UK Radio Astronomy Association

Starbase

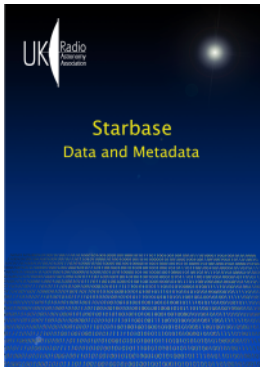
Release Log

Table of Contents

Introduction

This document gives the details of the changes in Starbase between the current and previous releases. If you are in a real hurry, just read the first three pages. Ideally, read in conjunction with the following documents, which are provided with the Starbase distribution in `install_root/doc`. Both documents are incomplete, but they are a good starting point to understanding the inner workings of the software.

User Guide



Data and Metadata

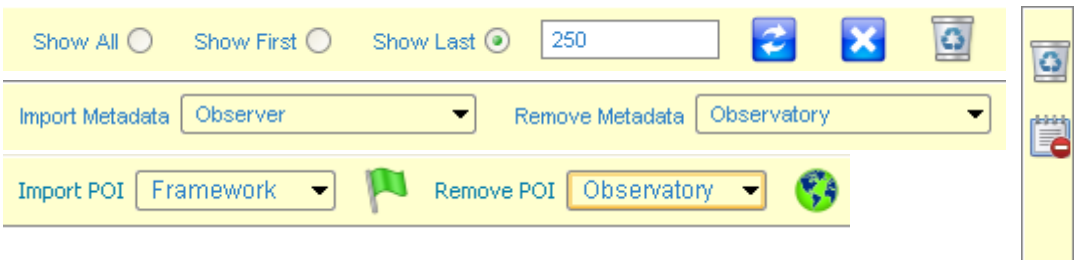
What's New

DataTypes, Metadata, POI, LOI

The internal implementation of DataTypes, Metadata, PointsOfInterest and LinesOfInterest have all been significantly changed. This has resulted in much 'stricter' use of metadata, and it should be much more difficult to have invalid combinations of DataTypes and Units. **PLEASE NOTE:** It is possible that some existing data files with metadata headers will now fail validation, and some minor editing may be required to correct this. We apologise for this inconvenience, but we hope the more accurate and robust data handling is some compensation.

Toolbars

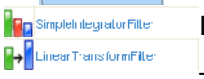
Several Toolbars have been improved, as shown below. For instance, it is now possible to remove a dataset to save memory, or to just remove the visible data report. You can select how many data items to display, to again save memory or to improve performance. The Command Log can also be truncated (at right).



Charts

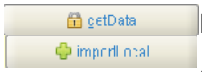
The operation of the charting facility has been improved, with the addition of a simple slider to allow selection of a range of data, the range being shown by cursors on the chart. The channel selection panel (shown at left) can now select between a logarithmic or linear display, autoranging, decimation, and application of gain factors to each channel. These selections do not affect the underlying raw data, which are preserved for later analysis.

There is now a DataProcessor command which can segment a dataset into lengths of Days, Hours, or even Minutes. This is particularly useful if a logger contains a week's data, which is easier to visualise as individual day records on the chart.



Data Filters

The data filters have been completely rewritten, to make addition of new filters much simpler: the LinearTransform function is now implemented as a filter. The filters are shown in the ObservatoryInstaller list of plugins, and later developments should allow deployment and installation of filters separately from the main program, as plugins in their own right.

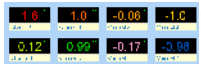


Distinction between Capture and Import

Part of the improvements in Metadata handling resulted in a clearer distinction between the action of *Capturing* data (for instance from a logger), and of *Importing* data, (for instance from a local file). The command buttons which result in captured or imported data are now shown with different icons to remind you of the source of the data and of the associated metadata.

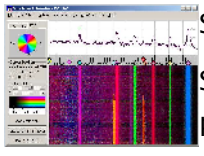
Sandbox Instrument

A new instrument called the 'Sandbox' has been added, as a general-purpose testbed. This instrument has all of the possible information tabs available (including RSS newsfeed), and can show data in a variety of ways.



