Amendments:

<table>
<thead>
<tr>
<th>Issue</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>September 2000</td>
</tr>
<tr>
<td>2</td>
<td>May 2002</td>
</tr>
<tr>
<td>3</td>
<td>February 2004</td>
</tr>
</tbody>
</table>

Disclaimer

Under no circumstances will iQuest (NZ) Ltd be liable or responsible for any consequential damage or loss that may arise from the use of this product.

All examples and diagrams shown in this manual and all supplied software examples are intended as a guide to understanding this product, not to guarantee operation. iQuest (NZ) Ltd accept no responsibility for use of this product based on these examples.

Owing to the wide variety of possible applications of this product, you must satisfy yourself as to its suitability to your specific application.

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1 INSTALLATION and OVERVIEW

1.1 Introduction

Thank you for purchasing iLink. iLink is a utility program used for communicating with the range of System DO® products manufactured by iQuest (NZ) Ltd. This program is used for:

- Configuring the device
- Setting the device’s address
- Loading firmware
- Loading application programs
- Writing/editing application programs
- Downloading logged data
- Viewing logged data
- Hardware and software diagnostics

The range of options available to the User will vary from device to device.

1.1.1 Supported System DO® Products

System DO® products supported include:

- DS-CPU3 Controller
- DS-4483 Datalogger
- DS-12840i Remote Telemetry Unit
- IRIS 300 GPRS Equipped Datalogger

1.1.2 Unsupported System DO® Products

The following System DO® products not supported by iLink are:

- DS-CPU2 DO Station
- DS-IRM Intelligent Radio Modem
- DS-CP/I Communications Protocol Interface
- DS-8840i Remote Telemetry Unit
- DS-RTU Remote Telemetry Unit
- DS-PS1 Pico Station

For these legacy or specialist products, use the DOS support tool, Manage.
1.2 Installing the iLink Application

The iLink Application is provided as a self-installing program, which is loaded, from the CD-ROM or website. This application will run on Windows 95/98/NT/Me/2000/XP. You will need at least 5Mb of free disk space to load the programs, profiles and templates. The iLink program requires a minimum screen resolution of 640x480 pixels.

To load this application, run Setup.exe from the CD-ROM. The installation wizard will guide and prompt you for any information required during the installation process.

1.2.1 iLink File Structure

The file structure for this application and the User Profiles that are generated are as follow:

```
<drive>:\iLink
  
  Bitmaps
  Data
  Firmware
  Profiles
  Programs
  Scripts
  Templates
  Win95Fix
```

The main executable file is iLink.exe
1.3 Using the Manual

This manual is provided to give you an overview of the various features of iLink and enable you to start using the software to communicate with and program selected devices including dataloggers and also to configure dataloggers, unload data, plot data, export data.

Screen shots are used extensively throughout the manual to provide visual confirmation of the processes explained and full examples are provided for some of the more involved features.

Within the manual, certain text styles are used to assist the reader:

1.3.1 Menu Items

[Menu][Submenu][Submenu]

Indicates a menu item. The main menu is inside the first bracket, followed by subsequent submenus.

1.3.2 Command Buttons

[Command Button]

Indicates a command button on a dialog (or a toolbar icon) that needs to be clicked to carry out an action.

The command buttons on this example dialog are:

[Browse]
[Get Ptrs]
[Unload]
[Auto-Split File Setup]
1.3.3 Dialog Options

Dialog Option

Indicates an option that can be set within a dialog window. Options in the above dialog window include:

Primary Data File Name, SOD Ptr, EOD Ptr, Unload File Mode

1.3.4 Option Lists

{Analogue input, Pulse input, Counter, SDI-12, Sync serial}

Indicates available settings or values for a specified option within a dialog window.

1.3.5 Notes

The information within this box is important to the relevant procedure

Indicates a note or explanation of particular relevance or importance.

1.4 Registration

When iLink is run for the first time, you will be prompted to enter your registration details and register the software. It is possible to bypass this window by clicking on [Cancel] and iLink will launch in an Unregistered Mode. However, iLink will only run a maximum of three times in Unregistered Mode.

If you choose to bypass the initial Registration Window, you can register iLink at any time by selecting [Help][Register iLink] from the menu.
Enter your registered name (this can be any name of 5 or more characters) and the registration code provided in the appropriate boxes and click on [Register Now].

If registration is unsuccessful, repeat the process taking special care to enter the registration code exactly as supplied. This code is not case-sensitive.

When registration is complete, a message box will appear confirming the registration and the [Help][Register] menu item will no longer be available.

If you do not know your registration number, please contact iQuest (NZ) Ltd for assistance:
Tel: +64 7 957-8160
Email: iQuest@iQuest.co.nz

1.5 Navigation

There are three main navigation bars.

- Menu Bar
- Tool Bar
- Status Bar

Drop-down menus are used for navigation. Once a menu has been selected, you can either scroll down to the required option or use the hot key. The underlined character in the menu name identifies the hot key.

The menu structure is:

```
New Profile
Open Profile
Save Profile
Save Profile As
Print Profile
Print Setup
Connect to Device
Work Offline
Exit Alt+F4

Databases etc
Keypad / LCD
Plot Data
Misc Options

Log Events to File
Show Hints

Integer
Floating Point
Base Level Memory
Status / Errors

Synchronize Device RTC
Unload Logged Data
Program Device
Advanced

SDI-12 Terminal
Flash Executive
Auto Unload Control

Communications
DS-4483 / CS-CPU3
Contel 20/20
Calibration / Personality

Contents
Register iLink
License
About iLink
iQuest Home Page
```
Options appearing as light grey text are not available with respect to the current displayed window. The tool bar provides single click access to commonly used menu options and displays only those icons that are applicable to the connected device.

The tool bar provides single click access to commonly used menu options and displays only those icons that are applicable to the connected device.

The status bar provides operational information relative to the established connection with a specific device.

A “device” in the context of this program is any System DO® product supported by iLink.

### 1.6 Communications

[Configuration][Communications]

The Communication Setup dialog sets up your computer ready for communicating with the connected device. Any changes made to the settings are automatically saved when the dialog is closed.

From the [Configuration] menu, select [Communications]

- **Port**
  
  This specifies the serial port on the computer that is used to communicate with the device.

  You can select from COM1 --- COM20. In addition, you can manually enter the name of a port that is outside this scope. E.g. COM25. Although unlikely, this may be necessary if the computer has several multi-port serial expansion cards installed.

- **Baud Rate**
  
  This is the speed at which the computer will communicate with the device. The baud rate ranges from 300 --- 38400 bps. The default setting is 9600 bps.
Retries
Defines the number of data packet retries before a communications failure (from the computer to the device) is logged. A communications circuit will exist but the actual transfer of data will have been unsuccessful. The default setting is 3.

Timeout:
Sets the timeout (in milliseconds) before a data packet retry is attempted. If using a low speed connection ensure sufficient time is allowed for the data packets to be transferred successfully. Default time (ms) = 2000 at 9600bps.

CTS Delay:
This inserts a delay to await the communications channel to come clear after transmission. Default time (ms) = 0 for direct RS232 connections. If the delay is zero, then CTS is ignored and transmission will occur immediately.

Leading Chars:
This parameter is used to set the lead-in delay time. The actual delay (in seconds) is:

(number of characters) / (baud rate/10)
So for example, 60 leading characters at 1200 baud will give a 0.5 second lead-in time (500ms). For a direct computer connection, set to 3.

Trailing Chars:
Sets the number of trailing characters to send after the actual data packet. For a direct computer connection, set to 1.

The selection of baud rate, retries, timeout and leading/trailing characters are more significant if communications is by a low speed communications link (e.g. radio), and may need to be adjusted depending on the integrity and speed of the communications. These settings should only be changed if communication problems are being experienced and a physical communications circuit can be proven to exist. The table below gives typical settings for various connection methods.

<table>
<thead>
<tr>
<th>Leading Characters</th>
<th>Trailing Characters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct PC-Device Connection or Modem connection across PSTN circuit</td>
<td>3</td>
</tr>
<tr>
<td>Radio or RS485 option where there may be a problem with buffered UARTs causing truncated packets where RTS goes false before all characters are transmitted with a modem connection</td>
<td>40</td>
</tr>
<tr>
<td>Connection using a 1200 baud radio channel</td>
<td>60</td>
</tr>
</tbody>
</table>

PC's Address: (Also referred to as iLink’s Address)
The default value is –5, which is a reserved address. Generally the PC Address will remain at this value.

If iLink is used to communicate with devices over a radio channel shared by HydroTel, make sure iLink’s address is NOT set to 0 (Zero), as this is HydroTel 2000’s normal base address.

Communication Mode
iLink supports 3 modes of communication to external devices. Select the mode you are using from the drop-down list.

**Telephone Modem Type:**
If you are using a phone connection (PSTN/Cellular selected for Communications Mode), you will need to select the type of modem you are using here.

