

HIRDLS

TR-OXF-273
2nd release

HIGH RESOLUTION DYNAMICS LIMB SOUNDER

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Subject/Title:

IFC Essential Data Set for Integration

Description/Summary/Contents:

Summary data set including performance measurements, interface verification details.

Keywords:

In Flight Calibrator (IFC), Interface, Performance, Data

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EOS

IFC Essential Data Set Summary List for IFC Integration

1) Nominal Current Draw at Start-up in air (Heater off, HCW=00):

	<u>A-Side:</u>	<u>B-Side:</u>	
+5V input line:	68 mA	68 mA	
+15V input line:	48 mA	49 mA	
-15V input line:	44 mA	48 mA	Data Taken from final CPT (July 11, 2000)

2) Nominal Current Draw with Max Heater in Air (HCW=FF) -w/Flight BB connected

	<u>A-side:</u>	<u>B-side :</u>
+5V input line:	69 mA	71 mA
+15V input line:	115 mA	114 mA
-15V input line:	48 mA	48 mA

3) Nominal Current Draw with Max Heater (HCW=FF) -w/BEU connected to Dummy

	<u>A-side:</u>	<u>B-side:</u>	
+5V input line:	68 mA	71 mA	
+15V input line:	117 mA	114 mA	
-15V input line:	47 mA	49 mA	Data Taken from final CPT (July 11, 2000)

4) Nominal Telemetry Values when BEU connected to Flight BB (HCW=00)

	<u>A-side</u> <u>(counts)</u>	<u>A-side</u> <u>(Eng. Units)</u>	<u>B-side</u> <u>(counts)</u>	<u>B-side</u> <u>(Eng. Units)</u>
+5V_mon:	DE	5.0 v	DE	5.0 v
+15V_mon:	E8	15.0 v	EA	15.0 v
-15V_mon:	E7	-15.0 v	E8	-15.0 v
Rref_Temp:	7E	24 C	7B	24 C
PRT-1:	AE83-AE86*	295* K	AED1-AED3*	295* K
PRT-2:	AEC7-AEC9*	295* K	AEB9-AEBA *	295* K
PRT-3:	AED0-AED2*	295* K	AEC6 - AEC9 *	295* K

Note *: Data Taken during T-Vac on July 6, 2000 (11:09-11:30)

-- Chamber Temp 23-25°C

-- Chamber pressure questionable, < 30 minutes pumping time passed

-- Chamber required 3.5hr to reach 4×10^{-5} mb

5) Nominal Telemetry Values (when BEU connected to Dummy BB)

	<u>A-side</u> <u>(counts)</u>	<u>A-side</u> <u>(Eng. Units)</u>	<u>B-side</u> <u>(counts)</u>	<u>B-side</u> <u>(Eng. Units)</u>
+5V_mon:	DE	5.01 v	E0	5.04 v
+15V_mon:	E9	14.98 v	EF	15.37 v
-15V_mon:	E7	14.92 v	EE	15.35 v
Rref_Temp:	7F	24 C	7E	24 C
PRT-1:	AFBD	295.9 K	AFC6	295.9 K
PRT-2:	ABC9	293.4 K	ABCD	293.4 K
PRT-3:	A707	290.3 K	A7DD	290.8 K

6) Maximum Temperature BB can achieve in air
Max Temp = 303 K (ambient room temp = 293 K)

