



Technical Note

Report on the use of QLA for AVM
Ken King

Ref: SRIRE-RAL-NOT-001460

Issue: 1.0

Date: 5th December 2002

Page: 1 of 10

1. INTRODUCTION

This report gives my personal views on the usefulness of the QLA version 1.0 release made on the 8th November 2002 for testing the AVM model of the SPIRE instrument.

These comments are made based on the software version pre-installed on the SPIRE project drive at RAL as it was found not possible to follow the installation instructions in the release note to create an independent system.

For testing, science and housekeeping data was generated by the EGSE SPIRE simulator tool rather than the QLA included simulator. This tool generates simulated chopping data according to the latest Data ICD and therefore I had to update the SID and Parameter tables to allow proper extraction of the science frames. In fact that system used included an old version of the EGSE tool, which had to be updated before the QLA could be tested (the version supplied does not simulate the THSK field, which is used by the QLA to tag parameters with their sampling time).

The link to the hcss was not tested, as I did not have access to a server. All telemetry was passed to QLA through the router interface.

The documentation used was the SPIRE QLA User Guide version 0.2, issued on 14th November. A second version (v0.1, dated 27th November) was received later, but did not seem to be very different and did not have any change bars.

This document, once updated as a result of comments on this version, should be placed under configuration control.

Final word: I have based my comments on my understanding of QLA, mostly gleaned from the User Manual. It may be that I have completely misunderstood how the software works and the comments are irrelevant or stupid.

2. COMMENTS

2.1 General Comments

2.1.1

Telemetry packets used and displayed by the QLA are referred to by using the SID contained in the packet header. This implicitly assumes that the SID is unique for each packet type. In fact there is no requirement for this. The proper unique reference for telemetry packets is made up of the Application ID, Packet Type, Packet Subtype and SID (in fact a second SID can also be specified, but this is not used in SPIRE).

All references to telemetry packets should include the packet APID, Type, Subtype and SID. *A naming convention should be put in place (e.g. APID(Type,Subtype)-SID)*

2.1.2

As telemetry packets contain data sampled at different times/rates the QLA parameter extraction routine has to tag each parameter sample with its correct sample time before they can be displayed correctly. To assign an absolute time for parameters in the Nominal Housekeeping packet the THSK parameter is used,



Technical Note

Report on the use of QLA for AVM
Ken King

Ref: SRIRE-RAL-NOT-001460
Issue: 1.0
Date: 5th December 2002
Page: 2 of 10

for science data the sample time is related to the TSYNC parameter. It is not clear how times for parameters available in other packets (other housekeeping, and event packets) is derived.

This needs to be documented

As a result of this mechanism, the QLA cannot extract parameters and make them available to the rest of the QLA if the THSK parameter does not update regularly. Because of the incorrect version of the instrument simulator being used this prevented any data being displayed by the QLA.

A mechanism be put in place to allow the user to override the requirement for the THSK parameter to be updated regularly.

2.1.3

Displays dealing with telemetry packets usually provide a packet counter, which indicates the packet currently being displayed. This counter starts at zero when the display starts and increments with each packet displayed. This means that there is no way to relate the telemetry being displayed in different windows as they have been started at different times.

Displays of telemetry packets should identify the current packet by a unique identifier which allows the user to know which packet is being displayed. *The value of such an identifier can be found in the header of each packet as the APID and packet sequence count. The display could show this in the format APID:Count*

2.1.4

The QLA windows contain various GUI components for allowing the user to interact with the display. These are displayed in different ways and in different places in the different windows. In some cases it is not possible to determine if you are about to press a button (which will perform some action) or open a menu (which will allow further options to be selected). For example on the ParameterVisualisationSelector window the Parameters menu and the Help button are identical.

A uniform layout for display windows should be put in place. *For example, all windows should contain a menu bar at the top, multiple display pages should be selected by tabs across the bottom of the window. Buttons appear on each page with the same look. Buttons common between display pages should appear in a button bar under the page tabs etc...*

2.1.5

There is currently no way to print the contents of a window (other than the default windows key combination). This will be required. *It should be possible to print directly or store the image to a file.*

2.1.6

Time fields seem to be displayed as floating point numbers. Given their likely values the changing time between packets is lost in the number of significant figures displayed. There are three types of time to be displayed:

1. absolute time (48bits) received in a packet (e.g. THSK) should be displayed as GMT
2. DRCU counter time (32 bits) received in a science frame (e.g. CHOPTIME) should be displayed as an unsigned integer (max value = 4294967295)
3. DRCU Counter time converted to absolute time (with ref to TSYNC) should be displayed as GMT



Technical Note

Report on the use of QLA for AVM
Ken King

Ref: SRIRE-RAL-NOT-001460
Issue: 1.0
Date: 5th December 2002
Page: 3 of 10

2.1.7

At one point I had to edit the Parameter table to reflect the new format of the CHOP packets being produced by the simulator. When I changed the name of the CHOPTIME parameter, QLA would not start. Why does QLA need a CHOPTIME parameter?

