PFR-129 Title: Probe Bus Time Jitter

Assembly : Probe 2	**SubAssembly : BAU**
Component : DPM	
Originator: P Harvey	**Organization: UCB**
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Failure Occurred During (Check one √)

□ Functional test □ Qualification test √ S/C Integration □ Launch operations

Environment when failure occurred:

√ Ambient □ Vibration □ Shock □ Acoustic
□ Thermal □ Vacuum □ Thermal-Vacuum □ EMI/EMC

Problem Description

The spacecraft sends the UTC to the IDPU every second in a 6-byte format as defined in the ICD thm_sys_101_AD section 4.4.1.1.1:

> *"The Time field is the probe clock time in UTC (4 bytes plus 2 bytes of sub seconds) at the time of the next 1Hz clock tick. This is ordered MSB first."*

The IDPU makes a copy of this time and includes it in the APID 404 mnemonic "ONESECMARK." Plots of this data show that there is a substantial variation in the reported time of the next clock tick, while data taken on the interface line "BUS1HZ_P" shows that the 1-Hz tick has a regular 1.000 second period.

As this time is used by the IDPU to time-tag all its science data, this clock jitter introduces errors in the timing of all E-field and B-Field data points.

Analyses Performed to Determine Cause

Data from APID 404 was plotted to determine the Time Field stability and found that the Time Field has a variability of +/- 20 milliseconds.

Corrective Action/ Resolution

This PFR was fixed with Build 3 of the BAU FSW. At UCB, the PFR was officially closed per THM-MINT-PROC-101 F2 PFR Close-out Procedure on 3/2/06. The ONESECMARK telemetry showed minimal variation (within specification) in the reported time of the next clock tick. See plot attached to as-run procedure.

Acceptance:
MAM: Ron Jackson_____; MSE: Ellen Taylor_____

PM Peter Harvey_____; Cognizant Engineer_____

Date of Closure_____

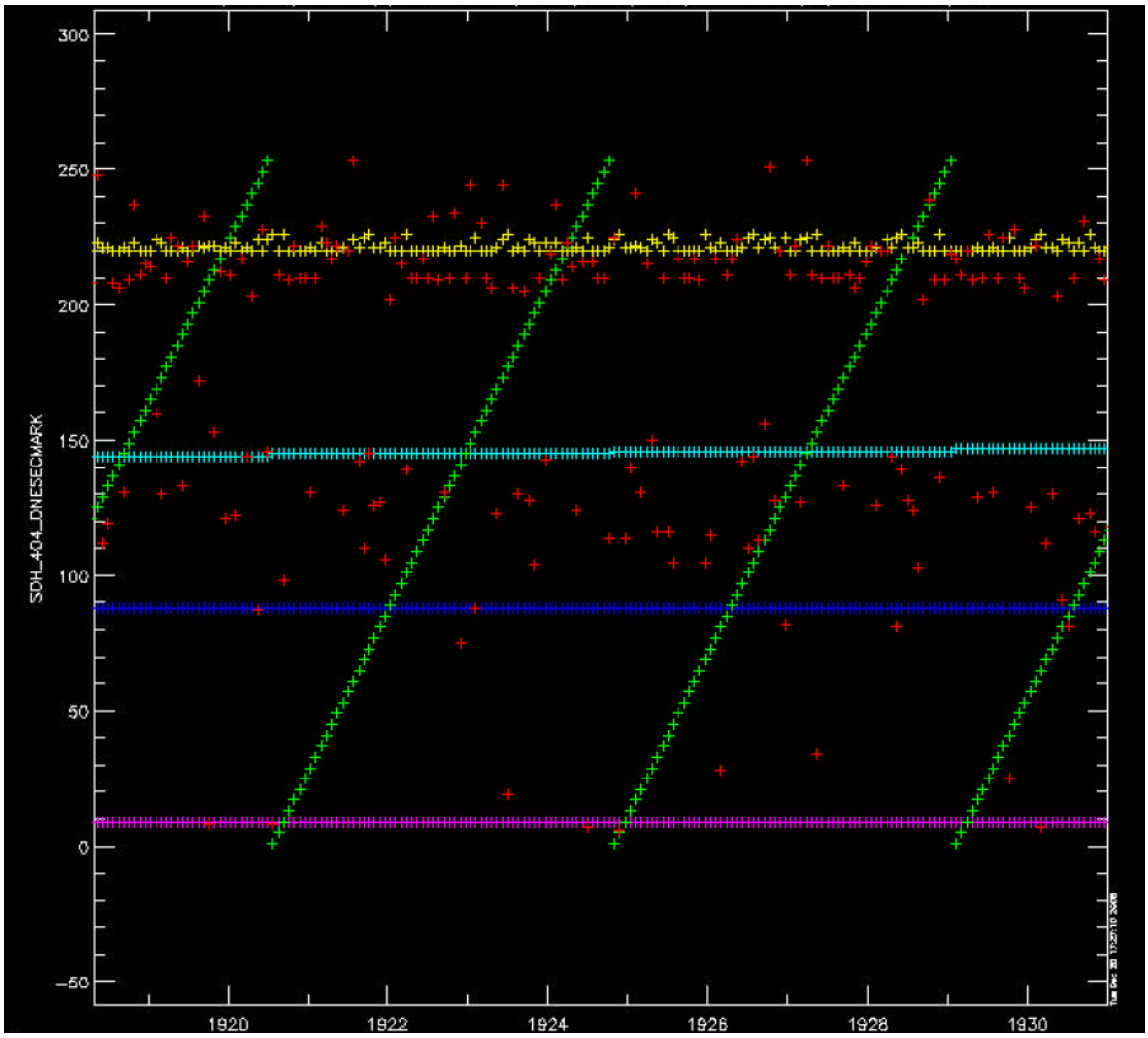

Figure 1. Plot of Time Field (Byte-by-byte)

