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Gravity Probe B Relativity Mission

Request Log Response: Quartz Block Temperature Transients

(RL 458: Originator: Bill Till, MSFC. Assignee: Dave Murray, SU)

S0698, Rev. -

September 4, 2002

Prepared by:

D. Murray

Date

Approved by:

S. Martin

Date

Approved by:

R. Singley

Date

ITAR Assessment Performed

Tom Langenstein

ITAR Control Req'd? ☐ Yes ☒ No

Purpose:

This document is a response to MSFC/IRT Request Log item #458, "Quartz Block Temperature Transients", originated by Bill Till. The specific request is for quartz block temperature histories.

Below is Mike Taber's initial e-mail to Dave Murray introducing Bill Till's request:

-----Original Message-----

From: Mike Taber [mailto:taber@relgyro.stanford.edu]

Sent: Wednesday, May 29, 2002 5:46 PM

To: murray@relgyro.stanford.edu

Cc: Till, Bill

Subject: Re: Quartz Block Temperature Transients

Dave--

This is the inquiry that I told you about. See if there are any data from the probe to help answer this question. I suspect that if we do have data, the time constant that we observed on the QB will be dominated by the pumpdown time constant.

Mike

Mike,

This is a follow up to our conversation last week where I inquired about the>archived temperature data. I'm trying to get a feel for how the quartz block temperature transient might behave following a 20 mK rise during SAA passage. My thinking was that the transient of the quartz block during transition to superfluid conditions would be fairly indicative. If you could provide the quartz block temperature histories along with the main tank temperature and perhaps those of station 200 (and any others you think might be pertinent) it would be great help.