Digital Panel Meter Tab

All logger instruments which can display numeric data now have a Digital Panel Meter tab, with one meter for each data channel. This is sometimes useful during setting up, when it is easier to see the output of each channel as a number rather than a point on a moving chart.



SpectrumLab Support

SpectrumLab CSV files may now be imported up to a maximum of 32 channels, provided that the correct metadata appear at the start of the file. Sample files are provided to show how this is done.

Known Issues

Some dates that are displayed on reports and charts will show Daylight Saving Time (DST) applied, rather than the required Universal Time (UT). This has proved to be a difficult fault to find, and we apologise for leaving this fault in this release.

Imported Observatory metadata will show default Colours which are intended to be used on the charts. These metadata are not yet carried through to the charting facility, and so please note that if you edit them, the changes will not be visible on the charts.

What's Coming Next

The development roadmap of Starbase tends to be driven by user requirements and the whims of the developers (we are supposed to be doing this for fun!), however some of the main goals are (still) on the list:

Chart Overlays – the facility to overlay multiple datasets to allow comparisons
Ethernet Logger – a fast controller with SD card data storage and NTP clock
Macros – a scripting language for task automation
Repository – a central database to store and examine observations.

Star News

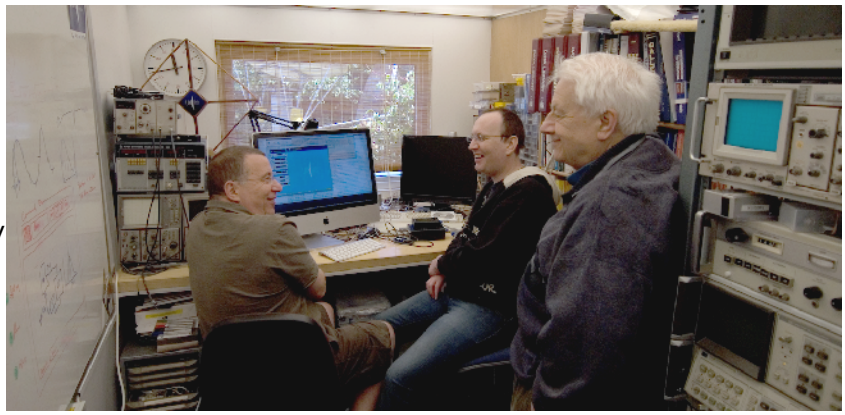
We thought you might like to see some of those responsible for the development and testing of Starbase. At a recent meeting, below, from the left: *Alan Melia*, with experience in reliability, testing and amateur radio, he is our software Delivery Manager; he regularly tests the operation of Starbase with its many peripheral devices. *Laurence Newell* is the project Java programmer with a mission to encode the World as a concise XML document, and to give it a consistent user interface. *Chris Green* is developing 'Starbase Futures' with the C coding of an Ethernet-based data logger and controller; he is experienced in embedded systems development, and Linux.

Alan Melia *Laurence Newell* *Chris Green* *Martin Richmond-Hardy* *Mark Horn*

Martin Richmond-Hardy is our Apple Mac specialist, with interests in astronomy and amateur radio. *Mark Horn* is our systems expert, with skills in many operating systems, databases, building and bug reporting tools. *David Farn* (not present) was responsible for the development of the Staribus communications protocol, and its implementation on the UKRAA Futurlec Controller.

Mark, Alan, Laurence and Martin during a rigorous Design Review. Notice the Adnams sponsorship, and the Sun is shining, so that narrows it down a bit.

Martin, Mark and Alan discussing Starbase on an Apple Mac, in the lab. Starbase is now fully supported on 32bit and 64bit Microsoft Windows, Linux and Apple Mac (except for an anomaly in 64bit serial communications, under investigation).



Starbase is now Open Source. You are free to use Starbase in any way that you like. Please note that there is NO WARRANTY of any kind that it is fit for ANY purpose whatsoever, and UKRAA and Laurence Newell cannot be held responsible for ANY errors, omissions or damage caused. Please see the section on the Starbase Licence Terms and Conditions for full details.