2.1.8

While running science data through QLA the packet receiver stopped. The problem with this is that there is no indication that this has occurred. A warning window should pop up and a (mutable) warning sound be issued.

2.2 Setting up QLA

2.2.1

The User Manual assumes that the user starts in a particular directory (user/lib) in 'user' tree of the Herschel CVS hierarchy. The installation of the system requires both the 'user' and 'hcss' directory trees to be provided to allow execution of, and reference to, other software systems. Some thought should put into defining a single location from which all the software should be accessible.

This is particularly a problem when the User Manual refers to the configuration file QLA.defaults, as the location given may assume a different start point from the location from which the QLA is run

The User Manual should describe the location of files (e.g. the QLA.defaults file) with respect to a root directory (QLA_ROOT), which is set up at installation time. *With the current setup this root directory contains the 'hcss' and 'user' code trees so the correct reference in the manual should be to QLA_ROOT/user/lib/herschel/spire/qla/QLA.defaults*

2.2.2

Remove InteractiveQla from the bullet list in the User Manual section 2.1.1 as this does not appear as an option.

2.2.3

The default port number for the router is 9877. Change User Manual section 2.2.1.2

2.3 Packet Dumps

See sections 2.1.1 and 2.1.3 for general comments

2.3.1

As the display is related to particular packets it should be updated as a new packet of the relevant type is received rather than at a fixed rate, which either updates the window with the same information (inefficient) or misses displaying a packet (could cause problems if the user is looking for a particular change)

2.3.2

It should be possible to halt the update of the display and step back to a previous packet. Normally when a problem occurs the cause is only identified some time later. It is then necessary to go back and look at the



Technical Note

Report on the use of QLA for AVM
Ken King

Ref: SRIRE-RAL-NOT-001460
Issue: 1.0
Date: 5th December 2002
Page: 4 of 10

packet contents at the time the problem occurred. This should be possible, without stopping the packet receiver, as the test may need to continue, while the user looks into a possible problem

2.3.3

It should be possible to display the parameter values in hex, decimal, engineering units (converted), or binary. It is acceptable to have a single selector (e.g. menu option) to change the format of all the displayed parameters in a single window

Note: hex and binary formats should be displayed in a fixed length field with preceding zeros (e.g. a 16 bit number (162 decimal) should be displayed in hex as 0x00A2).

2.3.4

The current display shows all parameters defined in a packet as a long list. For the housekeeping packet, which contains hundreds of parameters it is inconvenient (read nigh on impossible) to look at a particular set of parameters related to a single subsystem.

It should be possible to format the packet display to select a subset of the packet contents and display these alone. *The subset could be defined in a display configuration file selectable by menu, which identifies the parameters to be displayed, the location on the window where they should be displayed, any fixed text that should be displayed on the window (labels), and any other embellishments (e.g. use of colour) that make for an easily understood subsystem display.*

2.3.5

When displaying science data only the first frame in the science packet seems to be displayed. This means that at the end of science data the window does not display the latest data received.

2.3.6

I consider the current display to be a packet Display rather than a Dump as it only shows those parameters defined in the packet and no information on the packet header.

A packet dump facility should be implemented showing the complete packet contents. Display of packet contents should be in hex with the relevant header parts picked out (in decimal) e.g.:

```
Packet: 1282:00013
Len: 420
Type: 3 Subtype: 25
Time: Fri Dec 06 09:50:26 GMT 2002

0000: 0D02 C00D 01A3 0003 1900 3DF0 72F3 A76C 0300 0000 0000 0000 0000 0000 0000 0000 3DF0
0020: 72F3 9D2F 0000 0000 0000 0007 0012 0000 0000 0000 0000 0000 0000 0018 0055 1BD6
0040: 0250 0150 0066 0060 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
0060: 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
0080: 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
.....
.....
```

This display should update with each packet received.
It should be possible to stop the display and step back to view previous packets.