Thanks in advance,

Bill Till

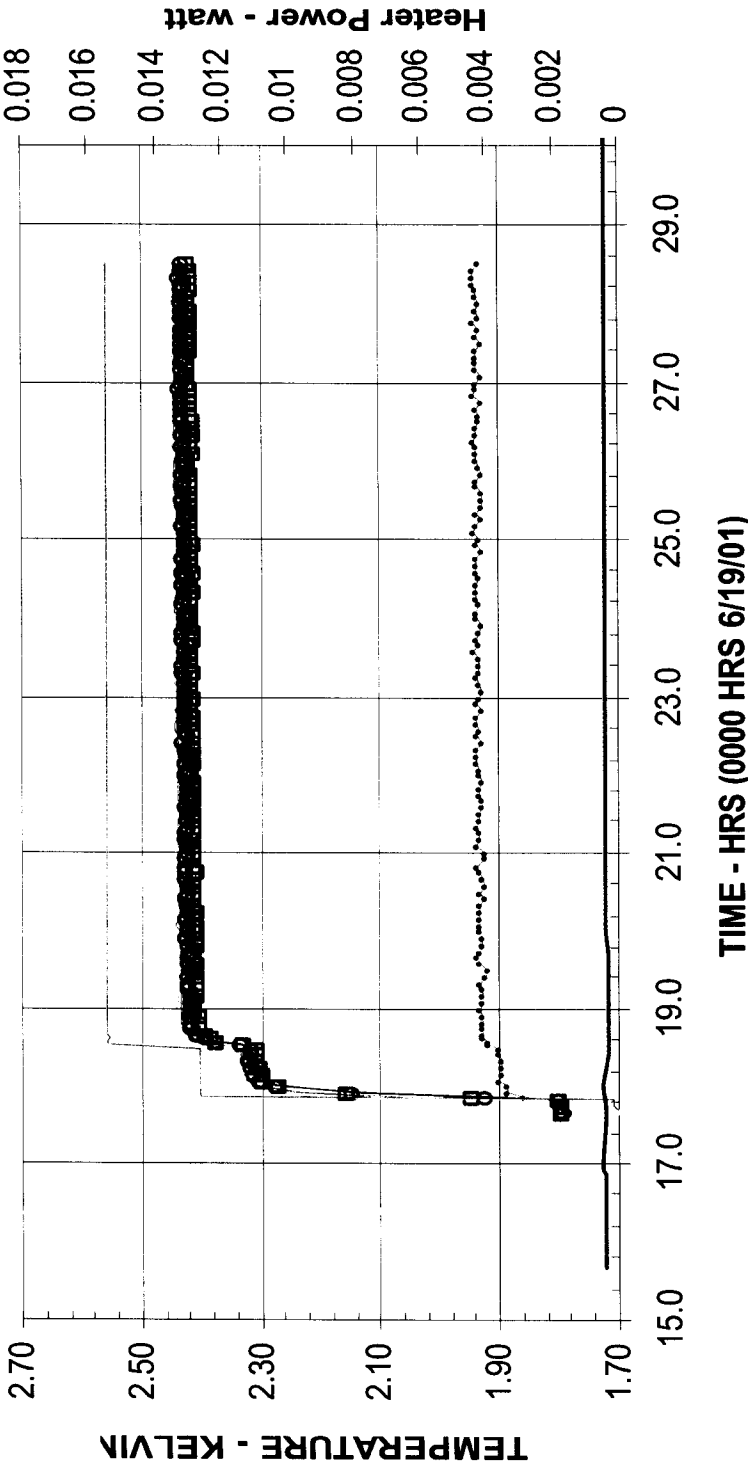
ED26 Thermal and Fluids Systems Group

Summary of Charts

Comments on 6/19/01 data set covering plot times of 18-144 hrs:

- 1) Chart 1/1a shows response to two changes in QBS (Quartz Block Support) heater power input. The base temperature for the Probe components (heat sink) is at HEX0. This in turn is tied to the Station 200 of the Dewar which is in close contact with the LHe. Connected to HEX0 are, in order, QBS fingers, QB flange, and then split to Gyros (#4 is farthest away) and telescope/QB forward end. This data set has almost all of probe data items included. It appears that Gyro #1 S-half has a calibration problem. There is a heater at all Gyro S-half's but they are almost never operated so a heater-on condition is not causing the high Gyro #4 temperature.
- 2) Chart 2 data set is for 60-144 hr plot time. Limited Probe data as the ECU was connected to most of the Probe cables and was not recording over this period. Chart 2a shows partial response to two heater levels at SQUID bracket. Chart 2b shows response to QBS heater change. Chart 2c shows response to SQUID bracket heater operation (unknown heater level)