If you have any stories or photographs of Starbase being used for observation or control, please let us know! Any feedback or fault reports should be sent to starbase@ukraa.com. I would particularly like to hear how you are using the software, and if you have any suggestions for additional features. Files of observational data which can be used for testing are also very welcome.

Laurence Newell
2012-06-10

Release 2.2.1

The principal changes have been to the Observatory plugin, but the Framework itself has also had some attention this time round. We are also improving the quality of the development, test and build cycle, by using some modern Continuous Integration methods.

Framework and Infrastructure

The Framework About 'box' now has an *Acknowledgements* tab detailing the many third-party libraries used in the software. To the best of my knowledge and belief, their licence conditions allow use in this software development. Please visits these websites for full details about these libraries.

There is a new user login named **builder**, with a user Role of **Builder**, for those users who wish to rebuild everything from scratch. The only difference is that some new commands are accessible in this role. It is possible to create your own instrument XML configuration files, and the C source files required to recompile the operating system of the Ethernet controller (currently in development).

Starbase is now built automatically using the Jenkins Continuous Integration tool. A build is initiated whenever a developer commits code changes to the Subversion server. When the build is completed, a new beta installation package is sent to the UKRAA webserver using FTP. See more about Jenkins at: http://jenkins-ci.org

Keep an eye on the latest builds at:
http://www.ukraa.com/www/starbase/jenkins.html

Observatory Instruments

Observatory Clock

The Ephemeris can now be driven directly by metadata, *i.e.* any instrument providing a coordinate pair can be linked to the generation of an ephemeris. This can be used to plot a point on the StarMap, so for instance the location of an antenna can be dynamically updated. The ephemeris can also be generated from a *Starscript* command, and exported. See the Data Guide for full details.

Communicator
Information tabs have been added to Communicator to give RSS newsfeeds from the Mantis bug reporting system, from the Subversion configuration management system, and from Jenkins, the continuous integration builder. These will enable you to keep track of current work without having to wait for the next release.

Observatory Explorer
There are no changes in ObservatoryExplorer. Sadly the automatic discovery process is still to be fully implemented!

Generic Instrument
The GenericInstrument shares the upgrades of the DataProcessor and MetadataManager tabs, giving consistent use of data filters, and of metadata manipulation.

GOES Xray Client
The main changes to GOES relate to the improvements in the Chart tab, shared by all instruments.

GPS Receiver
The GPS Receiver and Simulated GPS Receiver now have a ScatterPlot tab, which can accumulate GPS fixes over a long period of time. The calculated centroid of the fixes is shown, and should give a much more accurate position if enough fixes are taken. There are of course limitations to the accuracy obtainable, such as the precision supplied by the NMEA output of the receiver. The location centroid may be used to automatically update the Framework and Observatory locations.

Observatory Installer
The only change to ObservatoryInstaller relates to the display of the new DataFilter plugins on the ObservatoryPlugins tab. This work is the first step to the deployment of Filters as separate plugins, perhaps from different authors.

Observatory Monitor
There have been no changes to the ObservatoryMonitor.

NTP Client
The NTP client command which obtains time events and shows the clock offset on the Chart has been renamed to show that it is a Capture command, for consistency with the revised methods for handling metadata.

Sandbox
As explained earlier, a new instrument called the 'Sandbox' has been added, as a general purpose testbed. This instrument has all of the possible information tabs available (including RSS newsfeed), and can show data in a variety of ways. Use this instrument if you just want to experiment with the XML configuration, or to add features of your own.

SpectraCyber

There have been no changes to the SpectraCyber Receiver, Client or Server, other than to upgrade the Chart support and the DataProcessor and MetadataManager modules in line with other instruments. Capture commands are now clearly indicated as such.

Starcam

There have been no changes to Starcam, other than to indicate the distinction between capturing an image from a camera, and importing an image from a file.

Magnetometer

The main changes to the Magnetometer relate to the distinction between Capture and Import of data. For instance `DataCapture.getData()` and `DataCapture.captureRealtime()` are both Capture commands, but `MagnetometerPlugin.getRealtimeData()` is not. `Importer.importLocal()` is clearly an Import command.