7) IFC Warm-up profile in air

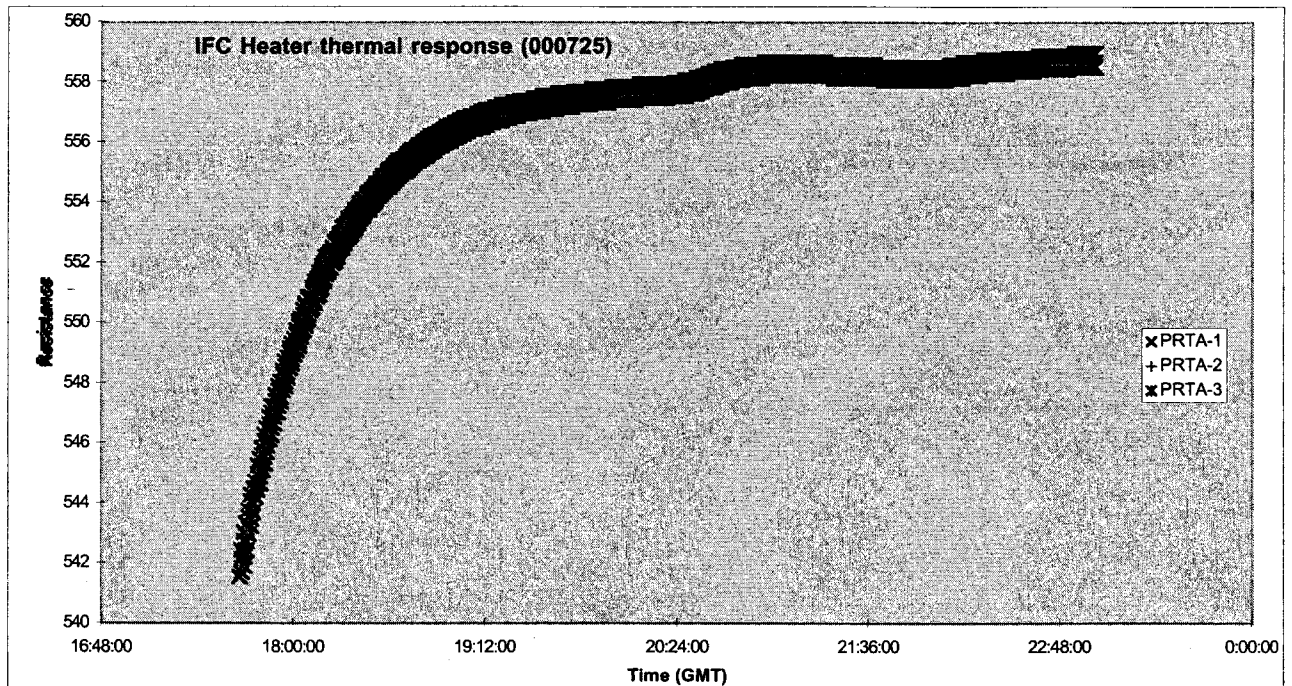


Figure 7
IFC Warm-up profile (in air)

8) Maximum Temperature BB can achieve in vacuum
Max Temp = 312 K (ambient chamber temp = 264 K)