**Phone Number:**
If you are using a phone connection (PSTN/Cellular selected for Communications Mode), you will need to specify the phone number here. The only allowable non-numeric character is a space, which provides a 1 second silent pause. Make sure any prefix digits (PABX access etc) are included.

**Device Address:**
The address must be numeric and can range from 1 – 32767. **DO NOT USE 0.** The default address is 1. Typically, this will only need to be changed if there is more than one device associated with the User’s network. If this is the case, each device will have a unique address. If the device address is unknown, use –3, which is a universal address. This sends out a global command to identify the address of the connected device. The actual address of the device will be retrieved and the device profile updated.

This function is *not* supported by the DS-CPU3, where the internal address is set by DIP switches.

### 1.7 Profiles

When running iLink, the first window displayed is the Device Profile window.

Throughout this manual, ‘Device Profiles’ will simply be referred to as ‘Profiles’.

The profile currently loaded is displayed in the status bar (in the example above it is 4483.prf). iLink automatically loads the last profile used. If no profiles have been saved, iLink uses default settings.

A ‘Profile’ is a record of all device and communication settings relative to the last communication with a specific device. Usually, the profile name will reflect the location and/or function of the device. The type of device could also be used as the profile name (as in the example above). Other than the Default Profile, all Profile names are defined by the User.
The Profile is automatically updated by iLink as the User communicates with the device and defines the User parameters. Information held by the Profile includes:

- Comment text
- Editor file name
- Build file name
- Program file name
- Upload data file name
- Kernel file name
- Executive file name
- Port configuration block
- Station information block
- Examine database start address
- Plot colour definitions
- Unload save mode
- Array template
- Script unload configurations
- Auto synchronisation of device
- Profile checksum

### 1.8 Templates

As detailed in the previous section, the device configuration and communication settings are stored in a profile, which could be used for a number of similar devices, or could be unique to a particular device. Similarly, the I/O configuration of a device (i.e. the sensors and control) is saved as a Template. The same template could be used for multiple devices, if they are performing the same function, or individual devices could use individual templates. This is left for the user to determine, according to the variety and number of devices that will be used.

When connecting to a device, it is recommended that the current configuration be retrieved using the [Refresh] button on the configuration window as the I/O configuration may have been changed by other Users. This will ensure that the profile and template that iLink has attached to a device matches the actual internal configuration of the device itself.

### 1.9 Array ID

Array ID's are defined when configuring a DS-4483 datalogger. These identification codes are assigned by the User and are unique to a specific data field such as Stage Level. In most instances, the Array ID is unique across all types of datalogger being used. As an example, Regional Councils typically use an Array ID of 100 for stage level data. This ID is used as a means of unloading data from dataloggers and having this data processed by other third party software applications. The common link in identifying and processing the data is the Array ID.

The Array ID is also used within the datalogger to manage the storage of the logged data. The Array ID is defined in the DS-4483 Configuration window and can be set between 1-999.

When plotting data using the iLink plotting features, the Array ID is used when selecting and processing the data string to be plotted.
2 DEVICE CONNECTION

iLink uses the settings in the currently loaded profile when a connection is attempted to an external device.

2.1 Getting Connected

[File] [Connect to Device]

Having loaded and/or set up the correct profile you can now connect to the device using the toolbar [Connect] icon or menu option.

While connection is taking place, you will see the TX and Rx status indicators flashing green on the Toolbar to indicate that communication is taking place between the PC and the device. The 1/3 in the screenshot here indicates that iLink is currently on attempt number 1 out of a maximum of 3 retries.

Once the connection has been established, you will see a graphic (if available) for the connected device, together with the device information. This window is always displayed whilst iLink is connected to the device, although at times it may be hidden by other configuration dialogs.

A comment field is provided for the device and this can be edited here if desired. The comment field is saved with the profile.
3 ENGINEERING RESOURCES

3.1 Keypad and LCD Emulation

This option applies only when connected to a DS-4483 Datalogger. In emulating the keypad and display, iLink is reading the virtual keypad and display information from the database locations in the device.

The emulated keypad and display operate in the same manner as the keypad and display on the datalogger. The buttons can be clicked with the mouse to emulate the device keypad. They do not respond to keyboard input.

3.2 View Device Databases

Viewing the Device’s Databases is an engineering tool and should be used with caution.

Making changes to the database locations could seriously impact on the integrity and/or functionality of the program loaded in the device.

The database locations d0-d99 are reserved for specific functions. These are summarised in the appropriate device manual’s sections – Reserved Database Locations.

The use of other locations is specific to the device and application. Refer to the application program for details of these.

There are two databases available for inspection as well as direct viewing of base level memory, and an additional summary of the device status and error flags. Each of these is described separately.
3.2.1 Integer Database

The database structure is similar to that of a spreadsheet with the addresses listed in units of 10.

Start Location
To set the starting location, enter the database location base unit and press <Enter>. For example, if you want to view location d115, enter the base unit of 110. Location d345 would have a base location of 340. Alternatively, use the scroll bar to pan up and down the database. Click the [Refresh] button after entering or panning to a new location to ensure the displayed data is current.

Auto Update
If this option is selected, the database locations are automatically updated (typically every 2 seconds for a direct RS232 connection at 9600 bps).

Display Mode
This option selects the format of the displayed information in the database. Formats supported are Decimal, Hexadecimal and ASCII. The ASCII mode will display the appropriate character if the character value is between the value of 32 and 127, otherwise a "." is displayed.

The integer locations are 16-bit and therefore each location displays two ASCII characters.

Location Editor
This allows the User to edit individual database locations.

Location: defines the database address to be changed (ensure you press <Enter> after entering a new address).

Value: the new value for the location (again ensure you press <Enter> after entering a new value).

Click on the [Write Value] button to enter the new value into the specified location.

When updating the location, this refers to the database location in the device.

When a database location position is selected, the "Location" and "Value" displayed data changes accordingly. Editing database values should be done with caution since incorrect use of this feature could cause device malfunction and/or data loss.
Common Database Locations

Reserved Database locations that are common to all devices and are often viewed include:

- **d50** Device Address
- **d61** Hour: Set to the current hour of the day in 24 hour format (0-23).
- **d62** Minute: Current minute (0-59).
- **d63** Second (0-59): Current second (0-59).
- **d64** Day of Week (0-6): Set to the current day of the week (Sun=0, Sat=6)
- **d65** Day of Month (1-31): Current day in the month (1-31).
- **d66** Month (1-12): Current month (1-12).
- **d67** Year: Current year (1950-2049).

A full summary of all reserved database locations can be found in the Reference Section of the User’s Guide for the specific device.

Adjusting the Viewing Frame

Although not recommended, the columns can be adjusted in the manner used in most spreadsheet applications. Any changes are lost when the window is closed.

Database Comms Error

If communication is lost with the device whilst the database locations are being automatically updated a Comms Error message will be displayed. The most likely cause of this will be a loss in the communications link itself.

If a direct serial link with a PC or a half-duplex radio link is being used and the cable became disconnected, then the link will automatically be re-established once the cable is reconnected.

If a dial-up modem type link (such as a PSTN or cellular) is being used, the communications link will need to be manually re-established before the database can be updated.

The use of an error message to indicate that data may not be up-to-date is deemed more useful than blanking out the data display entirely.
3.2.2 Floating Point Database

This view can be used to display the values stored in the floating-point database of the connected device. When the window is first opened, the addresses and corresponding values will be empty. To retrieve the current database values from the device, click on [Refresh]. This will instruct iLink to request the database from the device and update the display. If Auto Update is checked, iLink will automatically refresh the display every few seconds.

In the example above, there is only one value set, namely 5.0 at address f1.

The viewer is a read-only function used for debugging and fault-diagnosis and it is not possible to alter any of the values listed.

3.2.3 Base Level Memory

The viewer is a read-only function used for debugging and fault-diagnosis and it is not possible to alter any of the values listed.
The Base Level Memory window provides a window into the low-level memory areas of the device. It is a view only facility and is used for advanced debugging. The display shows the memory contents in both hexadecimal and ASCII. The ASCII section makes the identification of text strings easy. The Start Address entry box can be used to set the starting position for the displayed data, or the scroll bar can be used. Addresses must be entered in Hexadecimal. If Auto Update is checked, iLink will automatically refresh the display every few seconds.

Use of this feature assumes the User is conversant with the internal memory mapping of the Device being viewed and the relevance of the data displayed.

3.2.4 Status / Errors
[View][Databases etc][Status / Errors]

This view can be used to display information about the status of the attached device, and any errors that have occurred since the device errors were last reset. When the window is first opened, the Status, Standard Errors and Extended Errors panes will all be empty. To retrieve the current status of the device, click on [Refresh]. This will instruct iLink to request the status from the device and update the display. If Auto Update is checked, iLink will automatically refresh the display every few seconds.
A red rectangle behind an entry in the status pane indicates that the respective function is active.