Starinet Controller

The StarinetController is currently under development, but the instrument has been left in the Observatory so that you can see what is coming soon. The majority of the Modules and Commands are now implemented (with the exception of the data logging).

Terminal Emulator

There have been no changes to the TerminalEmulator.

VLF Receiver

The main changes to the VLF Receiver relate to the distinction between Capture and Import of data. For instance `DataCapture.getData()` and `DataCapture.captureRealtime()` are both Capture commands, but `VlfPlugin.getRealtimeData()` is not. `Importer.importLocal()` is clearly an Import command.
Please note that Martyn Kinder's remote VLF Receiver has been removed in this release. This is owing to some problems in decoding the RadioSky Pipe data files. We hope to be able to restore service eventually.

Web Server

There have been no changes to the embedded WebServer.

If you decide to go ahead and do your own XML configuration of these instruments, please note that when editing the files you must use a plain text editor such as Windows Notepad, ***not*** *a word processor!*
*In XML files, remember to use forward-slash (/) in all pathnames, regardless of the host platform! This is because the backslash will be treated differently by the XML file. Edit only those values between ">" and "</", e.g. <Name>**EditThisValue**</Name>*

*Default **Staribus** Addresses*

Staribus is the **Star**base **I**nstrument **Bus**, for RS485 based devices (RS232 if used stand-alone). UKRAA products are shipped with the following default bus addresses in the XML contained in the configuration EEPROMs:

`001`	Four Channel Logger
`002`	Eight Channel Logger
`003`	VLF Rx
`004`	Magnetometer

*Default **Starinet** Addresses*

Starinet is the **Star**base **I**nstrument **Net**work, for Ethernet-based devices. The Ethernet controller currently in development, and accessible via the Workshop Instrument ***Starinet Controller***, is set to use the following address by default:

`192.168.1.65`	Four Channel Controller

You may wish to change the above addresses for your observatory.

Java Version

Starbase 2.2.1 was created with Java 6, release 27.
http://www.oracle.com/technetwork/java/javase/downloads/index.html

The development system was IntelliJ v11.1
http://www.jetbrains.com

The remainder of this document details the history of previous releases, and may safely be ignored if you are looking only for what's new in the current release.

Release 2.1.1

Release 2.1.1 was created with Java 6, release 27.

In this release there have been many, many bug fixes and low-level improvements, and...

Changes in current build:

Starbase User Guide updated to cover v2.1

Framework

Starbase is now Open Source (see http://www.opensource.org/), supplied with the General Public Licence (GPL) - shown on login tab.

Creation of a cross-platform installer to simplify distribution.

The garbage collector has been 'tuned' to significantly improve performance on lower specification computers.

User Interface restyled to improve appearance and usability.

Addition of metadata to each Command to allow custom timeout tuning.

More useful documents added to `install_root/doc`.

`install_root/loader.properties` has a few more debug options.

Observatory

UI widget to allow the instrument rack to be hidden and the command area maximised.

Parameter group now tabbed, to show Response data and context-sensitive help for each command.

Addition of 'choosers' to parameters for easier selection of *e.g.* files.

Tabs on each instrument rationalised to show all possible data available for each instrument.

Command execution buttons now grouped differently, to improve usability.

Improvements to the Chart UI to allow channel selection and scaling.

Also a facility to cut long datasets into a series of time-sliced files. Cropping in development.

Toolbar added to tabulated reports and PDF readers to improve memory handling

and convenience of viewing.

Rationalisation of commands to manage metadata and points of interest, sample files in GenericInstrument.

Clock now shows UT and sidereal time.

VLF Rx has a SignalProcessor module, with a simple oscillator using the sound card, as a tuning aid (to be a wobbulator in next version).

Changes to Magnetometer following testing with new UKRAA product.

Changed multichannel logger control panels to show all channels of data.

GPS Rx NMEA parser updated to handle v3.0 of protocol.

Eight channel logger moved to Workshop group (in case you wondered where it was).

