don't exist, then a new empty table is created.
5. The directory where the local Readings Database is stored. If it doesn't exist, then the directory is created.
6. The BDE Readings Database alias. If this doesn't exist, then a new alias is created.
7. The Readings Database table. If it doesn't exist, then a new empty table is created.

8.2.2 Diagnostic Logs

The Diagnostic Log settings cannot be changed by the user

Log file directory [XLeMs.exe Path]\Logs

Log file names XLeMs-nn.log where nn is the day of the month (1..31)

These files store information shown on the Diagnostic Window (with date/time). The previous month's logs are always available.

8.2.3 Directories

The XLeMs Control Centre creates the following sub-directories off the directory where the executable file resides :-

Licence

This stores Licence files used by XLeMs. It cannot be overridden.

Logs

This stores Log files produced by XLeMs. It cannot be overridden.

Results

This stores Report files produced by XLeMs. It can be overridden – Reports can be stored anywhere.

Templates

This stores Template files used by XLeMs. It cannot be overridden.

Templates\Quick

This stores Template files used by XLeMs for Quick Reports (see section [6.3.3]). It cannot be overridden.

8.2.4 Configuration Database

This database stores the system configuration.

The settings for the Configuration Database are fixed, and cannot be changed by the user.

Its BDE Alias is **alsXLeMsCfg**

Its storage location is **C:\BDB\XLeMs\Cfg**

Its Database Type is **Paradox**

It consists of 5 main tables :-

- | | |
|----------------|------------------|
| 1. Connections | tblConn |
| 2. Loggers | tblLogger |
| 3. Channels | tblChan |
| 4. Customers | tblCust |
| 5. Constants | tblConst |

8.2.5 Readings Database

This database stores the Historic Data.

The settings for the Readings Database are fixed, and cannot be changed by the user.

Its BDE Alias is **alsXLeMsRdg**

Its storage location is **C:\BDB\XLeMs\Rdg**

Its Database Type is **Paradox**

It consists of 1 table :-

1. Readings **tblRdgs**

Each record in the Readings Database stores :-

1. The Timestamp of the reading
2. The Identifier of the Channel to which it belongs
3. The value of the Reading
4. An "Exceptions" string.

The character codes used in the **Exceptions** field are described in section [0].

8.2.6 Data1 Worksheet

The Data1 (or Data1...9) worksheet in a Report will contain the following information.

8.2.6.1 Readings

The number of readings will depend on the Span. For each Reading, the following will be written :-

- Date only (time = 00:00)
- Time only (00:00 to 23:59)
- Combined Date & Time
- Reading

8.2.6.2 Channel Info

For each Channel in the Report, the following information is copied from the **Recipe** sheet :-

- Channel ID Internal reference ID
- Chan Ref
- Description
- Chan Header Used as the Header above the readings column
- Cust Ref Channel's owner
- Units
- Channel Start Date Date/time of first Data Item for this Channel.
This may be earlier than the main date range if an offset is in use.

- Offset Code Internal use only
- Chart Type Internal use only
- Contact Name Only if CustRef has been assigned
- Company
- Address 1
- Address 2
- Town/City
- Postcode
- Phone
- FAX
- Email
- Last Invoice You can use this as a unique Invoice Number

8.3 Scheduler

8.3.1 Database Checks

On startup, XLeMs checks certain settings for the local database, and will take corrective action if there is a problem.

These checks are :-

1. The directory where the local Temporary Database is stored. If it doesn't exist, then the directory is created.
2. The Paradox database block size. If it isn't 16384, then the correct block size is set.
3. The BDE Temporary Database alias. If this doesn't exist, then a new alias is created.
4. The Temporary Database table. If it doesn't exist, then a new empty table is created.
5. The directory where the local Readings Database is stored. If it doesn't exist, then the directory is created.
6. The BDE Readings Database alias. If this doesn't exist, then a new alias is created.
7. The Readings Database table. If it doesn't exist, then a new empty table is created.

8.3.2 Diagnostic Logs

The Scheduler produces an Event Log, which records Start and Stop events, Schedule Items that have been run, and Errors. All Events are prefixed by the date/time. Events are also shown in the Events Pane of the Scheduler.

The Event Log settings cannot be changed by the user

Log file directory [XLeMsSch.exe Path]\Logs

Log file name XLeMsEvents.log

The Diagnostic Log settings cannot be changed by the user

Log file directory [XLeMsSch.exe Path]\Logs

Log file names XLeMsSch-nn.log where nn is the day of the month (1..31)

These files store diagnostic information (with date/time). The previous month's logs are always available.

8.3.3 Directories

The XLeMs Scheduler creates the following sub-directories off the directory where the executable file resides :-

Export

This stores GIF files that are subsequently exported to an FTP Server. It cannot be overridden.

Logs

This stores Log files produced by XLeMs. It cannot be overridden.

Results

This stores Report files produced by the XLeMs Scheduler. It can be overridden – The Results directory is specified as part of a **Run Report** Action.

Temp XLeMs

This stores the Temporary Database used when collecting data. It cannot be overridden.

8.3.4 Temporary Database

The Temporary Database is used by the Scheduler when collecting data.

The settings for the Temporary Database are fixed, and cannot be changed by the user.

Its BDE Alias is **alsXLeMsTmp**

Its storage location is **[XLeMsSch.exe Path]/Tmp_XLeMs/**

Its Database Type is **DBase**

It consists of 1 table :-

1. Readings **TempRdgs**

9. Additional Utilities

The XLeMs installation CD places several utilities in the **Tools** sub-directory :-

`[InstallDir]\Tools\`

There are no menu shortcuts to these utilities. They are for advanced users only and are supplied "as is" without warranty. You are advised to back up your database before using any of these tools. To run these utilities, Explore to the above directory and double-click the executable file.

XLM Restore

This tool restores XLeMs from backup archives. Refer to section 5.3.2.

XLM Table

This tool allows you to save tables in Excel format and load new or changed data into a table from an Excel spreadsheet. This is useful if you have a lot of channels to add to a configuration, or if you need to modify stored historic data.

This command should be used with great care. You must ensure that the "ID" column in each table has a unique numeric value. Save a table first to find out its structure. You can then add additional entries in bulk.

Ensure you have a backup of your database before attempting to manipulate it with XLM_Table, in case you render the system inoperable.

XLMTfix.exe

This utility allows you to change the XLeMs timeout parameters without having to use the Registry Editor.

These timeouts are :-

- Login
- R0 first Reply
- Reply Bias

TUTIL32.exe

Borland Database Table Fixer.

If you get an error message when starting XLeMs that indicates the database is corrupt, this is usually the result of the PC being switched off (not being shut down properly) while a database operation was in progress.

This tool can often fix errors caused by this happening.