A red rectangle behind an entry either error pane indicates that the respective error has occurred since the error flags were last reset.

In the example above, the status pane indicates that a program is loaded, the program is running and the database is locked. The LCD is *not* disabled, as this flag is not highlighted in the pane. No errors have been flagged since the device was last reset.

**Clearing the Error Flags**

[Clear]

Clicking this button will clear all the error flags. This is achieved by writing zeroes into addresses d79 and d80. The same result can be achieved by writing these values directly into memory using the Integer Database view.

Always [Refresh] the display after clearing the error flags. Any persistent errors that are still present may well be re-flagged when the display is refreshed, as this facility does not do anything with the errors themselves – it merely resets the associated flags.
3.3 Device Real Time Clock Synchronisation

[Tools][Synchronise Device RTC]

Use this feature to synchronize the real time clock in the connected device to the PC clock. Select [Tools][Synchronise Device RTC] to begin the process.

Ensure that the time and date on the PC are correct (and take into account any daylight saving offsets) before synchronising the device.

PC Time/Date
The current time and date of the PC. The format is hh:mm:ss dd/mm/yy

Device Time/Date
The time and date of the device. This will display ‘Update Paused’ if ‘Read Device Clock’ is not enabled. See below.

Read Device Clock
Tick this box if the device Date/Time is to be read from the device continuously and displayed for the duration of the connection.

Offset
Used to set a time offset between that of the PC and the location of the device. This may also be used if the PC time is set for daylight saving. The device must be set for standard time so as to match with the standard time setting of the monitoring station. The offset range is –12 to +12 hours.

[Sync]
Click this button to synchronise the Time/Date of the device to that of the PC, inclusive of the time offset.

After carrying out the synchronization, the PC Date/Time and the Device Date/Time should correspond (allowing for any offset) to an accuracy of ±1 second for a direct connection. The difference could be up to +/-3 seconds if communication is over a slow link such as radio.
3.4 SDI-12 Terminal Utility

[Tools] [Advanced] [SDI-12 Terminal]

Use of this utility assumes the user is familiar with SDI-12 instruments and the command set required for communication with the SDI-12 instrument.

This menu option is only available when iLink is connected to a device that has an attached SDI-12 sensor. In the screenshots that follow, iLink is connected to a DS-4483 datalogger that, in turn, has a Handar Incremental Shaft Encoder attached. The utility is provided as a means of communicating directly with the SDI-12 sensor, using the logging device as a transparent interface. Whilst in this mode, it is possible to send commands directly to the sensor and view the corresponding response(s). This allows for configuration and setup of the sensor from within iLink.

Click on [Tools] [Advanced] [SDI-12 Terminal] to launch the terminal window.

Within the terminal window, type the required command and press the <Enter> key to send the command to the device. In the example below, three commands have been issued (the Handar sensor is using SDI-12 address 0):

0I! Requesting the sensor to identify itself
0M! Instructing the sensor to take a measurement
0D0! Instructing the sensor to display the last measurement.
4 MANAGING PROFILES

4.1 Using the Wizard to Create a New Profile

[File][New Profile]

The New Profile Wizard will guide you through setting up a New Profile. Alternatively you can set up the communications ([Configuration][Communications]) and save this as a profile. Click [Next] to begin using the profile wizard.

Select the device you intend to connect to using this profile. If you are not sure of the device type, select Unknown.
Enter the communication address of the device to which you intend to connect. If you do not know the address of the device, use –3 (except for a DS-CPU3). This is a universal address and the device will respond with its actual address on first communication. If the device is a DS-4483, you can obtain the address from the logger itself, by viewing the LCD display.

Now select the connection method to be used with this profile:

Select the PC COM port that will be used for the connection. If the COM port is not listed you can manually type in the port name e.g. COM25. This may be needed if communication is via a multi-port serial expansion card.
If you have selected a dial-up connection you will now be asked to complete two additional steps:

- Specifying the modem
- Specifying the telephone number

If you have selected a radio or direct connection, these steps will not apply.

Select the modem that you will be using for the dial-up connection.

There are a large number of modem types to choose from. Information about modem types available and their configuration strings is available in Appendix B. If specific information about a modem is required, use an editor such as NotePad or WordPad to view the Modems.ini file that is in the root directory of iLink.

Alternatively use the standard windows modem from the list.

Enter the telephone number of the device to which you are connecting. Include any prefix numbers required to access an outside line etc. A comma introduces a 1 second delay in the dialing string.

- Continue on following page for all connection types:
The comment field is optional, and can be used to assign a meaningful identifier to the profile, such as ‘DS-4483 over radio link’.

Finally, click on [Finish] to save the new profile.

Note that the selected folder is the default folder for profiles, /iLink/Profiles. Enter a filename and click on [Save]. The profile is now saved. Click on the [Connect] icon on the toolbar, or select [File][Connect To Device] to connect to the device.

If the connection is unsuccessful, run through the wizard again checking each setting.

If the connection still fails, check the communications settings directly by clicking the menu option [Configuration][Communications].
4.2 Loading a Profile

[File] [Open Profile]

iLink always starts up with the last profile used already loaded (if no profiles have been saved, the default profile will be loaded). If necessary, a different profile can be loaded. Selecting [File][Open Profile] will bring up the Open Profile dialog. The currently loaded profile (if any) is indicated by the red arrow. To view the details for any listed profile, click on the profile and then click the [Details] button. The first screen shot below shows the current profile is 4483. The second screen shot shows the details for this profile.

A 'double mouse click' on any profile will load that profile into iLink
5 MANAGING LOGGED DATA

5.1 Unloading Data

[Tools][Unload Logged Data]

The unloading and viewing of data from a device is dependent on the device and the functionality of that device. The primary function of the device will be as a datalogger. The structure of the data file(s) will need to conform to the file structure defined in the section titled Device Configuration.

**Primary Data File Name**
This displays the directory path and file name. Use the [Browse] button to display a listing of current data file names. You can then select a file to replace/append or enter the name of a new data file. Although there are two default file types available (.dat and .csv), the actual contents will be the same.

If in any doubt as to the integrity of existing files or the data being unloaded, it is recommended that you create a new file. The files can later be edited, if necessary, using cut and paste tools in a standard editor such as Microsoft NotePad, or imported to a spreadsheet for further editing and processing.
Fetching Device Pointers

Click [Get Ptrs] to search the device and retrieve the start and end data pointers for the data that is stored in the device.

Once the data pointers have been retrieved the data can be unloaded from the device to the computer.

You can edit the pointers by over-writing the SOD (Start of Data) and EOD (End of Data) pointers.

5.1.1 Unload Settings

Before unloading the data from the device, there are a number of unload options that the User can define. The setting of the SOD and EOD pointers has been described above. Other options that can be defined are:

Unload File Mode

Replace  Replaces the current data file with data retrieved from the device. All previous data saved in that file on the computer is lost.

Append  Appends the retrieved data to the saved data file already stored on the computer. If the file does not exist, a new one is created. If retrieving data by changing the SOD and EOD pointers, it is possible to get gaps in the data. It is also possible to have multiple copies of the same data appended to each other as the SOD and EOD pointer information is not included in the file.

If in doubt, save the data with a unique file name for each unload session.

SOD Pointer Storage

The SOD pointer represents the location within the logger’s memory where the last data unload ended, so is effectively where the logged data starts. The are two values that can be used for the SOD:

- The Device SOD
- The PC Profile SOD

After a successful unload of the logged data, the new SOD pointer can be stored in the device profile, or back in the logger itself. This enables iLink to start from the correct storage location on subsequent unloads. It is recommended that the SOD is stored in the PC Profile. Provision for storing the SOD in the device is provided for backward compatibility for some older systems.
Unload All
Selecting this option will cause all logged data to be unloaded from the logger.

With the DS-4483 datalogger that has 1MB of storage, this can take a considerable time even at 9600 bps.

Bit Time Stamping
This option will be used to ensure future compatibility with logging devices and is not available in the current version of iLink.

Auto-Synchronization
Selecting this option will cause the time on the logger to be automatically synchronized with the time on the PC after the data has been unloaded.

Unloaded Data Output Format
(Standard date and time, Julian day)

**Standard date and time**
This option will output each line of data in the following format:

\[ id,dd/mm/yyyy,hh:mm:ss,value(s) \]

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Format</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>id</td>
<td>array identification number</td>
<td></td>
<td>100</td>
</tr>
<tr>
<td>dd</td>
<td>day</td>
<td>2 digit day</td>
<td>23</td>
</tr>
<tr>
<td>mm</td>
<td>month</td>
<td>2 digit month</td>
<td>02</td>
</tr>
<tr>
<td>yyyy</td>
<td>year</td>
<td>4 digit year</td>
<td>2002</td>
</tr>
<tr>
<td>hh</td>
<td>hour</td>
<td>24 hour clock format</td>
<td>18</td>
</tr>
<tr>
<td>mm</td>
<td>minute</td>
<td>2 digit minute</td>
<td>45</td>
</tr>
<tr>
<td>ss</td>
<td>second</td>
<td>2 digit second</td>
<td>00</td>
</tr>
<tr>
<td>value(s)</td>
<td>comma separated value list</td>
<td>values in the specified array</td>
<td>1345, 1267, 1195</td>
</tr>
</tbody>
</table>

The values are saved as stored in the logger and are therefore integers. A factor may need to be applied to them to convert them back to real engineering units. Knowledge of the values and their associated sensor sources is required. A future issue of iLink will link the logger template to the unload routine to enable automatic conversion of data items. If the unload file is to be imported into HydroTel 2000™ this conversion is automatically done.