Several additional tabs on ObservatoryMonitor.

Addition of the Moon to list of Ephemeris objects.

Ephemeris target objects now added via an XML file, for user configuration.

Ephemeris target definition via metadata to allow dynamic tracking of objects.

Changes to metadata operation to allow mapping any metadata item to control panel indicator.

Convenience command to get the version of software running on the controller.

An experimental command for the import of FITS images.

Improved sample files under `install_root/workspace`.

Staribus

WARNING! We have discovered that not all USB COM adaptors will work reliably - please contact for further details.

Full support for 32 and 64 bit Windows, Linux and Mac serial communications.

Rewrite of parts of Staribus comms to improve fault tolerance, timeouts and retries.

Changed operation to allow most controller commands while a capture is active.

Command to write an EEPROM configuration from a file.

Command reset(Staribus) to flush all buffers and reinitialise the bus.

All failed blocks are logged in `install_root/logs` for later examination.

Build 986

`install_root/datastore/distribution` now has a set of JAR files containing each of the Observatory instruments. This is the first step to having a method of downloading and installing new instruments one by one, in the field, without having to reinstall everything (JAR files are just special ZIP files). This was a major low-level change to the architecture, and a few things may appear to be different, but this is the reason for it! (For the technically minded, the Ant build script was rewritten to recursively gather all the bits for each JAR from the folders of the fractal architecture).

All documentation moved to `install_root/doc`, where you will find the Starbase User Guide and many other items, including the ReadMe for each platform. Read the Radio Sky Pipe document if you use RSP with Starbase. Read about Java Memory Management if you can't sleep. The user guide and VLF manuals are also available in the user interface (UI), on the Help tabs.

Observatory HelpViewer (main menu bar) gives the main user guide. I am trying to move all embedded documentation to PDF format, which is much easier to generate than HTML.

I intend to remove the 'exports' item from `Frameworks.xml` unless I receive strong encouragement not to do so! This is because it is very old code, and the Observatory exporters are much better. As part of the preparation for this I have removed the export options from the menu bar.

The print option remains, and yes, I know it is not very good.

`install_root/maps` has a ReadMe explaining how to add new RegionalMaps to Starbase, with the appropriate projection. This isn't as hard as it sounds :-)

`install_root/workspace` has many new sub-folders with example and test data files, including those for programming into instrument EEPROMs. Use these files to get a feel for how things work, and for example use of *e.g.* metadata.

A few tweaks have been made to the Staribus protocol in response to user testing.

Correction of an XML fault in SpectraCyber configuration.

Name of "`properties-StaribusPort.xml`" changed to "`StaribusPort-properties.xml`" as part of the rationalisation of all plugins in advance of dynamic updating. THIS NEW NAME IS NOT IN THE USER GUIDE.

New flag "`Enable.Validation.XML`" in `loader.properties`, Set '`true`' or '`false`' to control use of XML validation, *e.g.* on imports. Leaving XML validation OFF will improve performance, but at the risk of using an invalid data file. This option is not applicable to CSV and TSV formats.

The default garbage collector has been changed as an experiment (See the BAT and sh files). It may well be that we have to change back again later...

The Geophysics tab now groups VLF, magnetometry etc. with blue separators. If you don't like this, it can easily be removed by editing the attributes XML file. Later releases will allow more facilities on the instrument rearranger menu.

The login panel now sets the focus correctly!

Significant changes to Instruments

Geophysics:StaribusMagnetometer

Geophysics:StaribusLogger

Geophysics:StaribusVLFReceiver

GenericInstrument

All the above have improved import/export commands, for TSV and CSV, as well as XML. See `install_root/doc/Imports and Exporters.pdf` for a full list of what is supported, and what is planned.

A new module "DataProcessor" gives extensive support for metadata, you can now add metadata at any level, *i.e.* Observatory, Observer, Observation, Instrument, Plugin and so on. The metadata come from files in `observatory/imports`, and so are easily configurable by the user. If you don't find the file you need, just create it with the right name (follow the examples.... accurately). The data are saved with any export, and reloaded on import. In addition, the World Magnetic Model metadata can be added, for magnetometer users.