Bytes#0-#3 (seconds) = [Violet, Dk Blue, Lt Blue, Green]
Bytes#4-#5 (subseconds) = [Yellow, Red]

The plot shows seconds (green) advancing 1 second per second as expected. The subseconds (Yellow and Red) are expected to stay nearly constant from 1 second to the next, yet vary by approximately +/-20 milliseconds.

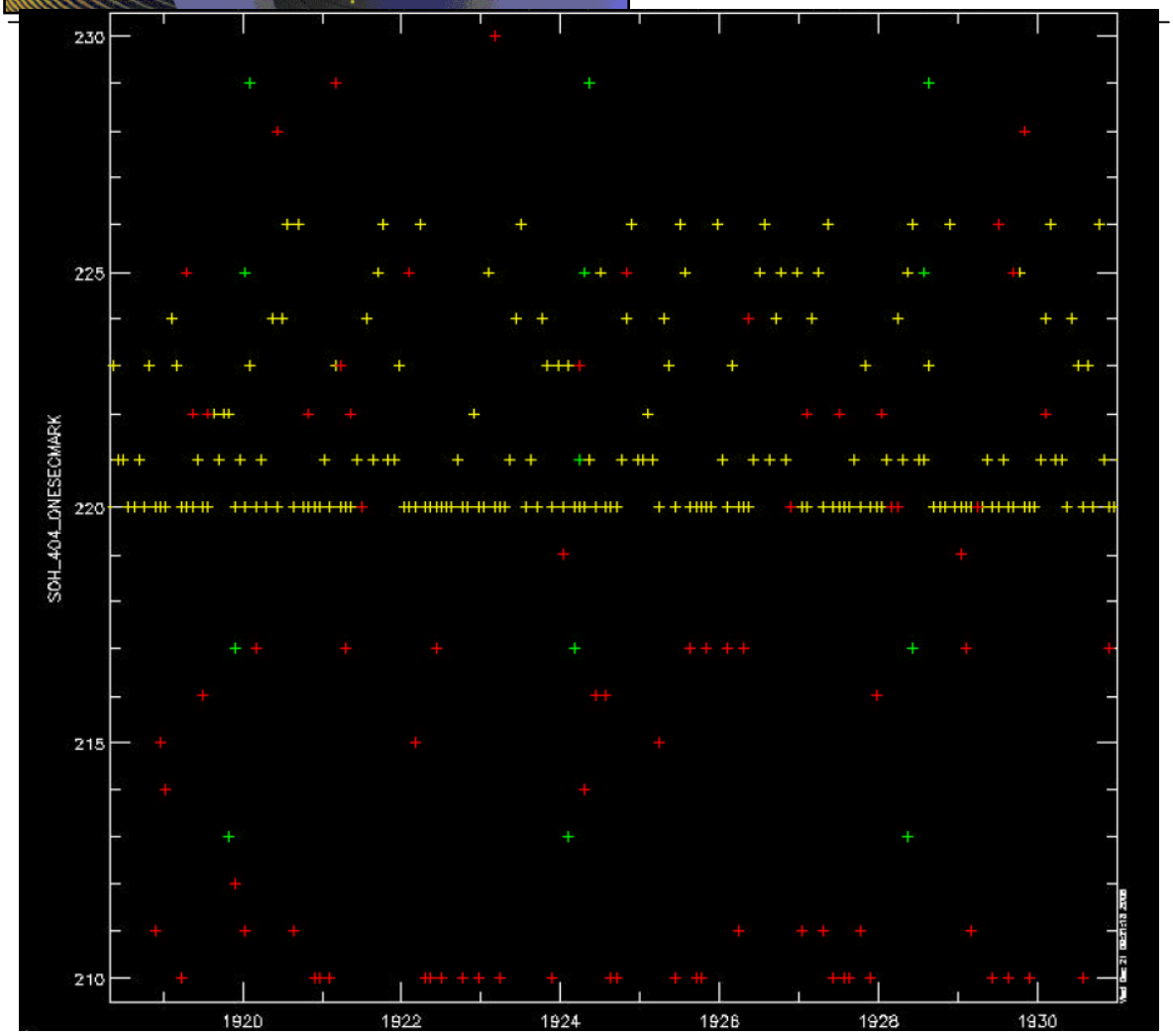

Figure 2. Expanded Plot of Time Field (Byte-by-byte)
Bytes#0-#3 (seconds) = [Violet, Dk Blue, Lt Blue, Green]
Bytes#4-#5 (subseconds) = [Yellow, Red]

The plot shows expanded subseconds (Yellow) go from 220 to 226, each of 1/256th of a second making a an apparent 23 msec jitter in the science data.