9) IFC Warm-up profile in vacuum

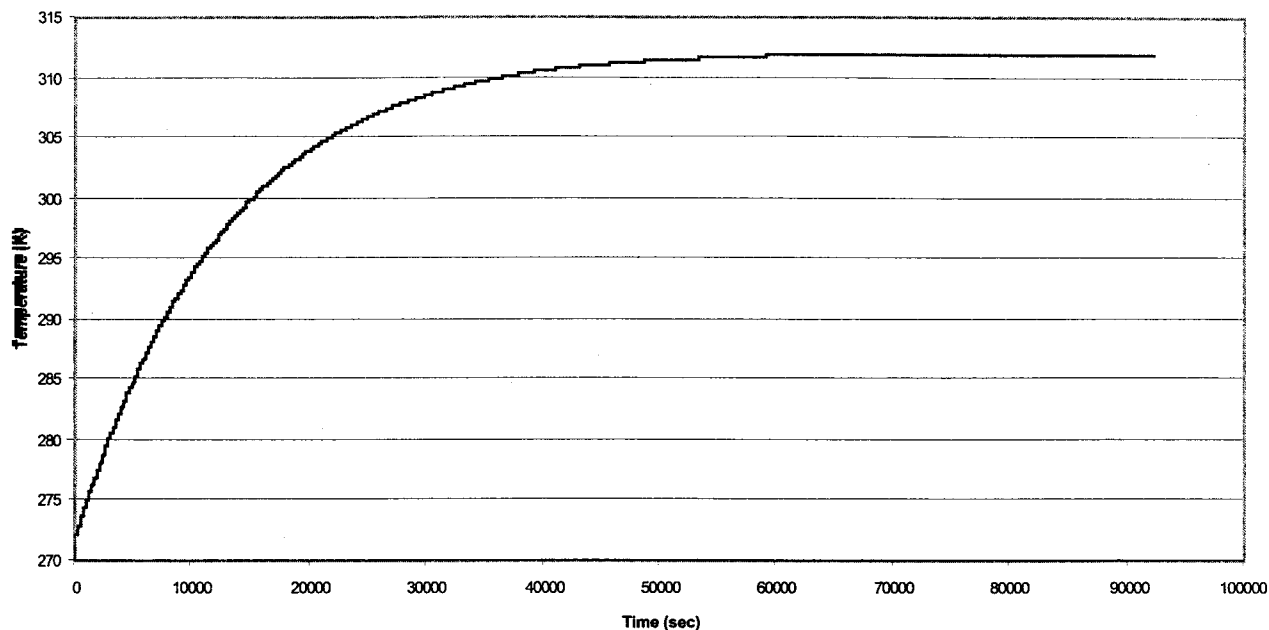


Figure 9
IFC Warm-up profile (vacuum)

Data: measurements during T/V 7Jul00 & Model ref. TC-OXF-265

10) PRT Telemetry Calibration/Conversion Polynomials

The polynomials which must be incorporated into the IEGSE to convert Black Body PRT telemetry counts into calibrated temperatures are as follows:

$$S(T) = a(1) + a(2) \cdot T + a(3) \cdot T^2$$

(T is in C, S is in BEU counts)

	a(1)	a(2)	a(3)
PRT A-1	35748.1899	402.416493	-0.0599695392
PRT A-2	35812.1400	402.665154	-0.0604901547
PRT A-3	35821.0250	402.758875	-0.0608033929
PRT B-1	35788.5651	402.552748	-0.0604291321
PRT B-2	35800.5548	402.691701	-0.0619758978
PRT B-3	35817.9227	402.623124	-0.0605965206

Notes: It is expected that these calibration/conversion polynomials also correct for individual offsets.
These data are not to be used for flight data processing.

11) Engineering Telemetry Conversion Polynomials

The polynomials which must be incorporated into the IEGSE to convert Black Body Engineering telemetry counts (Decimal) into Engineering Units are as follows:

Side-A

+5V_mon:	$2.250 \times 10^{-2} \times C$	Converts Telemetry counts to volts
+15V_mon:	$6.430 \times 10^{-2} \times C$	Converts Telemetry counts to volts
-15V_mon:	$6.460 \times 10^{-2} \times C$	Converts Telemetry counts to volts

Rref_temp: $172.7 - 31.778 \cdot \ln(C)$ Converts Telemetry counts to degrees C

Side-B

+5V_mon: $2.250 \times 10^{-2} \times C$ Converts Telemetry counts to volts

+15V_mon: $6.430 \times 10^{-2} \times C$ Converts Telemetry counts to volts

-15V_mon: $6.450 \times 10^{-2} \times C$ Converts Telemetry counts to volts

Rref_temp: $171.7 - 31.778 \cdot \ln(C)$ Converts Telemetry counts to degrees C

12) PRT Noise Performance

A) The noise (1σ) observed on each PRT output for each PRT Channel is nominally as follows:

PRT A-1: 0.45 counts

PRT B-1: 0.54 counts

PRT A-1: 1.3 mK

PRT B-1: 1.4 mK

PRT A-2: 0.55 counts

PRT B-2: 0.46 counts

PRT A-2: 1.4 mK

PRT B-2: 1.3 mK

PRT A-3: 0.48 counts

PRT B-3: 0.52 counts

PRT A-3: 1.3 mK

PRT B-3: 1.4 mK

B) Provide Noise plots of each PRT during Thermal Vacuum Testing after the Flight BB was Integrated as follows:

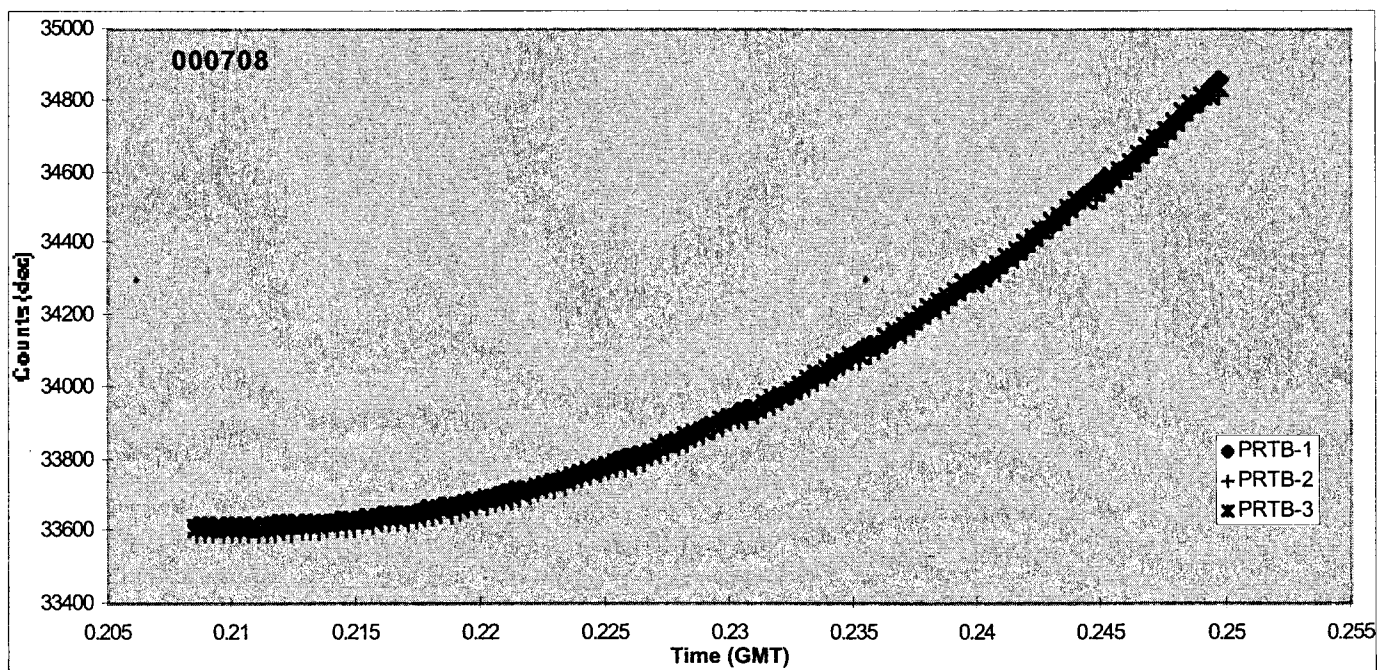
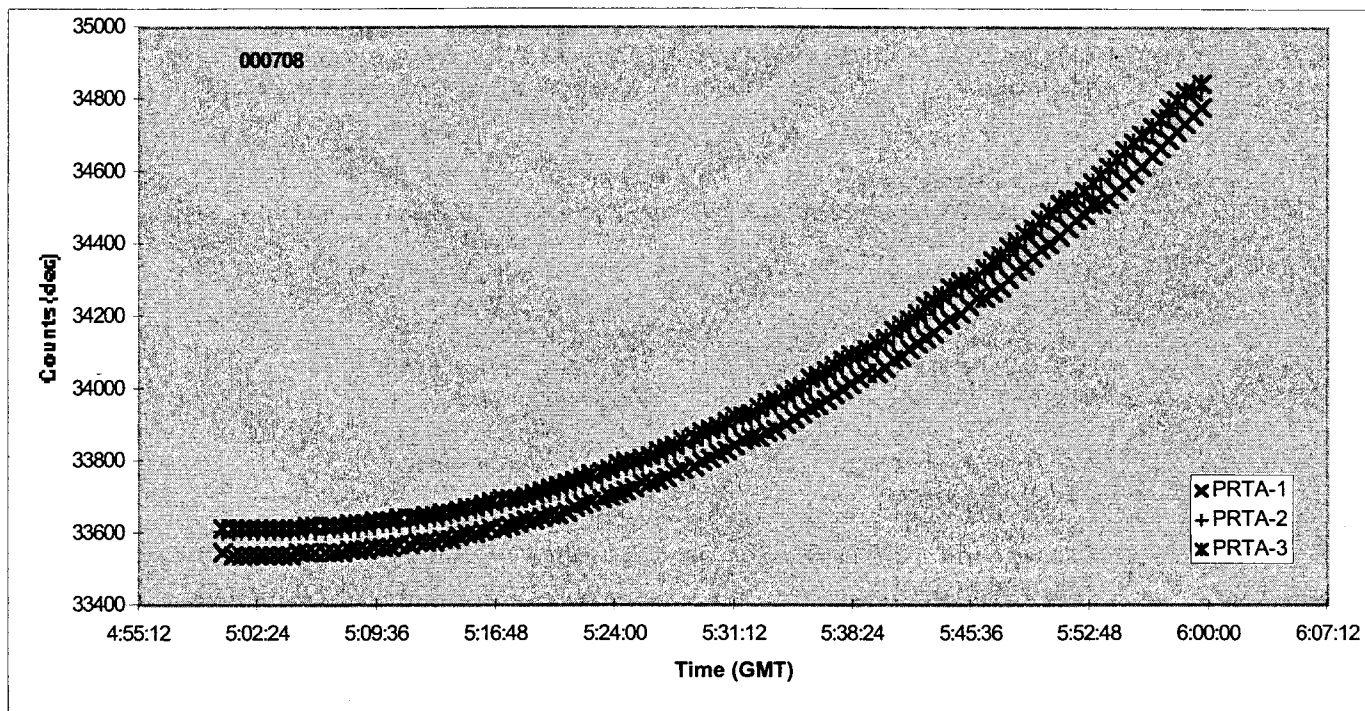