**Julian day**
This option will output each line of data in the following format:

\[ id,yyyy,jd,hh:mm,value(s) \]

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Format</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>id</td>
<td>array identification number</td>
<td></td>
<td>100</td>
</tr>
<tr>
<td>jd</td>
<td>Julian day</td>
<td>day of the year, from January 1st</td>
<td>54</td>
</tr>
<tr>
<td>yyyy</td>
<td>year</td>
<td>4 digit year</td>
<td>2002</td>
</tr>
<tr>
<td>hh</td>
<td>hour</td>
<td>24 hour clock format</td>
<td>18</td>
</tr>
<tr>
<td>mm</td>
<td>minute</td>
<td>2 digit minute</td>
<td>45</td>
</tr>
<tr>
<td>value(s)</td>
<td>comma separated value list</td>
<td>values in the specified array</td>
<td>1345, 1267, 1195</td>
</tr>
</tbody>
</table>
Auto-Split Data Arrays

This allows the data for up to five arrays to be automatically placed into separate files when the data is unloaded. For each array, the following information needs to be specified:

- **Array ID**: The array ID for which values are to be placed in the file.
- **Factor**: The factor to apply to the logged value to obtain real engineering units in the outputted data.
- **Data Filename**: The name of the file where the data is to be saved.

5.2 Plotting Device Data

This window is used to do a simple check plot of the logged data from a device, or to list the raw data samples.
File Selection

Click on [File] to select the data file to open.

Click the button to select the logged data file that you wish to load into iLink and display in the window.

View Mode

Use this option to toggle between the plotted data and the raw, underlying samples. Examples of each view are shown on the next page.

Array ID and Field

When in plot view, these settings are used to determine which logged samples are plotted. Enter the required Array ID and the field number containing the samples you wish to view from the array. The first sample for the specified array is in field number 1. The second is in field number 2 etc. For example, in the listing shown below, for Array ID 002, field 1 contains the value 100, field 2 contains the value 323, field 3 contains the value 25 etc.

5.2.1 Viewing Data in List Form

List view

The data is displayed in the data output format that was selected during the unload process described previously. All the unloaded data is displayed in this listing. You can use the scroll bars to scroll through the data or click on one of the data fields and use the arrow keys on the keyboard to scroll through the data.
5.2.2 Viewing Data in Plot Form

The plots use the data values as stored in the logger that are integers. Therefore, the Y-axis values may need to be interpreted with a factor in mind. E.g. Battery voltage may be plotted as 1200 to 1500 for 12.00V to 15.00V.

Plot view
The selected data file is plotted in the window, showing all sample values in the file. The vertical axis is scaled appropriately to enable the full range of data to be displayed. It is possible to format the plot as desired using the following settings:

- Plot Style
- Background colour
- Plot colour

It is also possible to zoom in and out of the plot using the buttons provided.

When changing the Array ID, Field or Plot Style from the Plot View, you may need to list the data then re-plot in order to "refresh" the plotted data.
6 CONFIGURING DATALOGGERS

6.1 Introduction

iLink provides support for full configuration of two logging devices. These are:

- DS-4483 Datalogger
- DS-CPU3 DO Station (when programmed to act as a datalogger)

Each of these devices has its own separate configuration dialog. The dialog is opened from the [Configuration] menu. Depending on the device connected, there will either be a submenu [DS-4483 Logger] or a sub-menu [DS-CPU3 as Logger]. These are explained in turn below.

6.2 DS-CPU3 Configuration

[Configuration][DS-CPU3 as Logger]

DS-CPU3 Sensor configurations are saved as Configuration Files with a .cfg extension.

These configuration files are in the same format as that used by HydroTel 2000. DS-CPU3 configuration files saved from iLink can also be uploaded to DS-CPU3 devices from within HydroTel 2000™.

If there is no valid configuration file currently loaded into iLink when the Configuration dialog is opened, you will see the following message:

This is a reminder that you will need to either load a valid configuration file (see below), or retrieve the current configuration from the device (see below).

When used as a logging device, the DS-CPU3 is running a User Program with seven possible hard-coded sensors. The configuration displays the settings for each of these connected sensors. Changes can be made and the datalogger updated with the new settings. The configuration settings can also be saved to file for future use.

When connecting to the device, it is recommended that you [Refresh] the sensor configuration to ensure that the configuration displayed on screen is synchronized correctly to that loaded in the device.

The [Refresh] command automatically loads the configuration from the device to the PC and displays the configuration parameters.
6.2.1 DS-CPU3 Configuration Settings

Sensor Configuration
This box lists the sensors that are loaded into the DS-CPU3.

Only the configurations for the ticked sensors are active in the logger. Only active sensors can have their configuration altered from this window.

The fields can be changed by selecting the desired sensor from the Sensor Configuration box, clicking on the appropriate field with the mouse and making the necessary changes. Remember that any changes will not become effective in the datalogger until you have clicked [Update] to send the updated configuration to the logger.

Logging Rate
This specifies the time interval in minutes. This is not the sampling rate. The sampled data is averaged over a period of time defined as the Logging Rate. This is a continuous rolling average.

Alarm Setpoints
It is possible to set up to six different alarm setpoints, depending on the sensor selected.

The DS-CPU3 logging program does not support configurable alarm reset setpoints. These are hard coded. The DS-4483 however does allow fully configurable trigger and reset setpoints.

Callback on Alarm
The DS-CPU3 can automatically call up an associated telemetry base (such as HydroTel 2000) if an alarm setpoint is triggered for any sensor. The base can then respond to the callback and unload any associated logged data.

Logging Enabled
This setting determines whether the selected sensor is to have its samples logged. In most cases this would be enabled.

Rain Event Mode
If selected, rainfall will be logged in event mode, that is, rainfall data will only be logged when rainfall occurs. If this option is not selected, rainfall data will be logged periodically regardless of whether any rainfall has occurred.
6.2.2 Examples of Sensor Configurations for DS-CPU3

Some examples of sensor configurations are:

**Water Level #1**

![Water Level #1 Sensor Configuration]

In the above examples, only Water Level #1 and Rainfall are active, indicated by the tick next to each in the Sensor Configuration box.

**Rainfall**

![Rainfall Sensor Configuration]

6.2.3 Transferring Sensor Configurations to the DS-CPU3

This is achieved from the DS-CU3 configuration dialog. Once any necessary changes have been made to the sensor configurations, click on [Update] to send the updated configuration to the DS-CPU3.

A message will be shown confirming the successful update.

6.2.4 Saving the Sensor Configuration

You can save the configuration shown in iLink by clicking on the [Save] button in the configuration dialog and specifying a file name, or by closing the dialog and answering ‘Yes’ to the prompt to save.
6.3 DS-4483 Configuration

This section deals with configuring Templates for the DS-4483. Templates are used to manage the sensor and I/O configurations loaded into the device. Connection settings such as baud rate, dial-up telephone number, modem configuration etc are contained in the profile for the device.

When creating and configuring new sensors for a device it is recommended that you begin by following the New Sensor Wizard. You can then check and modify any settings as appropriate by referring to the following configuration guide.

Selecting [Configuration] [DS-4483] from the menu opens the template configuration window. If the device is attached to an existing template, the following will be displayed:

Select [Yes] to load the template into iLink or select [No] to load a ‘blank’ template.

The template configuration dialog will then be displayed.
6.3.1 DS-4483 Sensor Configuration Settings

6.3.1.1 Retrieving the Datalogger Configuration

Before editing the template configuration, it is highly recommended that the current device configuration be retrieved from the datalogger. This will ensure that the configuration within the logger itself is synchronized with the configuration displayed in iLink. Even though you may be using an existing template linked to the device, someone else may have changed the logger configurations since the template was created.

This is achieved by clicking the [Retrieve] button. The datalogger’s current configuration will be retrieved and the template display updated. You can elect to retrieve the configurations for all 20 sensors within the logger, or just those that are currently marked as active. In order to be certain that your template matches the logger configuration exactly, you should always retrieve all the sensors. However, this can be time consuming over a slow connection, e.g. a radio link, and the option of retrieving only the active sensors may be beneficial in these circumstances. It is important to remember that other sensor configurations may be present in the logger and this option should be used with caution.