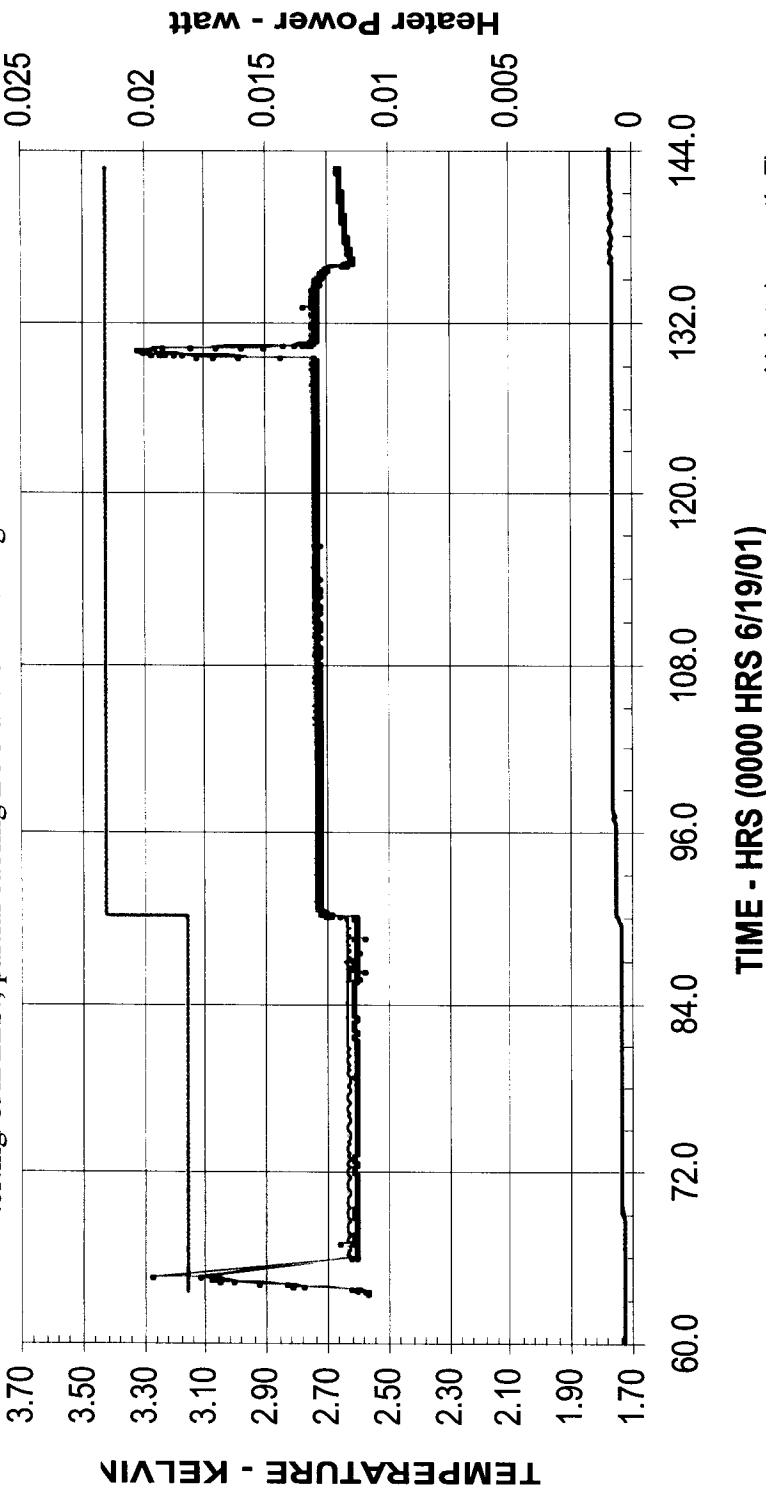
19 Jun 2001 17:37:25 Payload Test No. 2 Probe-C / Data file: 0106190p.pcd /
Configuration is: Config3z data configuration for Flight Payload testing/CABLES:: I1; I2;
I3; I5; I5h; I6; I7 Configuration: all cables except I2 now hooked up; doing ECU and SR



□ Gyro #2 S-half	T02Q {102}	QB Flange	T06Q {105}	QB Forwd end	T17Q {110}
• HEX-0 /a	T05P {118}	QB G3/G4 +X	T05Q {104}	QBS fingers/a	T10P {121}
— Sta 200 Dewar /a	T01D {01}	Htr QBS fing/a	H05P [25]		

Chart 1

21 Jun 2001 15:37 Payload Test No. 2 Probe-C / Data file: 0106190p.pcd /
Configuration is: Config3z data configuration for Flight Payload
testing/CABLES.; partial cabling ECU and SRE testing



• QBS fingers/a T10P {121} Tel Top PI/325d T12Q {125} Tel Top PI/125d T15Q {123}

—— QBS fingers/a T10P {121} Sta 200 Dewar /a T01D {01} Htr QBS fing/a H05P [25]

Chart 2

21 Jun 2001 15:37 Payload Test No. 2 Probe-C / Data file: 0106190p.pcd /
Configuration is: Config3z data configuration for Flight Payload testing/CABLES;;
partial cabling ECU and SRE testing