Figure 12-1
PRT Noise in vacuum @ Min Op Temperature

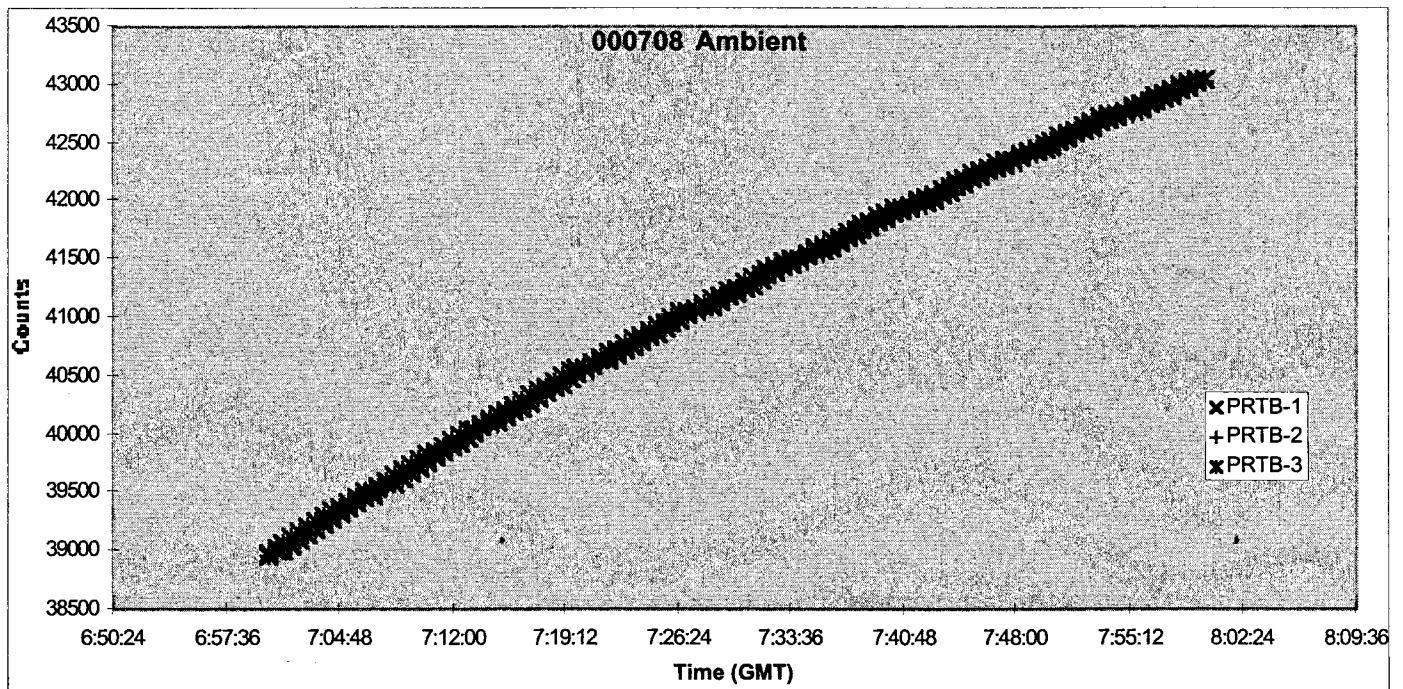
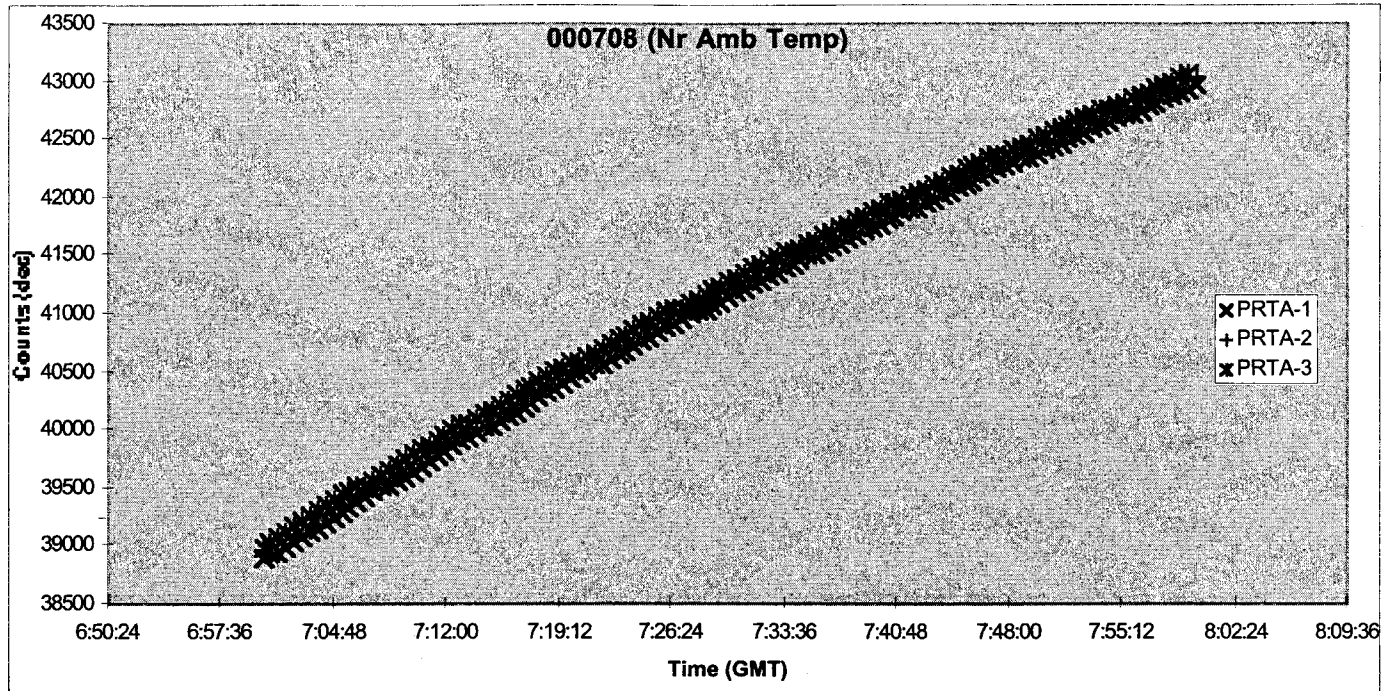