PointsOfInterest (and LinesOfInterest) have also been made accessible via files in `observatory/imports`. Now it is much easier to add your own POIs.

DataProcessor also performs a Pearson correlation test of a data channel against a temperature channel, if available. If you suspect that your data are varying with temperature, this is a simple way to see what's happening. No guarantees, but it is a useful tool.

GenericInstrument

This instrument has a "Macros" module, with one example non-functioning macro, to show how I intend to embed macros in the UI. Macros are the next major milestone on the Starbase roadmap, and will give the ability to program (script) complex tasks as a single command. Macros can also be exchanged between users. Suggestions welcome for macro functions, and for ideas on how to record macros in the UI.

Geophysics:GOESXrayClient

This now retrieves the latest GOES xray image as well as the data for the chart. Very interesting to compare the two. Images can be archived by the exporter, as can the chart.

Services:Communicator

A completely new instrument, giving Twitter and RSS newsfeeds, configurable by the user. I'd appreciate knowing of any useful feeds you might need. A few of the obvious feeds are given as examples. The UI may improve in later releases, but for now it is 'functional'.

Manager:ObservatoryExplorer

Skeleton commands to show how instrument "discovery" will work. (Inactive) commands for serial and Ethernet discovery, which have very different mechanisms. The discovered instruments will appear in the rack, and may then be distributed around the various tabs as you see fit. Save the configuration as explained in the user guide.

Manager:ObservatoryInstaller

Skeleton UI to show how dynamic plugin installation will work. The idea is that the UI shows the plugins you have installed, and those available on the server for download. It currently shows those installed, but no server connection yet. Plugin authors needed!

Manager:ObservatoryMonitor

A new tab "Java Console" which when enabled will capture the messages going to the DOS/console window. This tab may be exported in the usual way, and is useful for debugging. Revert to the DOS/console by executing the `enable(false)` command.

Help

Help Tabs for the following are either empty or very sparse:

ObservatoryClock	SpectraCyberServer	StarinetController
StaribusMagnetometer	Starcam	StarinetTester
StaribusLogger (4ch and 8ch)	NtpClient	ObservatoryExplorer
GenericInstrument	TerminalEmulator	ObservatoryInstaller
SpectraCyber	Communicator	ObservatoryMonitor
SpectraCyberClient	WebServer	

Your help would be much appreciated to fill in these gaps! The preferred method of delivery would be a PDF file (I can specify the page aspect ratio) which I would normally produce in Open Office. I am trying to move away from the old style HTML help tabs, far too clunky to produce content.

Known Issues

Not all tabs can be exported in all formats.

Some commands are just 'skeletons', *i.e.* they appear to complete correctly, but do nothing.

e.g. `get/setStaribusAddress()` and the Explorer/Installer commands.

Macros don't appear in the CommandLexicon.

The 'Help' is usually very poor :-)

All software contains bugs, or unintended behaviours. Let me know what they are, and I will try to fix them :-)

Build 719

Staribus protocol changed to allow multiple variations of each command for different instrument types. We have called the extra field 'CommandVariant', and a list is given below of the current values. Any existing controllers you may have will need a software upgrade before the new Starbase will function correctly. The reason for the change is to simplify the coding required for new controller developments. The new protocol may be disabled (for testing) by a switch in the file "`install_root/loader.properties`". This file may be edited with a simple text editor (not a wordprocessor).

Two switches are relevant:

```
Enable.Debug.Protocol=true
Enable.CommandVariant=true
```

Several changes to CommandCodeBases to make things easier to read; this is unlikely to affect any users.

The Core commands for configuration are now implemented. So *e.g.* `getConfiguration()` will read all XML from any attached I2C plugin, and assemble the parts into one XML document. This is the penultimate step to a full 'Discovery' process.

All EEPROMs on attached plugins can now be written by the user, using `setModuleConfiguration()`. The compression option can typically save about 30% of storage space, hence speeding up downloads.

The `setModuleConfiguration()` command may now be tested 'off line' using test data in "`workspace/staribus-stub`". Read the Help tab for details.