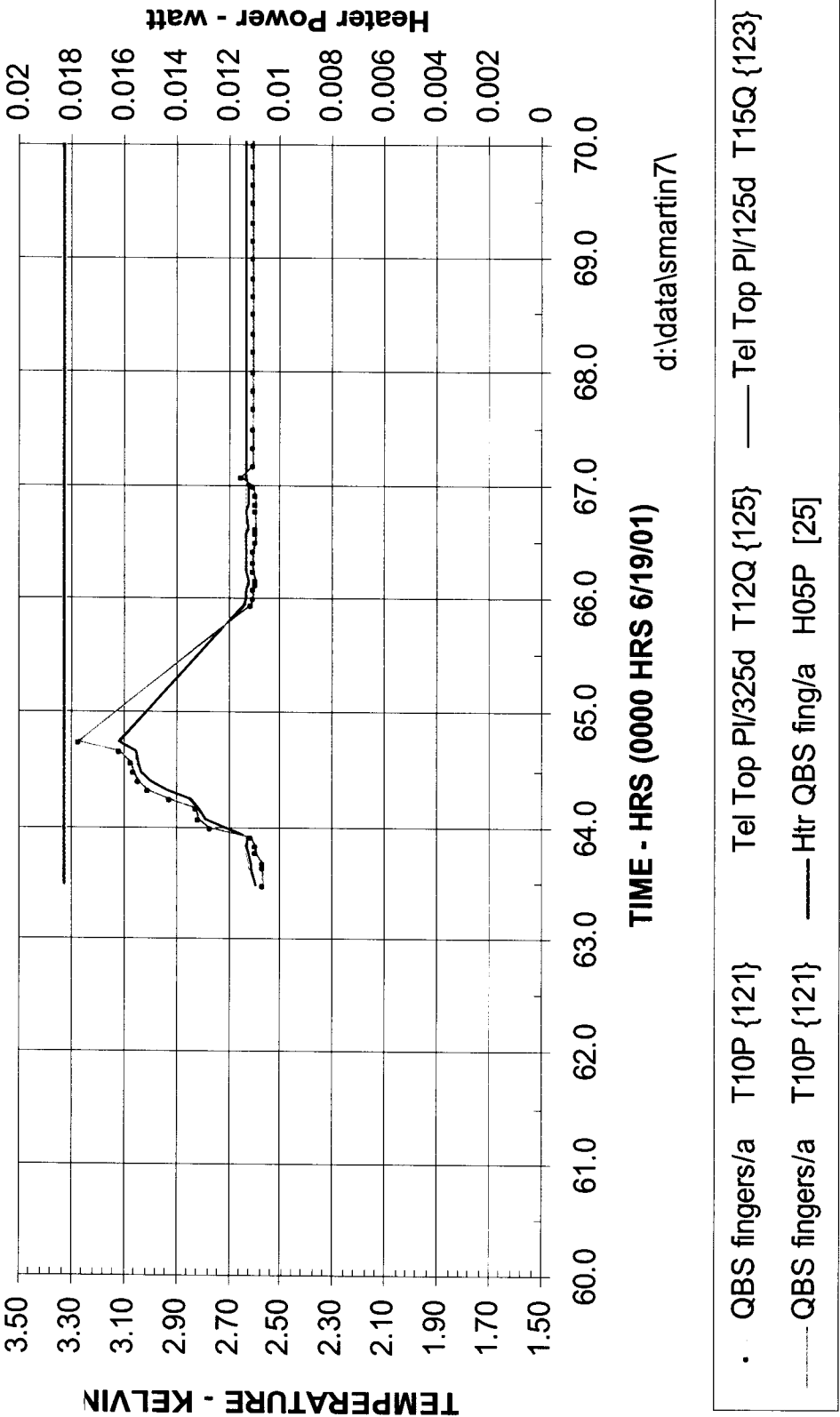