Figure 12-2
PRT Noise in vacuum @ Nominal Op Temperature

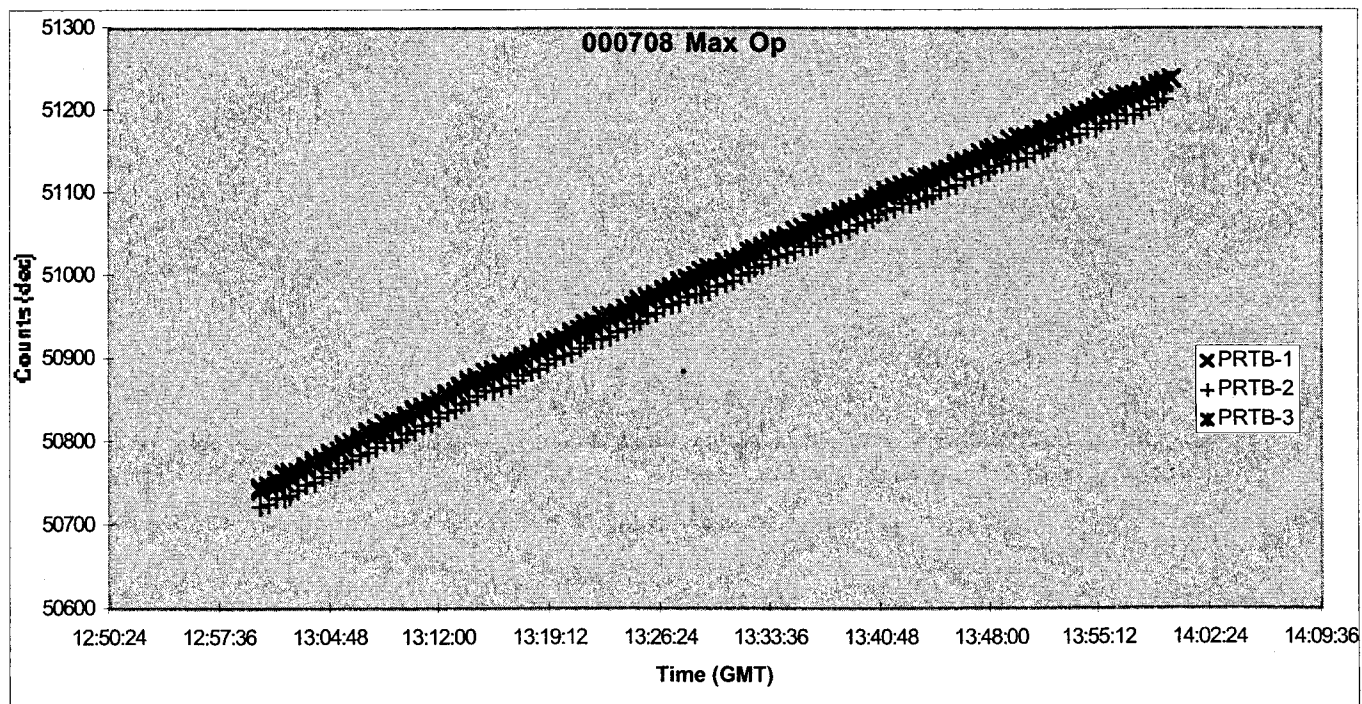
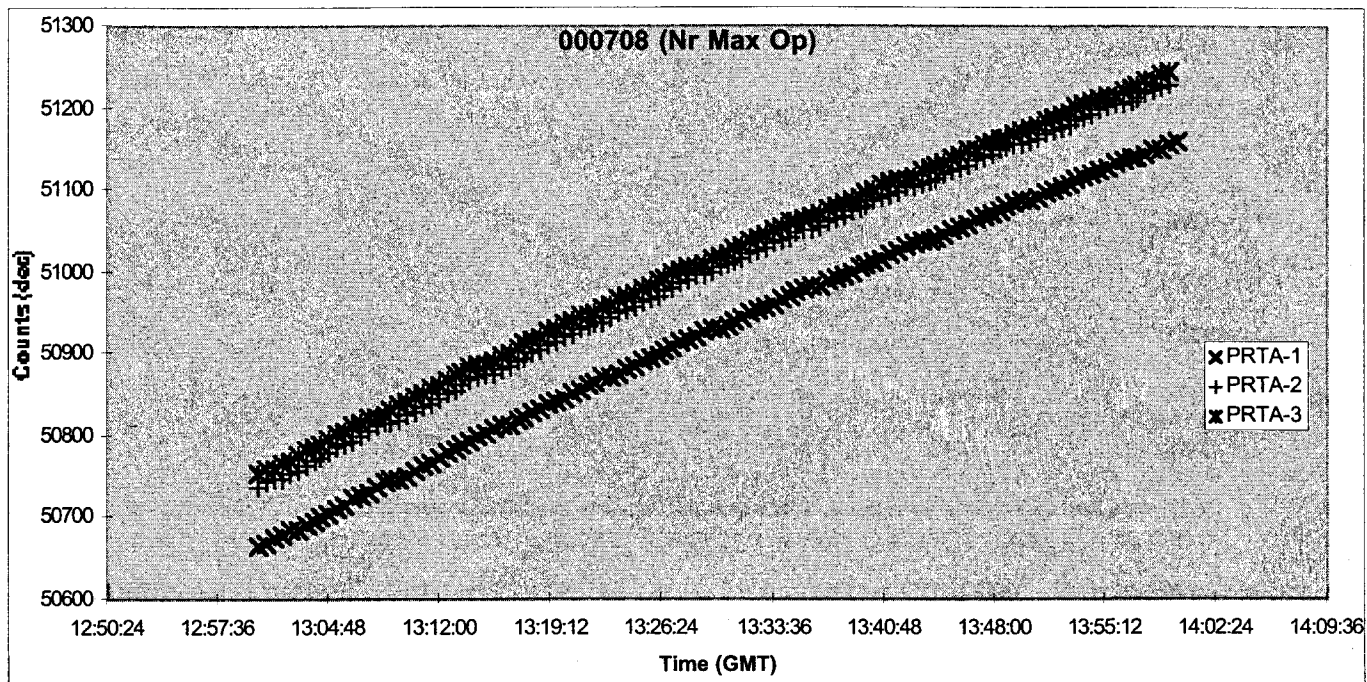