Stardata importer and exporter now split into a Formatted and a Compressed variant. The Compressed form can save a lot of file space.

Many Exporters and Importers now pre-populate their parameters, to save a bit of typing!

Observatory 'General' group tab renamed to 'Discovered' in preparation for needing somewhere to park those Instruments which have just been discovered on Staribus or Ethernet.

Excel export now works correctly in all contexts. Please let us know if this is not the case.

GOES Xray Client Help updated to reflect recent changes in their file naming convention.

Many minor bug-fixes, too numerous to mention...

Known issues:

XML compression in Stardata Exporter does not work on the header Metadata, under investigation.

John Cook's data imports have little or no metadata to identify the type of file.

Build 700

Autoscaling checkbox on most charts.

New RegionalMap, for Europe, with instructions in `install_root/maps` on how to create a map of your own.

New Utilities command `copyResponseToClipboard()`.

Completion of command set for the Ethernet-based StarinetController (under development).

Improvements in data import for John Cook's logger format; all historical files are now readable.

Testing and bug fixing for the Staribus Logger, VLF and Magnetometer.

Change of all default data import filter selections to 'PassThrough'.

Addition of `<PluginManifest>` to the Instrument XML to aid the discovery mechanism (under development).

Some changes to the `<Plugin><Software>` element in the XML, but this will change again shortly :-)

Build 638

Rebranded for UKRAA

Instruments are now mapped to Groups and to User Roles, in `instruments-attributes.xml`. This removes the dependency on these items from the hardware. Later versions will allow dynamic run-time mapping. You can change these mappings as you wish.

There is a new user '**wirral**' of role 'Educational', password '**starbase**'.

Renamed Observatory CommonPort to StaribusPort, which is now more meaningful. StaribusPort defaults to `COM1`. Look in `StaribusPort-properties.xml`.

Renamed a few XML files to have more meaningful names.

Instrument Controller addresses expanded to include `StaribusAddress` and `IPAddress`. If you use an IP instrument you will need to examine the XML change to see where to put the address.

Converted Starcam, SpectraCyberClient and StarinetController to have a proper `IPAddress` in Instrument XML definition rather than the 'Virtual' address of zero used previously.

Fixed ABORT bug when downloading with `getData()`, now terminates correctly.

Chart colours now added to Instrument DataCapture Metadata. You can change at will! Later we hope to have a Metadata editor

SpectraCyberClient and SpectraCyberServer now work reliably.

GPS NMEA bugs with some receivers fixed, I hope.

Staribus 4 channel logger added, awaiting testing with Futurlec code.

Ethernet Starinet 4 channel logger added.

COM Port closure bug on stopping and restarting Observatory fixed, I hope.

Configurable debug messages for GPS Receiver and Staribus.

```
properties-GpsReceiver.xml   -->  GpsReceiver.Enable.Debug
properties-Staribus.xml   -->  Staribus.Enable.Debug
properties-StaribusController.xml
properties-StarinetController.xml
```

both have flags to enable download of data even after errors:

```
Dao.OnError.Continue
```

Acknowledgement

I would like to take this opportunity to thank the Council of the BAA for awarding me the Horace Dall Medal in 2009,
"*... to a person who has shown marked ability in the making of astronomical instruments*",
which was a gratefully-received vote of confidence in the project.

Contacts

The UK Radio Astronomy Association
Springfield
Rookery Hill
Ashtead Park
Ashtead
Surrey
KT21 1HY

Limited by Guarantee Reg. No. 6481611
Registered UK Charity No. 1123866

E-mail: info@ukraa.com
Website: www.ukraa.com
Fax: 0870 132 3728
Telephone: 01372 279066

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Version 3, 29 June 2007

Preamble

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Revision History

Release	Date	Author	Status
Build 638		L M Newell	
Build 700		L M Newell	
Build 719	2009-12-12	L M Newell	
Build 986	2010-07-18	L M Newell	
V2.1.1	2011-10-29	L M Newell	
V2.2.1	2012-06-10	L M Newell	

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