COS Calibration Platform D_2 Lamp Ignition Delays During Alignment and NDF Selection at CU

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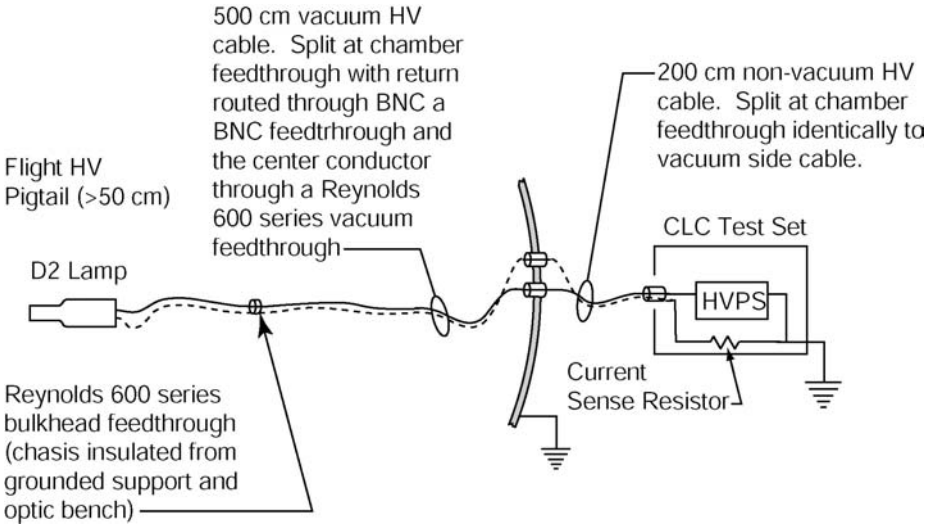
1. INTRODUCTION

This document describes the delayed ignition observed with the calibration platform flat field deuterium lamps during alignment and NDF selection. Delays ranging from 1 to 72 seconds were observed. Since the primary goal of efforts at CU was to align the deuterium lamps, and to select the neutral density filters, no effort was made to obtain sufficient statistics to characterize the distribution of the turn on delays. For roughly half of lamp operations, turn on behavior was noted, either as no delay, or with the delay time noted.

2. TEST SETUP

The lamps were powered using the CLC test set ('brass board power supply') in order to simulate the flight power supply as closely as possible. The only significant difference was that the power supply was not designed for vacuum operations, so it was separated from the lamps by an additional 700 cm of high voltage cable, and an additional bulkhead connector.



Light from the deuterium lamps was observed with a photomultiplier tube at the focus of the calibration platform, and count rates were shown with a 1 second update rate. The power supply output current was monitored using the 'D2 Lamp I Mon' jacks and a calibrated Fluke 87 DMM (see operation rules at end of this document).

3. DATA

Ignition delays were first observed with the original D2 lamps before the calibration platform was installed in the vacuum chamber. Intermittent delays continued to be observed for both vacuum and non vacuum operations. After the new lamps were installed, the delays continued to occur, at a somewhat higher frequency than before (no reliable statistics are available for the previous turn on delays).

Lamp startup involved setting the CLC to the desired current, and flipping the hv power switch, rather than starting the lamps at the low setting and then incrementally increasing the current. Ignition delays were observed at all settings. Observed D2 I Mon values were 1.44V, 3.40V and 8.26V for the minimum, nominal and maximum setting, respectively, corresponding to 2.87, 6.80 and 16.52mA delivered to the lamp.

The turnon performance for operations where the delay was recorded are listed below. When the lamps failed to ignite, no counts were observed on the PMT, and the D2 Lamp I Mon rose to 0.665V, indicating roughly 1.3mA draw (note that this was the same behavior as was observed with the power supply connected to an open circuit). Once the lamp ignited, the current monitor rose to the nominal level and the expected count rate was observed with the PMT.

D2 FF Lamp Turn On Summary

Date (yyyymmdd)	Primary FF Lamp		Secondary FF Lamp	
	Delay (sec)	Setting	Delay (sec)	Setting
20030109	3	Nominal	0	Nominal
20030111	10	Nominal	3	Nominal
20030111	0	Maximum	0	Maximum
20030113	0	Maximum	21	Maximum
20030113	62	Nominal	4	Nominal
20030114	0	Nominal	2	Nominal
20030114	0	Maximum	2	Maximum
20030121	0	Maximum	72	Maximum
20030121	10	Maximum	0	Maximum
20030129	5	Nominal	0	Nominal

4. CONCLUSIONS

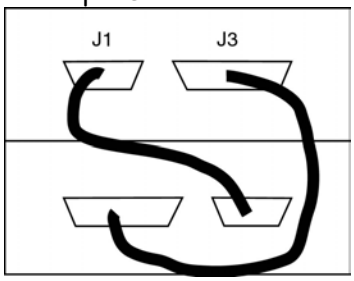
There is insufficient data to draw conclusions from these observations. It is worth noting that the consensus is that ionizing radiation can help initiate the arc in D2 lamps, so this problem should be less of an issue in orbit than on the ground. In addition, the failure of the lamps to turn on will not cause the instrument to go into safe mode, so an ignition delay will not impact observing efficiency significantly (the loss of 30 seconds of data on a 3600 second flat field is not an overwhelming concern). An actual ignition failure would necessitate the rescheduling of the flat field, so if the lamp fails to ignite when powered with the flight power supply, a restart procedure might be considered. This might involve a rate check at the detector, and if a reasonable rate is not observed, then the lamp would be powered down and restarted, and an appropriate error flag set.

CALIBRATION PLATFORM GSE POWER SUPPLY INSTRUCTIONS USED DURRING ALIGNMENT AND TESTING:

Calibration platform lamp operations using the GSE brass board power supply (BBPS)

Connections and input power:

- With the harness provided, connect the two 15 pin D connectors on the right side of the box to each other, and the two 25 pin D connectors to each other.



- Input +30VDC, 1A into "30VL" plugs on top of box (do not use "30VS or 30V MON).
- Input +5VDC, 100mA into 5V input plugs on top of box
- Note that black is common, red is hot (+)
- Do not provide power to 15V plugs
- Connect HV load (lamps) to lower set of Reynolds connectors on left side of box (do not use upper set of connectors – leave capped). D2 and Pt provide power to the Deuterium (flat field) lamps and the Platinum (spectral calibration) lamps, respectively.

Operations:

- For spectral cal (Pt) use Pt lamp, Side A, and select power level desired. Note current setting and duration for all operations. Current can be monitored using Pt Lamp I Mon plugs, with 1mA draw corresponding to 0.5V at the monitor.
- For flat field (D2) use D2 lamp, Side A, and select power level desired. Note current setting and duration for all operations. Current can be monitored using D2 Lamp I Mon plugs, with 1mA draw corresponding to 0.5V at the monitor.
- If there appears to be a problem, try toggling from side A to side B with the MEB Sel push button.