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MEMORANDUM

Date: May 12, 1999
From: M. Juda
To: Distribution
Subject: Time Tagging HRC Rates in NIL Mode
Re: HRC Time Tagging memo - February 28, 1996
File: `hrc_time_tagging_2.tex`

1 Introduction

In a previous memo (HRC Time Tagging - February 28, 1996), I described how to time-tag HRC telemetry in both "observing" and "next-in-line" (NIL) mode. That memo contains errors in its explanation of the time-tagging of the rate data when in both modes. This memo is an update that provides a correction to the time-tagging algorithm.

2 Observing Mode Rate Data

There are two samples of each of the rate data items (total, valid, and shield events) in every science frame. The previous memo incorrectly stated the the two samples corresponded to the two halves of the science frame. The two samples actually correspond to two consecutive, 1 second intervals, starting at the begining of the previous science frame. The last 0.05 seconds of the science frame are not included in the rate data.

If r_{ij} is the j-th rate sample ($j = 0$ or 1) from the i-th science frame ($i = 0$–15) within a major frame, T_{MF} is the time of the start of the major frame, and τ_{MF} is the duration of a major frame (32.8 seconds), then the time tag of the sample is given by:

$$T_{r_{ij}} = T_{\mathrm{MF}} + i\frac{\tau_{\mathrm{MF}}}{16} + (j-2) \times 1.000 \text{ sec} - 0.050 \text{ sec}.$$

3 NIL Mode Rate Data

There are two samples of each of the rate data items in every major frame of HRC NIL mode data. Unlike the observing mode case, the accumulation intervals for the two samples are not equal and do not both occur in the previous major frame.

The start of the accumulation interval of the first sample of each pair occurs 2.000 seconds after the start of science frame 14 (of 0-15) in the previous major frame. The end of the accumulation interval is 1.000 seconds after the start science frame 15. Thus this interval starts 2.100 seconds before the major frame the rate is telemetered in and lasts for 1.050 seconds. The start of the accumulation interval of the second sample of each pair is at the start of the major frame and lasts for 1.000 seconds.

Given the description above, the time-tags that should be applied to the two samples are:

$$T_{r_1} = T_{\mathrm{MF}} - 2.100$$

and

$$T_{r_2} = T_{\mathrm{MF}},$$

where T_{r_1} and T_{r_2} are the time-tags for the first and second samples respectively and T_{MF} is the start time of the major frame in which the samples are telemetered.