6.3.1.2 Transferring Configuration Settings to the DS-4483

Any changes made to the template in iLink will not be transferred to the DS-4483 until the [Update] button is clicked. This can be done at any time.

You will be asked to confirm the update to the sensor configuration:

The next dialog is asking whether you wish to upload all 20 sensor configurations or just those which are marked as active in the template.

If only the active sensors are updated, configuration settings for the other sensors will remain unchanged within the logger. This means that other sensors may still be active within the logger. If you wish to activate only those sensors that are active in the template, you should update all sensors. This is the recommended option. However, updating all 20 sensors over a slow radio connection can be time-consuming so the extra flexibility is provided, but should be used with caution.

Confirmation of the sensor configuration update will be provided.
You will then be asked to confirm the update of the control information:

![Confirm dialog box]

The control information relates to the lower pane in the template configuration dialog, namely the Control, Radio, Callback, Lookup and Misc settings. These settings apply to the device, rather than the individual sensors. They are set for the device, not individually for each sensor.

If you wish to update the control information, click [Yes], otherwise click [No]. Confirmation of the control update will be provided.

![Information dialog box]

At this stage it is recommended that you save the template to ensure consistency between the template file and the logger configuration.

6.3.1.3 Loading a Template into iLink

To open a different template file, click the [Open] button. You will be presented with a dialog box requesting the file name of the template.

Browse to the required file and click [Open].

The configuration settings displayed will be updated to reflect the new template. Remember, however, that the DS-4483 will not reflect these settings until the [Update] process has been carried out.

6.3.1.4 Saving a Template to file

To save the current template configuration displayed in iLink, click the [Save] button. A dialog box will appear requesting a file name under which to store the template. All template files are automatically saved with a .tpl file extension.

Browse to the required folder (the default folder for templates is /iLink/Templates) and enter a file name. Click on [Save] to save the template.

6.3.1.5 Printing Template Information

It is often useful to print out a hard copy of a template for use as a reference. To obtain a print out of the currently loaded template, click on the [Print] button and follow the instructions.
6.3.1.6 Sensor Selection

The standard DS-4483 logger program has provision for up to 20 independent sensors. The Sensor Selection box lists all the sensors currently configured in the device. Those with a tick next to them are active in the logger. Those without a tick are not active. To toggle a sensor between active and inactive, simply click the check box next to the sensor. If you are configuring new sensors, it is recommended that you use the New Sensor Wizard.

Remember: Only the configurations for the ticked sensors are active in the logger. Only active sensors can have their configuration altered from this window.

The fields can be changed by selecting the desired sensor from the Sensor Configuration box, clicking on the appropriate field with the mouse and making the necessary changes. Remember that any changes will not become effective in the datalogger until you have clicked [Update] to send the updated configuration to the logger.

6.3.1.7 General Setup

Name
Enter a name here that will be used to identify the sensor, e.g. Water Level, Battery Voltage etc

Units
Select the unit from the list for the logged data, or enter a unit of your own.

Array ID
Enter an array ID for the sensor. Take care to ensure that each of the sensors configured has a different array ID. As a default, the new sensor wizard allocates the sensor number to the array ID field.

Display Format
Select a display format from the list, e.g. 00.00 equates to 2 figures before the decimal point and 2 after.

[Clear Sensor]
This option will clear all configuration information from the selected sensor location. Confirmation is required before the action is carried out, as the action cannot be undone.
6.3.1.8 I/O Setup

Input Source
{Analogue input, Pulse input, Counter, SDI-12, Sync serial, Battery volts, Internal Temp, Up/Dn Encoder, Derived}

Use this setting to specify the type of input that will be read in from the sensor. Select the appropriate option from the list provided.

Depending on the input source selected, other options may be become enabled or disabled. Each of these are detailed in turn below:

Analogue Input

Input Channel
{AIN1, AIN2, AIN3, AIN4, AIN5, AIN6, AIN7, AIN8}

Select the input channel to which the sensor will be connected. There are 8 available analogue input channels from which to choose.

Input Range
{0 – 1V, 0 - 2V, 0 - 2.5V, 0 - 5V, 4 – 20 mA, -2.5V to + 2.5V, CS107B, 0 – 100mV}

Select the appropriate input range from the list provided. Refer to the individual sensor documentation for help with this setting.

Excitation Channel
{None, V01, V02, V03}

Specify the excitation channel if required. There are three excitation channels from which to choose. If an excitation channel is required, the excitation level must also be set.

Excitation Level
{1V, 2V, 2.5V, 5V}

Set the required voltage level to be output on the excitation channel selected above.

Control Channel
{None, D01, D02, D03, D04}

This setting only applies if the selected sensor is powered by the logger, via one of the control ports D01 – D04. If the 'warm-up' time is zero the sensor is powered continuously, otherwise the sensor is turned on according to the warm-up time specified.

Pulse Input

Channel
{DI1, DI2, P1, P2}

Select the channel to which the sensor is connected.

Increment
{0.1, 0.2, 0.5, 1.0, 2.0, 5.0, 10.0}

Select the corresponding value to increment on each pulse.
Counter

Channel
(P1, P2)
Select the channel to which the sensor is connected.

SDI-12

Address
{0,1,2,3,4,5,6,7,8,9}
Select the address of the sensor on the SDI-12 bus.

Variable
{1,2,3,4,5}
Select the variable for the sensor.

Sync Serial
No other I/O settings are required for this type of input.

Battery Volts
No other I/O settings are required for this type of input.

Internal Temp
No other I/O settings are required for this type of input.

Up/Dn Encoder
No other I/O settings are required for this type of input.

Derived
Currently, only one type of derived input is supported. This is a lookup function. A lookup table can be loaded into the DS-4483 logger and used to generate a derived input. For example, a derived ‘sensor’ could be based on a stage level sensor and use the lookup table to output corresponding flow levels.

Sensor
{1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20}
Select the number of the sensor that is to provide the input for the lookup function.

Function
{Lookup}
Select ‘Lookup’ from the drop-down list.

6.3.1.9 Scaling Setup

Not all of the settings listed below apply to every type of input. For example the Minimum Raw, Maximum Raw, Minimum E.U and Maximum E.U apply only to Analogue Inputs. The applicability of each setting is indicated as appropriate.

Minimum Raw
 Applies to: Analogue Input
All logged values stored within the logger are stored as integers. This setting indicates the minimum raw value that can be stored for this particular analogue input. It is unlikely that this setting will need to be altered.

Sensor
{1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20}
Select the number of the sensor that is to provide the input for the lookup function.

Function
{Lookup}
Select ‘Lookup’ from the drop-down list.

6.3.1.9 Scaling Setup

Not all of the settings listed below apply to every type of input. For example the Minimum Raw, Maximum Raw, Minimum E.U and Maximum E.U apply only to Analogue Inputs. The applicability of each setting is indicated as appropriate.

Minimum Raw
 Applies to: Analogue Input
All logged values stored within the logger are stored as integers. This setting indicates the minimum raw value that can be stored for this particular analogue input. It is unlikely that this setting will need to be altered.
Maximum Raw
Applies to: Analogue Input
This setting indicates the maximum raw value that can be stored for this particular analogue input. It is unlikely that this setting will need to be altered.

Minimum E.U
Applies to: Analogue Input
Values output by the sensor are converted to actual Engineering Units (E.U) by the logger program. This setting specifies the minimum value in actual engineering units.

Maximum E.U
Applies to: Analogue Input
This setting specifies the maximum value in actual engineering units.

Logging Mult
Applies to: All Input Types
\{1, 10, 100, 1000, 0.1, 0.01, 0.001\}
The logging multiplier setting is used to convert the actual values (in Engineering Units) into integer values for storage in the logger database. Thus in the screenshot above, in order to convert the E.U values of 0 – 5 into the stored values of 0 – 4095 a multiplier of 1000 is required. Other ranges of E.U values may require different logging multipliers to bring them within the range 0 – 4095. Select the most appropriate logging multiplier from the list.

E.g.  E.U Range: 0 – 1  Logging multiplier: 1000
      E.U Range: 0 – 2  Logging multiplier: 1000
      E.U Range: 0 – 10  Logging multiplier: 100
      E.U Range: 1000 – 10000  Logging multiplier: 0.01

When working with unloaded logged data, the multiplier is used in reverse to return the logged values back to their correct Engineering Units.

Scale Factor
Applies to: Counter, SDI-12, Sync serial, Up/Dn Encoder, Derived
This is used to specify the scale factor for digital devices, e.g. SDI-12.

6.3.1.10 Timing/Misc Setup

Warm Up
This setting is only applicable if the sensor is to be powered by the logger (using a Control Output). It specifies the number of seconds to turn on the sensor before each reading is taken. If this value is zero, the sensor will be permanently powered up.

Sampling
Enter the sampling frequency here. This setting specifies how often the logger will take a reading from the sensor.