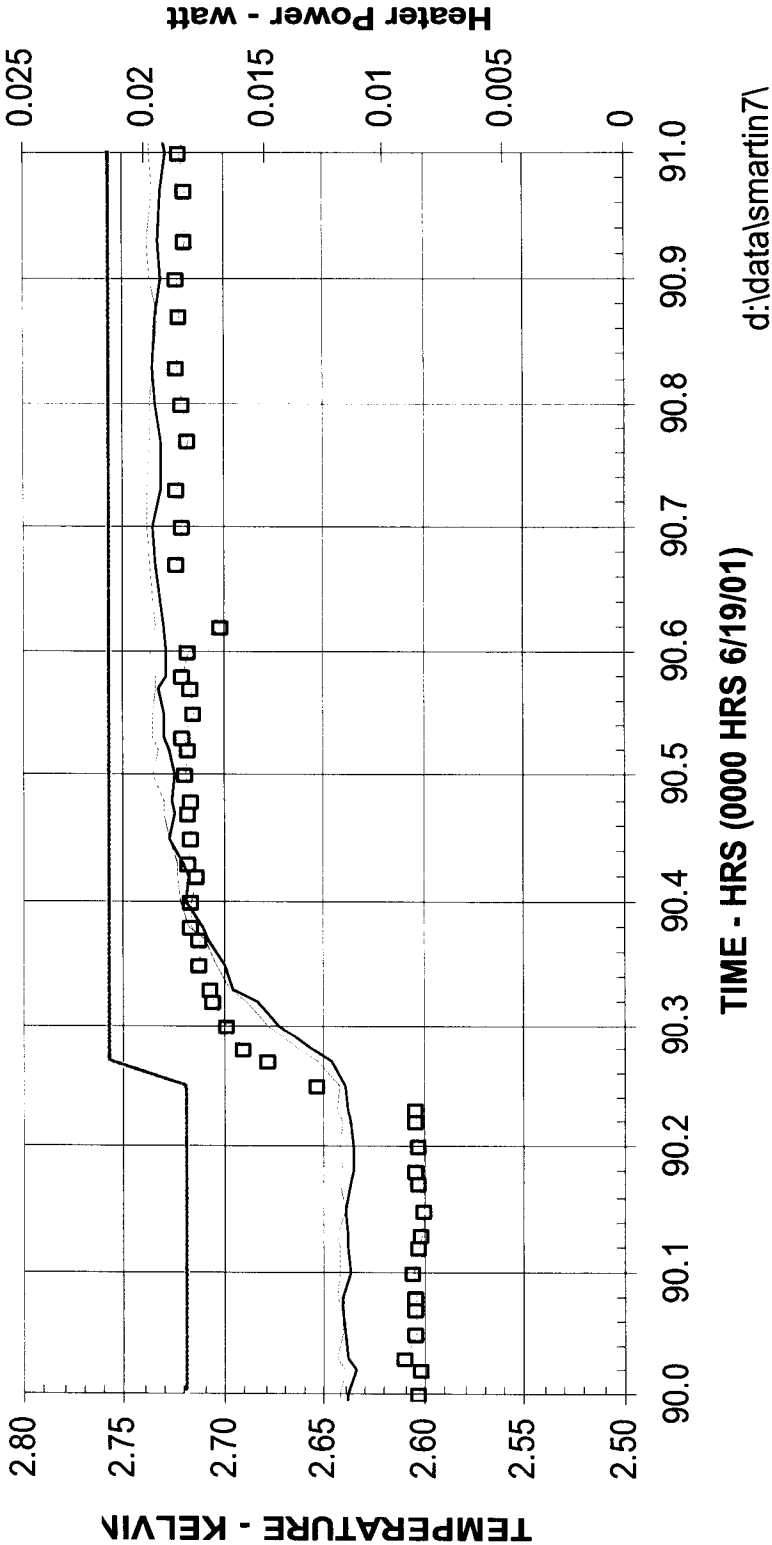