Figure 12-3
PRT Noise in vacuum @ Maximum Temperature

13) Engineering Telemetry Noise Performance

The noise (1σ) observed on each Engineering Telemetry output is nominally as follows:

+5V_mon: 0.2 counts, 0.01 volts
+15V_mon: 0.2 counts, 0.01 volts
-15V_mon: 0.2 counts, 0.01 volts
Rref_temp: 0.2 counts, ??? C

Data from CPT 11Jul00

16) IFC Measured Mass

BEU: 2.230 kg
IFC BB: 0.666 kg
Cable: 0.220 kg
Total: 3.116 kg

17) IFC BB wiring diagram showing the physical location and wiring of the PRT's and AD-590's

Note: Bob Watkins provided this and it is in the Data package box.

18) Mechanical Inspection Data

BEU Footprint (hole-to-hole spacing)

	measured	required	
Hole Pitch (A1 LRCF)	107.01 \pm 0.05	107.0 \pm 0.1	mm
Hole Pitch (A2 LRCF)	188.85 \pm 0.05	189.0 \pm 0.1	mm
Hole diameter	4.52 \pm 0.05	4.5 - 4.6	mm

BEU Envelope

Height (A3 LRCF)	81.0* \pm 0.1	81.0* \pm 0.1	mm
Length (A1 LRCF)	239.7 \pm 0.1	240.0 \pm 0.1	mm
Width - widest (A2 LRCF)	204.8 \pm 0.05	205 \pm 0.1	mm
Width - @ top (A2 LRCF)	172.7 \pm 0.05	not specified	mm

BB Footprint (hole-to-hole spacing)

Mounting hole PCD	87.975 \pm 0.010	88.0 \pm 0.1	mm
Hole separation (degrees from REF hole)			deg
	49.94 \pm 0.05	50.0 \pm 0.1	
	89.95 \pm 0.05	90.0 \pm 0.1	
	134.93 \pm 0.05	135.0 \pm 0.1	
	179.91 \pm 0.05	180.0 \pm 0.1	
	270.07 \pm 0.05	270.0 \pm 0.1	
	310.06 \pm 0.05	310.0 \pm 0.1	
Spigot O/D	79.973 \pm 0.010	79.971-79.990	mm

IFCBB Aperture size & Rotational Alignment (LRCF)
Due after re-assembly

19) Contamination Control

Out gassing verification: TQCM < 23 Hz/Hr (~2E-11g/cm2*sec)
Particulate level: To follow.