Technical Note

Report on the use of QLA for AVM
Ken King

Ref: SRIRE-RAL-NOT-001460

Issue: 1.0

Date: 5th December 2002

Page: 5 of 10

2.4 Displaying Parameters

2.4.1

Add the 'Select' button to the list of items on the ParameterVisualisationSelector window in the User Manual section 4

2.4.2

There seems to be no way of selecting all the detectors for a particular array other than clicking on all the individual names. This should be offered as an option.

I would go further and say that a user defined set of parameter sets should be read from a configuration file and displayed on the parameters menu.

2.4.3

The 'Clear Selected Parameters' button on the ParameterVisualisationSelector window clears the complete list. It should be relabelled 'clear' as on the detector array selector window, or the functionality should be provided to select a set of parameters and clear them.

2.4.4

The User Manual should make it clear that it is possible to remove a selected parameter from the list in the ParameterVisualisationSelector by selecting it again, through the Parameter or Arrays menus. (I tried to select a parameter using the mouse and of course it did not work.)

2.4.5

There needs to be a convention on how parameters with the same name are distinguished. For example OBSID occurs in many telemetry packets. There needs to be some clear way to distinguish which one is selected – presumably a unique name needs to be provided that identifies which packet the parameter is extracted from.

2.4.6

Selection of the display type should be done in the same way as selecting parameters - a Display menu is used to select the display type and this is displayed on the window.

2.4.7

The 'Select' button should be renamed to 'Create Display' or something similar, which indicates the action to be performed.

2.4.8

The parameter displays each have a window title showing the SID of the packet from which the parameter comes. This should display the Packet APID, Type and Subtype as well as the SID (see 2.1.2)

2.4.9

There seems to be no way of specifying that I want the converted values displayed for scrolling lists and time series plots



Technical Note

Report on the use of QLA for AVM
Ken King

Ref: SRIRE-RAL-NOT-001460
Issue: 1.0
Date: 5th December 2002
Page: 6 of 10

2.5 Clock Display

2.5.1

It should be possible to select the display of raw data in decimal, hex or binary (possibly by right clicking on the value?)

2.5.2

I was unable to display the converted values for CHOPMODE and SMECPOSN, which have conversion curves defined for them. Only the raw value appeared on the display.

2.5.3

When displaying science data the displayed values gets cleared at the end so that it is not possible to see the final values of the parameters.

2.5.4

When displaying science data the CHOPOBSID and CHOPBBID were not correct (they remained clear – throughout) and CHOPPOSITION showed the wrong values (2560 and 240 instead of 784 and 258).

2.6 Scrolling Lists

2.6.1

This display does not open immediately when selected (unlike the Clock display), but only when data is arriving. This confuses the user who is likely to keep clicking the 'select' button to no avail. An empty display should open when the 'Select' button is pressed.

2.6.2

There is no way to stop the window update so that you can scroll back to view earlier parameter values. I do not want to use the packet receiver as this will stop other windows updating.

2.6.3

Selecting the Save option on the pop-up menu brings up the Save Data window with only one parameter listed. I would have expected all the parameters selected for the scroller display to appear in this list. Does this mean that only one parameter may be saved to a file?

2.6.4

When displaying science data more samples than expected were displayed, CHOPOBSID and CHOPBBID remained at zero instead of changing to 0x11121314 and 0x21222324 respectively during the chopping, and CHOPPOSITION gave a list (more than 20) of erroneous values (240) followed by the correct values for one chop cycle (8 times 784 followed by 8 times 258) followed by a list of incorrect values (2560)



Technical Note

Report on the use of QLA for AVM
Ken King

Ref:	SRIRE-RAL-NOT-001460
Issue:	1.0
Date:	5 th December 2002
Page:	7 of 10

2.7 Time Series Plots

2.7.1

Science data plotted was incorrect – see 2.6.2

2.7.2

Scales on the plots are difficult to read as they change format depending on the value. Raw values should be displayed as integers, not floating point.

2.7.3

I found it impossible to zoom out on the display of CHOPPOSITION. I got to a point when all values on the y scale were identical. I also managed to get to a point where no time was displayed on the x axis. There should be some way of returning to a default zoom value.

2.7.4

The zoom facility works in both the x and y directions. It is almost impossible to zoom in one direction without affecting the other. I suggest that some other form of zoom mechanism is provided to allow this.

2.7.5

Due to the lack of correct science data extraction I was unable to determine if the different modes (compress/fix/follow) operated correctly.

2.8 Image Displays

2.8.1

The preview in the Colour Table Selector doesn't tell me how different values will be displayed. I assume the colour used will vary from black for zero signal to the full colour for maximum signal (what is this?). Is this true? It should be explained in the User Manual.