Chart 2a

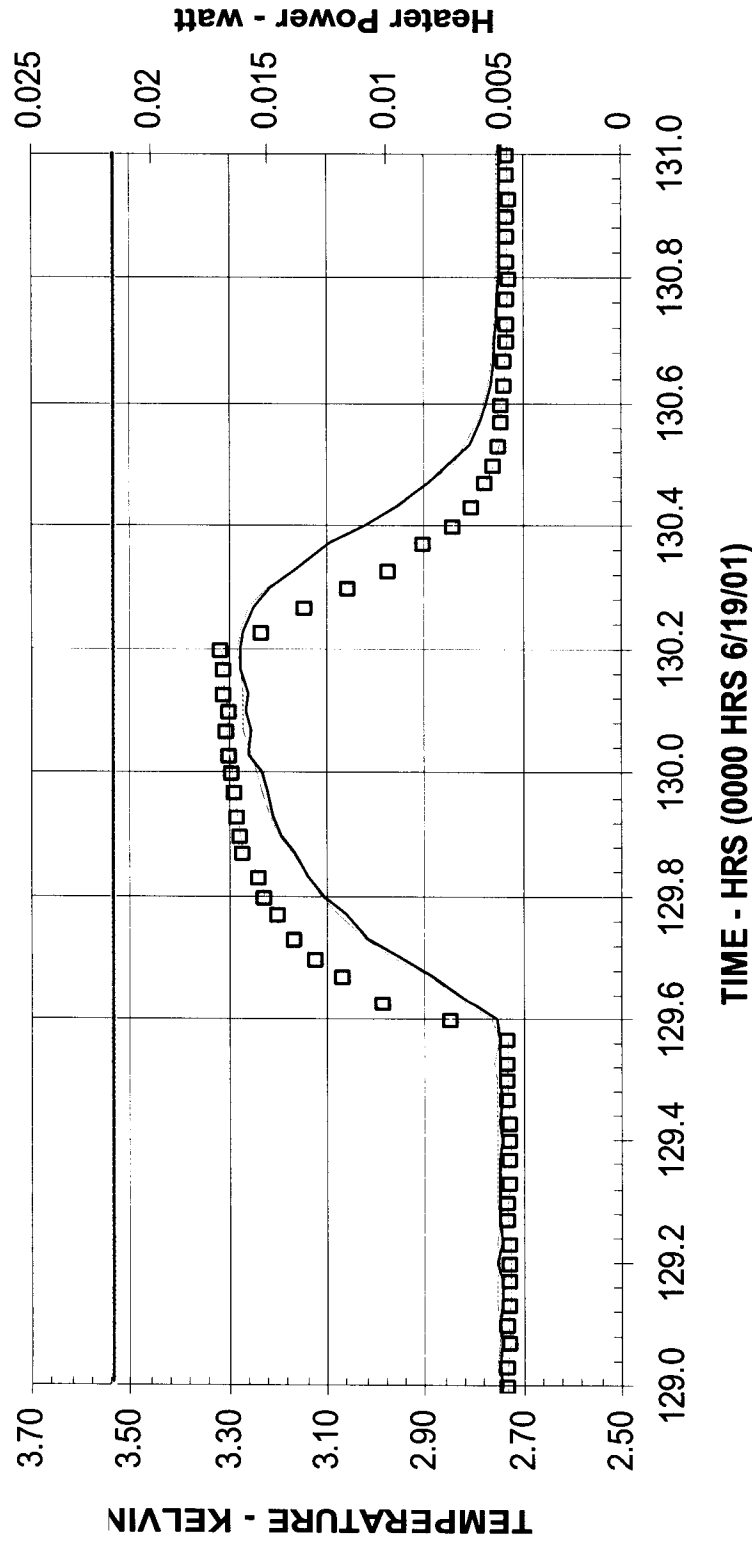
21 Jun 2001 15:37 Payload Test No. 2 Probe-C / Data file: 0106190p.pcd /
Configuration is: Config3z data configuration for Flight Payload testing/CABLES;;
partial cabling ECU and SRE testing



□ QBS fingers/a T10P {121}	Tel Top PI/325d T12Q {125}
— Tel Top PI/125d T15Q {123}	— Htr QBS fing/a H05P [25]

Chart 2b

21 Jun 2001 15:37 Payload Test No. 2 Probe-C / Data file: 0106190p.pcd /
Configuration is: Config3z data configuration for Flight Payload testing/CABLES;;
partial cabling ECU and SRE testing



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□ QBS fingers/a T10P {121}

— Tel Top PI/125d T15Q {123}

Tel Top PI/325d T12Q {125}

— Htr QBS fing/a H05P [25]

Chart 2c