Notes on the QLA Workshop held at RAL 12/13 March 2001

DAY 1

Present:
Tanya Lim, Bruce Swinyard, Neal Todd, Dave Smith, Ken King, Matt Griffin, Steve Guest, Sunil Sidher, Jean-Paul Baluteau, Ken Ganga

Various discussion points that arose:

- Commonality - is it a good thing or a bad thing?
- Should QLA be based on IDL or not?
    - JAVA doesn't have maths or astronomy libraries, at present.
    - Need to ensure that whatever we decide it's ready in time for ground testing.
    - QLA and IA have different needs - to what extent should IA drive QLA?
    - QLA not necessarily tied to OO approach or JAVA
- KJK: We need to write down the requirements and need dates for the various parts of the system
    - QLA requirements could put requirements on the interface to the common system therefore will need to be specified quickly
    - BMS: Observer will want FITS files
- Observing modes: New FTS observing mode - step and look for low-res spectrophotometry is available
- Additional requirements on the DPU and OBS were identified:
    1. Parallel mode: we require to be able to select a set of detectors (exact set still TBD, but could be any selection from the total) from the arrays to TLM to ground to reduce the TM rate.

    2. There is a requirement to add housekeeping data and DPU status information (e.g. step number) to the science (detector) data in a Science TM packet in order that the QLA and IA may process the data correctly

    3. Require the ability to be able to send data faster than 100 kbps to be able to sample detectors at ~100 Hz for noise measurements.

- QLA import directly from Router - gives quicker response - does HCSS meet performance requirements? But how do we get info not in the tlm stream (e.g. conversion curves, command history) into QLA. How do we put results back into HCSS?

- Triggering QLA - do we attempt to use BBID's or a specific trigger field in the telemetry or a special trigger packet?

- QLA uses science packets whereas RTA uses only the housekeeping packets

We then went on to discuss the types of test required for the detectors and the FTS subsystems

Detector Testing

Load curves

1. measure VI (for all detectors, or any set)
2. Should store these values in database along with relevant HSK parameters (these need to be defined in advance of testing)
3. display any VI

4. comparison with standard set of values (mimimum only one detector on each array? Or across all detectors) could use R_o, R_{op}, V_{max}, $I_{(turnover)}$

should do reduced number of tests each day

Noise level

Point at blank part of sky

On ground - with shutter closed, cryostat blanked off - constant background

1. measure time series of detector signal for up to 60 mins (allows 1/f noise down to milliherz) - could also do for a few mins each day (just to check consistancy) and store in database
2. Should store these values in database along with relevant HSK parameters (these need to be defined in advance of testing)
3. need oscilloscope mode to check for microphonics
4. display - time series, power spectrum, and estimates of integrated or averaged noise in a frequency band at a couple of spot frequencies
5. comparison with standard values
6. Same measurements should e done with detectors at 2k - gives noise of JFETS

Time Constant

1. Use chopped radiant source outside dewar (0-> ~50Hz)
2. Need to demodulate chopped signal from the detectors in real time to generate signal time series
3. Measure signal vs chop position
4. Should store these values in database along with relevant HSK parameters (these need to be defined in advance of testing)
5. Chopper reference needs to be put into the ESGE
6. Plot response v frequency
7. Characteristic parameter: f_{3db} plus possibly 'shape of curve'

Optical Responsivity

1. Operate internal calibrators (flashing)
2. Measure detector signal v time -> time series for ~ 30 secs
3. Characteristic parameters: Signal Level (peak value or integrated under curve)

Special Tests

1. Monitor VI (R_{op}) v time (while carrying out any other operation) - e.g. to check for warming of parts of instrument by mechanism or calibrator operation.

Beam Profiles

1. Need to demodulate chopped signal from the detectors in real time to generate time series
2. Needs real time display of image from pixels around a detector, while we peak up signal on a detector

Spectral band

1. TBD Need to demodulate chopped signal from the detectors in real time to generate time series if FTS is slow scanning
2. Need to be able to combine data from FTS with detector time series from the instrument

Statistics for sets of detectors

1. Plot any characteristic parameter (responsivity or RMS noise over given band and at given freq) for a set of detectors versus detector number (or as histogram)
2. Should be able to select sets of detectors based on Bias electronics, ADC converter used or any other grouping.
3. Should store these values in database along with relevant HSK parameters (these need to be defined in advance of testing)

Trend Analysis

1. Plot stored statistical parameters v time

DAY 2

Present: Tanya Lim, Ken King, Matt Griffin, Steve Guest, Sunil Sidher, Jean-Paul Baluteau, Ken Ganga

FTS Testing

Functional Tests

1. Assume FTS subsystem test give table of moire step v position
2. Use trace mode to store more channels than can be done in normal mode
3. Possible outputs delta time between steps plus **LVDT output**, Demand Current, **Error signal**
4. Plot velocity error v time or scan position (or Delta T v step no)
5. Need oscilloscope mode to monitor error signal v time while finding end stops

Find ZPD

1. Scan using internal calibrator + shutter to define input signal
2. Plot detector signal v LVDT position

Total Optical throughput

1. Use internal BB source
2. Set at ZPD (or do small scan about ZPD) while source is switched on/off

Spectral coverage

1. Use external source through telescope simulator and scan SMEC
2. Plot spectrum
3. Needs to be done for each detector in turn

Fringe contrast

1. Use laser line and scan SMEC and look at signal v position
2. To be done for each detector in turn

Operating modes

1. Rapid scan - use detector signal and delta T to derive transform.
2. Step and look - use BSM to chop signal - needs to demodulate signal at each FTS position before transforming
3. Backup modes - open loop scanning
4. Need to display spectrum v wavenumber and frequency (in real time?)
5. Needs to display phase errors across interferogram
6. Implies an analysis package for FTS data!!

Other Subsystems Testing

AIV facility?

OK for now.

BSM

1-Chopped external source with telescope simulator; print BSM at various parts of the array to check beam steering and stability

2-Static external source - chop between two pixels at various rates and amplitudes and directions - check all jiggle and chop observing modes. QLA should present display and simple analysis of the results. Check servo control parameters

Filtering OOB rejection test: bright source with drilled plate filter

Observing modes Testing:

Photometer:
- Point source - OK
- Jiggle - OK
- Scan map - can we scan the telescope simulator spec.?

Other issues:

Development will start ~ Jan. 2002
JAVA or IDL? - TBD

Next steps:

- KJK send notes to MJG
- MJG add/comment
- TL will work from that to “QLA Req. Doc.”
- Req. Doc. To be circulated to all subsystems for their comments.