Logging
Enter the logging interval here. This setting specifies how often the DS-4483 will log a value for this sensor. See also Event Mode (Timed) and Event Mode (Instant) below.
Processing Mode
(Immediate, 1 Minute Avg, Full Period Avg, Wind Vector)
Select the processing that is required to generate the logged sample. The options are:

Immediate: the logged value is the instantaneous value as reported by the sensor at the time of logging.

1 Minute Average: the logged value is the average of readings taken (according to the Sampling Rate) over the 60 seconds immediately prior to the time of logging.

Full Period Average: the logged value is the average of all readings taken (according to the Sampling Rate) over the Logging Period.

Wind Vector: wind vectors require independent processing due to the nature of the data.

Disable Logging
There may be occasions when a sensor, although active in the logger, does not require its values to be logged. For example, the sensor is being used as an input for a control output, or the sensor is being used as the base sensor for a derived output. Enabling this option will prevent data from the sensor being logged.

Event Mode (Timed)
This setting applies only to rainfall sensors. If Event Mode (Timed) is selected, data will be logged at the specified Logging Period (see above) but only if rainfall has occurred during the logging period in question.

Event Mode (Instant)
This setting applies only to rainfall sensors. If Event Mode (Instant) is selected, the Logging Period will be ignored and data will only be logged as rainfall occurs.

Log Min/Max only
Enabling this setting will cause only the Minimum and Maximum readings over the specified Logging Period to be logged.

Append Min/Max
Enabling this setting will cause the Minimum and Maximum readings over the specified Logging Period to be appended to the normal logged data for the sensor.

Append Check Count
This setting will generally apply to rainfall sensors. Enabling the setting will cause a check count (total of all readings for the Logging Period) to be appended to the normal logged data.

6.3.1.11 Alarms Setup

Alarm 1 – Alarm 6 Enable
Each sensor active in the logger can have up to 6 alarms set. To enable an alarm, simply check the box next to the alarm required. Each alarm has a trigger point and a reset point.

Trigger
This is the value at which the alarm will be triggered and actioned. The value entered here should be in real engineering units.
Reset
This is the value at which the alarm will be reset.

Alarm Time
This setting applies only to rainfall alarms. It is used to specify the duration over which the total rainfall must exceed the alarm trigger points. For example, a trigger of 10 (mm) and an Alarm Time of 30 (minutes), indicates that the alarm would be triggered if the rainfall exceeded 10 mm over any 30 minute period. All rainfall alarms for a sensor are tied to the same Alarm Time.

Call Back
If the Call Back setting is enabled, the logger will automatically call back to the base station (such as HydroTel 2000) if any alarm for the sensor is triggered. The base station can then unload the logger and/or take other appropriate action, such as sending text message or pager notification to appropriate personnel.

6.3.1.12 Output Setup

Any active sensor can be used to provide a variable control output on one of the output channels of the logger. A typical example of this would be in reading the digital input from an SDI-12 sensor and outputting this to a PLC as a scaled analogue voltage, which could not directly ‘talk’ to the SDI-12 sensor.

Minimum Value
Specify the minimum value from the sensor that should be converted to a control output. Values below this will be treated as equal to the minimum.

Maximum Value
Specify the maximum value from the sensor that should be converted to a control output. Values above this will be treated as equal to the maximum.

Channel
{None, V01, V02, V03}
Select the logger output channel where the control voltage should be applied.

Range
{0 – 1V, 0 – 2V, 0 – 2.5V, 0 – 5V}
Select the range of voltage to be applied to the output channel. The sensor values will be scaled to this range according to the Minimum and Maximum Values set above.

Value to Use
{Immediate, Last logged Value}
This setting indicates how the output voltages are determined.

Immediate: Each sensor reading results in a corresponding voltage change at the output channel.

Last Logged Value: The output voltage remains steady at a level based on the last logged value. The voltage level is changed each time a new value is logged.
6.3.1.13 Comment Setup

The comment field is set at a device level and therefore applies to all sensors. It is provided as a means of describing the station usage, physical sensor details, sensor configurations, site layout etc.

6.3.2 Telemetry Communications Control Configuration

The device configuration panel is used to set up radio communications and telemetry options for the connected DS-4483. These settings are optionally sent to the logger each time the sensor configuration is updated by clicking [Send]. After the sensor update is complete, the option is available to update the control configuration also.

6.3.2.1 Control Cfg

The specified control configuration applies only when the communications device, for example a radio or cellphone, is controlled from the datalogger via the built-in relay.

**Relay Mode**

*Continuous, Timed*

This specifies whether the connected device is continuously powered via the relay or switched on and off according to the scheduled specified.

**Continuous:**

The relay on the DS-4483 is continually activated. The communications device (wired via the Normally Open contact) will be continuously enabled by the datalogger.

**Timed:**

The relay is switched based on the defined time parameters.

**Start at**

The time (based on the logger time) when the relay is first turned on for each calendar day.

**End at**

The last time (based on the logger time) at which the relay can be turned on for each calendar day.

**Interval**

The time interval between successive switching of the relay.
Relay On Time
The duration that the relay remains on when switched.

For example, if the first communication for each day is at 06:00h, then every 1 hour until 23:00h, and the relay is to be on for a period of 15 minutes (900 seconds), the entries would be:

Enable Sleep
If this option is enabled, the logger will return to its ‘Sleep’ mode when the keypad has not been used, or external communications have not taken place, for a period of 1 minute.

6.3.2.2 Radio Cfg

These settings only apply to radio communications using the internal FSK modem, and enable certain parameters to be set.

Baud Rate
\{1200, 600, 300\}
This setting specifies the rate at which data will be transferred across the radio link. The default setting of 1200 should not be changed unless necessitated by failed communications due to a poor signal etc.

Lead-In
\{1.5 secs, 2.0 secs, 2.5 secs, 3.0 secs\}
There is provision here to increase the lead-in time. This should only be necessary under normal circumstances if the transmission is passing through a repeater network, or the logger itself is acting as a gateway/repeater.
6.3.3.3 Callback Cfg

These settings, with the exception of ‘Enable daily callback’ and ‘Time for daily callback’, are also used by the logger for a callback following a triggered alarm (if set).

Callback via
(Internal Modem, RS232 Port)
Specify here whether the logger will use its internal modem to callback (via radio or PSTN/cellphone mode) or its RS232 port (via external modem or cellular device). This setting is also used for alarm-generated callbacks.

Enable daily callback
If enabled, the logger will automatically callback once per day at the time specified.

Time for daily callback
If ‘Enable daily callback’ is enabled, this setting tells the logger at what time to callback.

Base
Specify the base address here. Under normal circumstances this would be left at the HydroTel 2000 default of zero. This setting is also used for alarm-generated callbacks.

Base phone number
If callbacks are to be performed via a PSTN/cellphone link, the number to dial is specified here. This setting is also used for alarm-generated callbacks.

6.3.3.4 Lookup Table

The DS-4483 logger is able to store a single lookup table for performing derived sensor calculations. For example, it may be necessary or useful to have the flow rate derived from a stage level sensor within the logger and utilized as a separate value. The lookup must be in the correct format.

File Name
Enter the file name of the lookup table here.
Num Blocks

Specify the size of the lookup table here. This is necessary so that the Logger can allocate the correct amount of memory prior to the upload.

[Browse]

Click here to open a ‘File Open’ window from which you can browse to the file containing the required lookup table. By default, iLink lists files with a .tbl extension, and looks in the /iLink/Tables folder for them.

[Clear]

Click here to clear any loaded lookup table from the connected device. Confirmation is required as a precaution before the action is carried out.

[Send]

Click here to upload the table specified. Confirmation is required before the action is carried out. While the table is being uploaded, the status bar will indicate the progress as the blocks (segments) are loaded. If the specified table contains more blocks than that specified in the ‘Num Blocks’ setting, the extra blocks will not be uploaded.

6.3.3.5 Misc Cfg

Inter-Retry Time

This setting specifies the amount of time the device will wait before re-trying if it is unable to initiate a callback due to, for example, poor communications etc. The default is 15 seconds. However, it may be necessary to increase this duration if, for example, power consumption is an issue for the device and/or it is expected that communications failure may be frequent and/or increased time delays on the callback are not critical.

Reset Button Enable

It is normal to reset the overall rainfall totals directly from the keypad. It is also possible to set up the DS-4483 with an external reset button (wired to DI2) that can be housed, for example, on an outer casing. In such a configuration, the external reset button can be enabled or disabled here. The reset button will always wake-up the logger from its sleep mode. If this option is checked here, then holding the button down continuously for 3 seconds will reset the overall rainfall totals as well.
6.3.4 New Sensor Wizard

The New Sensor Wizard is the recommended method of adding new sensors to a device template. It will take the user through a number of simple steps and then create the sensor using the supplied information and any necessary defaults. The sensor configuration can then be reviewed and, if necessary, customised as appropriate. The stages of the wizard are outlined below.