2.8.2

When looking at science data, because the data extracted (incorrectly) was all zeros the majority of the bolometers displayed disappeared (presumably displayed as black circles on a black background?). This should be corrected. Currently the prime pixels are outlined with red circles – another colour (not in the colour table in use) should be used for the non-prime pixels.

2.9 Playback Speed

2.9.1

This was not tested



Technical Note

Report on the use of QLA for AVM
Ken King

Ref: SRIRE-RAL-NOT-001460

Issue: 1.0

Date: 5th December 2002

Page: 8 of 10

2.10 Saving Parameters

2.10.1

From the DataView, I entered a parameter name into the box, but when I pressed the 'Save Data' button The 'Save Data' window opened with no parameter displayed as in the buffer. I therefore had to use the right-click method from the scroller to get any data saved.

2.10.2

It seems to be only possible to save one parameter to a file. It should be possible to save a set of parameters, especially those extracted from the same packet, as a 2D table of values.

2.10.3

When I saved data to a file I only got one value store (the latest value). I would expect to be able to select the data for a range of times.

2.10.4

When saving data to a file I saved HKBBID. This was being constantly extracted from HSK packets but had a constant value (0x21222324). The values stored in two different files were different. Here are the contents of the two files:

```
structure herschel.spire.qla.Parameter {description = 'Automatically generated structure';parameter _name {description = 'java.lang.String _name';value = ""HKBBID""};parameter _lastTim {description = 'int _lastTim';value = '-1'};parameter _lastRaw {description = 'int _lastRaw';value = '110'};parameter _lastCnv {description = 'int _lastCnv';value = '-1'};parameter _style {description = 'int _style';value = '0'};parameter _title {description = 'java.lang.String _title';value = ""};};
```

```
structure herschel.spire.qla.Parameter {description = 'Automatically generated structure';parameter _name {description = 'java.lang.String _name';value = ""HKBBID""};parameter _lastTim {description = 'int _lastTim';value = '-1'};parameter _lastRaw {description = 'int _lastRaw';value = '214'};parameter _lastCnv {description = 'int _lastCnv';value = '-1'};parameter _style {description = 'int _style';value = '0'};parameter _title {description = 'java.lang.String _title';value = ""};};
```

2.10.5

The files generated ended up in the 'bin' directory rather than the directory selected in the file chooser window.

2.11 The Console

2.11.1

When loading a file the complete file contents are added to the command history. This means that it is very inconvenient to load a file, send a command, load the file again, resend the command, which is what I was doing during development of scripts. Admittedly this is less important when running scripts but nevertheless I would prefer file contents not to be added to the history.



2.12 Command Line Interface

In order to test this I thought of the different facilities I would like to see available for testing – some may not be necessary for AVM testing but will need to be put in place soon. Some I managed to write scripts for, some not. For these I suggest an API.

2.12.1 Start up any display with defined parameters

This would be used to define the default start up configuration and to start up displays associated with particular tests.

2.12.1.1 PacketDump

I was able to define a function to start PacketDump with any SID:

```
def pd(sid):  
    p = PacketDump()  
    try:  
        p.setSid(sid)  
    except:  
        print 'Unknown SID: ' + str(sid)  
        return()  
    WindowManager.add("Packet Dump",p)
```

2.12.1.2 Clock

clk(parmset)

2.12.1.3 Scroller

scrl(parmset)

2.12.1.4 TimeSeries

ts(parmset)

2.12.1.5 BolometerImage

image(array)

2.12.2 Select a set of parameters (parmset) to be collected using the GUI

2.12.3 Define a set of parameters (parmset) to be collected

2.12.4 Events

It should be possible to define an event, which can be used to trigger further action in the future. Events should be define as:

2.12.4.1 Parameter Events

Triggered when a set of parameters reach a set of defined values:



Technical Note

Report on the use of QLA for AVM
Ken King

Ref:	SRIRE-RAL-NOT-001460
Issue:	1.0
Date:	5 th December 2002
Page:	10 of 10

2.12.4.2 Time Events

Triggered when a time is reached or after an elapsed time period:

2.12.5 Collect data (defined by a parmset) into a dataset

2.12.5.1 Collect data from now until a predetermined event

2.12.5.2 Collect data from an event until a second event

2.12.6 Start a script on event

2.12.7 Save a dataset to file

2.12.8 Plot a dataset

2.12.8.1 Plot it as it is collected

2.12.8.2 Plot it after it is collected

2.12.9 Process a dataset