University of Michigan
Space Physics Research Laboratory

TIDI FLIGHT CALIBRATION SEQUENCE		
	CAGE No.	0TK63
	Drawing No.	055-3917
	Project	TIDI
	Contract No.	NASW-5-5049
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APPROVAL RECORD

Function	Name	Signature	Date
Originator	Wilbert Skinner		
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REVISION RECORD

Rev	Description	Date	Approval
	Initial Release	22-Nov-1999	
A	added data and science PIDS	30-Oct-2000	MC
B	added table cross referencing filter positions and spectral lamps	31-Oct-1999	WS
C	rearranged flight calibrations to reduce excess time	23-Mar-2001	WS
D	Added photon transfer for gain of 10 and 40, rearranged white light and spectral scans to keep wavelengths together	8-Feb-2002	WS
E			
F			

I. Introduction

This memo describes the routine calibrations to be performed by the TIDI instrument once operations commence. Special one time calibrations, or calibrations that are performed infrequently, or those that are part of the activation, are not discussed here. Section II of this memo provides the constraints of the calibration and Section III discusses the calibration sequence.

II. Assumptions and constraints

The following rules will be followed in designing the calibration modes:

1. A calibration will last no longer than about 5 minutes.
2. Calibrations will be performed at the spacecraft terminator, first as the spacecraft goes from day to night and any others will be as the spacecraft goes from night to day. Those that take the least time will be used on the night to day transition.
3. The calibration sequence will repeat every day.
4. The calibrations will consist of the same tests that comprise the EPET or the extended EPET unless otherwise noted.
5. There is no required order of data collection.
6. The telescopes can be exercised during the calibrations by using the scan tables.

III. Calibration sequence

Table 1 provides a list of the flight calibrations.

Table 1. TIDI flight calibration sequence

Sequence number	Description	Data PID	Science PID
1[1]	CCD bias at all 4 gains	110	110 (x4)
2	Inferred bias for gains of 5 and 10 electrons/count	190	190(x2)
3	Inferred bias for gains of 40 and 160 electrons/count	190	190(x2)
4	Images (see Table 3) fw1=5, fw2=1, background & white light fw1=5, fw2=1, background & neon lamp	NA	180
5	Images (see Table 3) fw1=6, fw2=6, background & white light fw1=6, fw2=8, background & white light	NA	180
6	Image (see Table 3)0 fw1=3, fw2=1, background & white light	NA	180
7	EPET photon transfer (160 electrons/count) (lamp on only)	100	160
8	extended EPET photon transfer (5 electrons/count) (lamp on only)	100	160
9	Inferred bias for 160 electrons/count , Background, white light and spectral lamps for sequence numbers 1-4 (see Table 2)	190 40	190 series of: 130 140 150
10	Inferred bias for 160 electrons/count (180s), Background, white light and spectral lamps for sequence numbers 5-10(see Table 2)	190 40	190 series of: 130 140 150
11	Inferred bias for 160 electrons/count (180s), Background, white light and spectral lamps for sequence numbers 11-15(see Table 2)	190 40	190 series of: 130 140 150
12	Inferred bias for 160 electrons/count (180s), Background, white light and spectral lamps for sequence numbers 16-21(see Table 2)	190 40	190 series of: 130 140 150
13	Inferred bias for 160 electrons/count (180s),	190	190

	Background, white light and spectral lamps for sequence numbers 22-25(see Table 2)	40	series of: 130 140 150
14	EPET photon transfer (40 electrons/count) (lamp on only)	100	160
15	EPET photon transfer (10 electrons/count) (lamp on only)	100	160

Notes:

1) Initial timing indicates this calibration should be performed on night to day transition.

The lamps to be used with the various filter combinations are shown in Table 2.

Table 2. Filter and spectral lamp cross reference

Sequence number	Filter 1	Filter 2	Integration time (s)	Filter Air Wavelength (nm)	Lamp	Spectral line wavelength (vacuum nm)
1	1	1	3.0	867.13	white	
2	1	1	5.0	867.13	HAK	Ar-867.03250
3	2	1	3.0	892.10	white	
4	2	1	3.0	892.10	neon	Ne-892.19450
5	3	1	8.0	866.12	white	
6	3	1	10.0	866.12	neon	Ne-865.78998
7	3	1	15.0	866.12	HAK	Ar-867.03250
8	4	1	5.0	765.00	white	
9	5	1	5.0	630.10	white	
10	5	1	1.0	630.10	neon	Ne-630.65325
11	7	1	10.0	557.80	white	
12	8	1	10.0	763.68	white	
13	8	1	0.125	763.68	HAK	Ar-763.72078
14	6	2	1.0	761.00	white	
15	6	2	0.2	761.00	HAK	Kr-760.36367
16	6	3	1.0	764.00	white	
17	6	3	0.125	764.00	HAK	Ar-763.72078
18	6	4	3.0	779.50	white	
19	6	5	10.0	589.40	white	
20	6	5	10.0	589.40	neon	Ne-558.35254
21	6	5	10.0	589.40	HAK	Ar-589.02160
22	6	6	12.5	557.20	white	
23	6	6	10.0	557.20	HAK	Kr-557.18353
24	6	7	3.0	844.8	white	
25	6	8	6.0	732.10	white	

Table 3 Instrument setup parameters for the CCD image test

Parameter	Image 1/2	Image 3/4	Image 5/6	Image 7/8	Image 9/10
Filter wheel 1	5	5	6	6	3
Filter wheel 2	1	1	6	8	1
Neon lamp	off	off/on	off	off	off
HAK lamp	off	off	off	off	off
White light 1	off	off	off	off	off
White light 2	off/on	off	off/on	off/on	off/on
Telescope shutters	closed	closed	closed	closed	closed
Telescope elevation position	NA	NA	NA	NA	NA
CCD gain	state d	state d	state d	state d	state d
Integration time	15 s	5 s	5 s	3 s	8s
Binning pattern	equal area	equal area	equal area	equal area	equal area
Number of samples at each integration time	1	1	1	1	1