Starting the New Sensor Wizard

Open the DS-4483 Configuration Window [Configuration][DS-4483 Logger]

1. Select an empty sensor location (or [Clear] an existing sensor location.). In the screenshot above, sensor location number 04 has been selected by clicking on the ‘04’ in the Sensor Selection window.

2. Click on [New Sensor Wizard]

The wizard will launch and you will be asked to confirm that you wish to begin the wizard.

3. Click [Next] to continue.

At any stage of the wizard you can click [Back] to review/change your settings or click [Cancel] to exit the wizard.
Sensor Type

1. Select the sensor you wish to create. In the example above, an Aquaflex moisture probe has been selected.
2. Click [Next] to continue.

Sensor Name

1. Enter a name for the sensor. A maximum of 15 characters is permitted.
2. Click [Next] to continue.

Measurement Units

- Select the engineering units to be used with the sensor. If the unit you desire is not found in the list, you can enter your own by typing it in the edit box.
- Click [Next] to continue.
Display Format

1. Select the desired display format from the list of options, or accept the default suggested.
2. Click [Next] to continue.

Input Channel Selection

1. Select the input channel to which the sensor is/will be connected. You will only be able to select from those channels that are appropriate to the device. In the example here, a choice of Analogue Input Channels is presented to match the Aquaflex moisture probe selected earlier.
2. Click [Next] to continue.

Logging Rate

1. Enter the logging rate you require for the sensor. This setting will determine how often a value is logged for the sensor in the DS-4483 database. It does not affect how often readings are taken from the sensor. This can be configured manually at a later stage if required.
2. Click [Next] to continue.
Array ID

1. Accept the default array ID (which equates to the sensor number being configured) or uncheck the box and enter your own array ID.
2. Click [Next] to continue.

Confirmation

1. If you are happy with the settings you have entered, click [Finish] to create the sensor. You can then review the settings and make any modifications necessary.
2. Alternatively, click [Back] to step back through the various steps and review your settings.
7 LOADING PROGRAMS

7.1 Loading An Application Program

[Tools][Program Device]

Application programs and/or configuration settings can be separately loaded into a device. Loading a new program or configuration setting automatically clears the device of the previous program.

The default directory for all programs is ..\iLink\Programs\<filename>.extn. Each family of programs has its own unique extension as listed below:

- DS-CPU3 <filename>.stn
- DS-12840i <filename>.rtx
- DS-4483 <filename>.lgr
- IRIS 300 <filename>.irs

Depending on the device connected, iLink will automatically list only those files that can be loaded to the device. The following example relates to loading a program to a DS-4483.

Select [Tools][Program Device] from the menu to go to the User Program window.

In the example above, iLink is reporting that a program is currently loaded and running in the device. Loading an alternative program will replace the existing program in the logger.

Using the [Browse] button invokes a listing of the files saved in the default directory. Alternatively the filename can be entered manually.
Note here that iLink has identified that only files with the extension .lgr are to be displayed, as these are the only program files that can be loaded into a DS-4483.

Once the correct program has been selected, the file name and directory path will be displayed in the Program File Name field. This field can be edited at any time up to the time of initiating the [Load] command.

Start the program upload to the logger by clicking on [Load]. During the loading process, the Progress Bar will report the progress of the file being loaded.

Once started, the upload process can be aborted at any time during the transfer by clicking the [Abort] button. However, this action will leave the logger with no program installed. In this event you must successful upload a valid program before the logger will function normally.

A message will be displayed when the program has been successfully loaded into the datalogger.

The control panel will report the Program Status as ‘IDLE’ and the [Start program] and [Clear Device] buttons will be enabled.
The device profile will also be updated when a new program is loaded into the logger.

The Control buttons are used to start/stop the loaded program and clear the device:

**Starting the Program**
After loading the program it must be started by clicking the [Start Program] button. The program will switch from an IDLE state, to the RUNNING state. The only options then available to the User are to [Stop Program] or [Clear Device].

**Stopping the Program**
Clicking this button will return the program back to an IDLE state.

**Clearing the Device**
This command clears the integer, floating point and string databases, the User / Application program and any logged data (if applicable) in the device. It does not affect communication port speeds or modes.

It is generally only used when an installation is first commissioned or the device is being reinstated to a completely "known" state. To clear the device, click on [Clear Device].

Since all logged data within the device will be lost, appropriate consideration should be given before carrying out this command. As an added precaution, a confirmation dialog will be displayed if you click the [Clear Device] button:

![Warning dialog]

**Note:** The [Clear Device] command completely strips out the device of all User loaded information and logged data but does not affect the communication settings.
7.2 Loading Kernel and/or Flash Executive Files

These files are loaded as part of the manufacturing process and are unlikely to need to be reloaded by the User. The facility to load replacement programs will enable firmware upgrades to be made without returning the device to iQuest.

The general process of loading these flash executive files is the same as loading an application program. Files to be loaded will be supplied by iQuest or may be available from the iQuest web site, www.iquest.co.nz.

7.2.1 Loading a Kernel Program

The “Kernel” file in a device can be treated like the BIOS on a PC. Kernel files should NEVER be loaded over any communications medium other than a clean RS232 link with the User PC next to the device. Although a loss of communications during a partial load will not render the device useless, it will prime it to fail later if the device is de-powered or has a watchdog reset.

For the reason above, it is most important that communications is not lost to the device during the process of loading the kernel file.

If the device loses power during the update process, it will need to be returned to iQuest for servicing.

When the [Browse] button is clicked, iLink searches for the firmware files in the default directory:

\iLink\firmware
Once the file is selected, click on the [Update] button to initiate the update process.

A confirmation dialog will be presented as a reminder that communications must not be lost during the update process.

Click on [OK] to confirm that you wish to begin the update.

During the update process, a progress indicator provides visual feedback of the status of the upload. Once the update is complete, a dialog will be shown confirming that the update was successful.

**7.2.2 Loading an Executive Program**

The “Executive” file in a device is analogous to the operating system in a PC. It is the Executive that is the main firmware component and can be uploaded via a radio communications link, although this may take a considerable time and is not recommended. No changes will occur within the device until the Executive file is fully loaded and verified.

From the [Tools][Program Device] menu, click on the [Browse] button in the ‘Executive Firmware Update’ panel.
The flash executive files are stored in the default firmware directory, `/iLink/firmware/`, and are identified by the filename extension `.fls`.

Select the file to upload to the datalogger.

Click the [Load] button in the ‘Executive Firmware Update’ panel to begin the upload. You will be prompted to confirm the upload before the file transfer begins.

During the update process, a progress indicator provides visual feedback of the status of the upload.

Once the update is complete, a dialog will be shown confirming that the update was successful.
The new file is stored in a buffer in the connected device and the Executive file is not updated until the [Start Flash Upgrade] button is clicked.

A final confirmation is required before the new flash executive is activated within the device.

Whilst the flash upgrade is in progress, the status light on the device will flash green and red.

When the flash upgrade is completed, the status light will resume its normal state of a steady flashing green.

Following an upgrade, disconnect from the device and reconnect. You will also note that the ROM version number changes, confirming that the process has completed successfully.
8 DEVICE CALIBRATION

8.1 Device Calibration

[Configuration] [Calibration/Personality]

This option is only available when iLink is connected to a device that supports Calibration Configuration, such as the DS-4483 logger. It can be used to modify some of the parameters needed by the device firmware, and to view internal manufacturing/hardware properties of the device, such as the device Serial Number, Date of Manufacture, Firmware Version etc.

The primary use of this configuration feature is to specify the operating mode of the Internal modem. The other settings are provided as diagnostic tools and it should not normally be necessary to alter these.

When the Calibration Configuration is selected, iLink attempts to communicate with the connected device and retrieve the calibration table. If successful, the following message will appear:

Clicking on [OK] will bring up the calibration dialog.

Manufacturing Details
These are configured at the time of manufacture and cannot be altered.

Internal Modem Mode
(Radio/Leased Line, PSTN/Cellphone)
Select the mode in which the internal modem should operate. This will naturally depend on the method of communication.
**Modem Busy Signal**

*Active when Low, Active when High*

For radio connections this should be set to match the ‘Busy Polarity’ of the connected radio.

**Rel TX Level**

The minimum permitted value is 0, the maximum is 15. If using the internal modem to connect to a radio, a setting of 7 is normal. If connected to a PSTN interface, a value of 12 should be used to comply with New Zealand Telecom’s Telepermit line levels.

---

The remaining settings are pre-set at time of manufacture and should not require alteration under normal circumstances.

**Battery Volts / Offset**

The last reading taken for internal battery voltage is displayed here. It is possible to enter an offset here, which is incorporated in the reading and logged values (if the internal battery voltage is set up as an active sensor).

**Temperature / Offset**

The last reading taken for internal device temperature is displayed here. It is possible to enter an offset here, which is incorporated in the reading and logged values (if the internal temperature is set up as an active sensor).

**RTC Calibration**

This setting should be left at zero. It is provided to offset any ‘drift’ in the device real-time clock that may be experienced over time.
APPENDIX A

System DO® Device RS232 Port Configurations

The 9 pin RS232 Port on the System DO® devices (DS-CPU3, DS-12840i, DS-4483 and DS-COM9) can be used for connection to a PC or a radio fitted with a RS232 data port. It is a DTE configured port. Its pinouts are shown below together with the standard null modem cable connections. The port may be configured for a standard range of baud rates and character framing types via the user program. The RS232 port device is a MAX-202 or MAX-222 type device and these meet the standard EIA-232D and V.28/V.24 interface specifications.

<table>
<thead>
<tr>
<th>DB9 Pin</th>
<th>Function</th>
<th>Pin Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin 1</td>
<td>Not used</td>
<td></td>
</tr>
<tr>
<td>Pin 2</td>
<td>Receive Data in (RXD)</td>
<td>Min ± 3V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Max ±30V</td>
</tr>
<tr>
<td>Pin 3</td>
<td>Transmit Data out (TXD)</td>
<td>Min ± 5V loaded with 3k to GND</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Typ ± 8V</td>
</tr>
<tr>
<td>Pin 4</td>
<td>Data Terminal Ready out (this is linked active permanently to +12V via 10k resistor)</td>
<td></td>
</tr>
<tr>
<td>Pin 5</td>
<td>Ground</td>
<td></td>
</tr>
<tr>
<td>Pin 6</td>
<td>Not used</td>
<td></td>
</tr>
<tr>
<td>Pin 7</td>
<td>Request to Send out (RTS)</td>
<td>Min ± 5V loaded with 3k to GND</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Typ ± 8V</td>
</tr>
<tr>
<td>Pin 8</td>
<td>Clear to Send in (CTS)</td>
<td>Min ± 3V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Max ±30V</td>
</tr>
<tr>
<td>Pin 9</td>
<td>Not used</td>
<td></td>
</tr>
</tbody>
</table>

The standard cable to connect an IBM PC compatible computer to these ports should be wired as shown. The data rate is typically 9600bits/sec.

<table>
<thead>
<tr>
<th>Device RS232 Port</th>
<th>Computer RS232 Port</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DB9 Type</td>
</tr>
<tr>
<td>Pin 2 (RXD)</td>
<td></td>
</tr>
<tr>
<td>Pin 3 (TXD)</td>
<td></td>
</tr>
<tr>
<td>Pin 5 (GND)</td>
<td></td>
</tr>
<tr>
<td>Pin 7 (RTS)</td>
<td></td>
</tr>
<tr>
<td>Pin 8 (CTS)</td>
<td></td>
</tr>
</tbody>
</table>

Note: The RTS/CTS lines are not required unless the port is used in a way that requires the handshaking lines externally e.g. when connected to a serial printer and the port is used in ASCII mode.
Sample Modem Configuration Settings

The following example, for the Zoltrix 14400 Fax/Modem, is taken from the ‘modems.ini’ file located in the root iLink folder.

```
[Zoltrix 14400 FAX/modem]
InitCmd=ATZ^M
DialCmd=ATDT
DialTerm=^M
DialCancel=^M
HangupCmd=DTR
ConfigCmd=AT&F^M|AT\J0\Q3\N3\V0&W^M
AnswerCmd=ATA^M
OkMsg=OK
ConnectMsg=CONNECT
BusyMsg=BUSY
VoiceMsg=VOICE
NoCarrierMsg=NO CARRIER
NoDialToneMsg=NO DIAL
RingMsg=RING
LockDTE=TRUE
DefaultBaud=19200
```

To view all currently supported modems with their configuration settings, open up the modems.ini file with a text-editor such as NotePad.

If you need to insert alternative modems, the entry must match the format shown above. You must also insert an entry in the [Index] section of the file, in the appropriate place.
APPENDIX C

DS-4483 Lookup Tables

The DS-4483 supports a single lookup table for use in calculating derived data from an attached sensor. This format is identical to that used by HydroTel 2000™.

The lookup table must be contained in a text file with a .tbl extension and only integer values are permitted. The format of the table is that of ‘paired couplets’. An excerpt of a sample table is shown below:

<table>
<thead>
<tr>
<th>1000</th>
<th>Recorded value from attached physical sensor</th>
</tr>
</thead>
<tbody>
<tr>
<td>21600</td>
<td>Value to be inserted for derived sensor</td>
</tr>
<tr>
<td>1010</td>
<td>Recorded value from attached physical sensor</td>
</tr>
<tr>
<td>22000</td>
<td>Value to be inserted for derived sensor</td>
</tr>
<tr>
<td>1020</td>
<td></td>
</tr>
<tr>
<td>22300</td>
<td></td>
</tr>
<tr>
<td>1030</td>
<td></td>
</tr>
<tr>
<td>22600</td>
<td></td>
</tr>
<tr>
<td>1040</td>
<td></td>
</tr>
<tr>
<td>22900</td>
<td></td>
</tr>
<tr>
<td>1050</td>
<td></td>
</tr>
<tr>
<td>23200</td>
<td></td>
</tr>
<tr>
<td>1060</td>
<td></td>
</tr>
<tr>
<td>23600</td>
<td></td>
</tr>
</tbody>
</table>

The DS-4483 deals with recorded values that fall between table entries by using simple linear interpolation. Thus for the table above, if a value of 1005 is recorded, the associated derived value will be calculated as:

\[
21600 + \frac{(22000 - 21600) \times (1005 - 1000)}{(1010 - 1000)} = 21800
\]

Table Size

The DS-4483 will support tables ranging from 2 couplets up to 512 couplets.
APPENDIX D

iLink Auto Unload Mode

In addition to its normal mode of operation, iLink can also run in an ‘Auto Unload Mode’. When set to run in this mode, iLink will automatically connect to a given profile and unload the associated device according to a specified schedule. Each unload is carried out according to the Unload Settings configured for the defined profile.

This can be useful for a ‘one-off’ logger that is not connected to a base station such as HydroTel 2000 but which needs to be unloaded on a regular basis. The procedure for starting iLink in Auto Unload Mode is described below:

1. Ensure that iLink is not already running.
2. Using a text editor, such as NotePad, open the ‘iLink.ini’ file in the root iLink folder. By default this will be: c:\program files\iquest (nz) ltd\iLink
3. Insert the following two lines at the end of the file (exactly as shown here):

   [User Specials]
   Script=1

4. Now launch iLink in the usual manner.

   In the status bar at the bottom of the iLink window you will see confirmation that iLink is now running in Auto Unload Mode.

   Select [Tools][Advanced] from the menu. The last entry in the list [Auto Unload Control] is now available. Select this option to configure the Auto Unload settings.
The Auto Unload Scripting Control will appear given you three options:

- Edit the unload script
- Reload the script
- Clear the unload log.

**Edit the Unload Script**

The Auto Unload Script is contained in a file named Unload.scp that is located in the root iLink directory. If the script file is not present, iLink will create one on entering the Unload Control window above.

Each line in the script represents a device to unload. The format for each device is:

```
<hh>:<mm>,<Device Type>,<Profile>
```

These are defined as follows:

- `<hh>:<mm>`
  This is the time of day (in 24 hour format) at which to unload the device. If the device is to be unloaded at multiple times during the day, then a separate entry is required for each unload.

- `<Device Type>`
  This is the device which is to be unloaded. Possible values are `{DS-4483, DS-CPU3}`.

- `<Profile>`
  This is the profile to be used for connecting to the device. The profile defines the connection and communication settings for the device in question.

It is possible to have numerous devices listed for Automatic Unload, each with its own connection profile. The number of unload entries in the script is limited only by the physical limitations of the communications system used. It is also possible to have the same device listed many times, for different unloads during the day. Unloads that coincide are queued and executed sequentially.

**Reload the Unload Script**

This button will re-load the script into the Scripting Control. It is important to do this after editing the script.
Clear the Unload Log

While iLink is running in Auto Unload Mode it generates a log file detailing information such as the time of each unload, the device unloaded etc. This file is stored in the root iLink folder and can be viewed in the Auto Unload Scripting Control window. If the log becomes unmanageably large, it can be cleared by clicking this button. Both the disk file and log window will be cleared.

Manually Running an Unload Schedule

It is possible to run any unload schedule directly by clicking on the checkbox next to its entry in the script pane. In the screenshot above, an unload schedule has been set up for a DS-4483 logger using a profile named 4483.prf. This unload has been activated manually by checking the box and the resulting log file can be seen in the log file pane. The Unload Settings for this profile enables the Auto-Sync After Unload and this can be seen in the log file (RTC synchronised in device).

Note also, that if you are viewing the Script Control window while an automatic unload occurs, you will see a check appear next to the appropriate entry for the duration of the unload.