GIADA FS MODEL

REPORT ON
IN FLIGHT ACTIVE PAYLOAD CHECKOUT N. 4 (PC4)
performed on
24/25-11-2006 and 04-12-2006

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REV	DOCUMENT CHANGE ORDER	DATE	CHANGES DESCRIPTION	PREPARED
0	-	12-03-2007	First issue	GIADA Team

1. SCOPE AND APPLICABILITY

The Active Payload Checkout n. 4 (PC4) test is the first in a number of active Payload checkouts performed during Rosetta cruise to be carried out before any major activity during the Rosetta Cruise phase. Payload Checkouts 0-3 were passive. It consists of 2 phases. The 1st phase is a passive test (GD01) similar to the previous Passive Payload Checkouts n. 0-3, the 2nd phase is an active test (GD02 and GD03) performing and checking new commands.

The passive test was executed on 24-25 November 2006 by switching on Main and Redundant I/Fs in sequence and executing similar procedures for the two cases. The active test was executed on 04 December 2006 and only the timeline GD02 was performed. A NOGO was issued by GIADA Team for the GD03 due to the partial failure of GD02.

This document reports the results obtained on GIADA experiment during PC4.

This report is applicable to GIADA FS model on board the Rosetta S/C. The data were retrieved from DDS by means of the PI Workstation located at INAF - Osservatorio Astronomico di Capodimonte in Naples.

GIADA IWS software configuration is GES v. 4.2.2 plus RSOC Converter v. 1.1.2. GIADA in flight software configuration is 2.3 plus three additional patches (one more patch is used to update the context file).

2. REFERENCES

2.1 APPLICABLE DOCUMENT

AD1	RO-EST-RS-3001/EID A	ROSETTA Experiment Interface Document – Part A
AD2	RO-EST-RS-3009/EIDB	ROSETTA GIADA Experiment Interface Document – Part B
AD3	RO-ESC-PL-5000 – last issue	Flight Control Procedure
AD4	GIA-GAL-MA-007 Issue 4	GIADA Flight Spare Experiment User Manual

2.2 REFERENCE DOCUMENT

	None.	

3. DEFINITIONS AND ABBREVIATIONS

3.1 ABBREVIATIONS

CAL	Calibration
CF	Context File
CREP	Cover REPort
CT	Context Table
DDS	Data Disposition System
EGSE	Electrical Ground Support Equipment
EQM	Electrical Qualification Model
ESA	European Space Agency
FCP	Flight Control Procedure
FS	Flight Spare
GDS	Grain Detection System
GES	GIADA EGSE SW
GIADA	Grain Impact Analyser and Dust Accumulator
HK	House Keeping
I/F	InterFace
INAF-OAC	INAF - Osservatorio Astronomico di Capodimonte – Napoli (I)
IRQ	Interrupt ReQuest
IS	Impact Sensor
IWS	Instrument Work-Station
MBS	Micro Balance System
ME	Main Electronics
MTL	Mission TimeLine
MON	Monitor
OBCP	On-Board Control Procedure
PC	Payload Checkout
PI	Principal Investigator
PS	GIADA Power Supply
PZT	(IS) Piezoelectric Sensor
RED	Redundant
REV	Revision
RMOC	Rosetta Mission Operation Centre
RSOC	Rosetta Science Operation Centre
S/C	(Rosetta) Spacecraft
S/S	(GIADA) Sub-system (e.g. IS or GDS or MBS)
SCI	Scientific
SSC	Source Sequence Count
SSMM	Solid State Mass Memory on-board of Rosetta Spacecraft
SW	Software
TC	TeleCommand
TM	Telemetry
UM	User Manual
UTC	Coordinated Universal Time
VC0	Virtual Channel 0 (Real Time TM packets)
VC1	Virtual Channel 1 (TM packets coming from Mass Memory)

4. DESCRIPTION OF ACTIVITIES

The Active Payload Checkout n. 4 (PC4) was performed on 24/25-11-2006 (passive test) and on 04-12-2006 (active test) according to the timelines reported in Section 11. Commands were previously loaded in the Rosetta S/C and sent to GIADA via MTL.

Starting with PC2, some new FCPs have been used, together with other FCPs already validated in the previous GIADA Commissioning phases. The two timelines used for Main and Red I/F (see below) in GD01 are similar to the PC2 timelines, but for the timing that was revised in order to correct the too short time intervals between commands, that were used in PC2 and generated some problems.

The plan of activities referred to as passive part of PC4 foresees the following steps for the Main Interface (for the parameters values see timelines in Section 11.1):

Sequence	**Timeline GD01 – Main Interface**

AGDS001A	VGD0001B = "nom. Branch" [ENG] \ # GIADA on Main IF
	VGD0001A = "YES" [ENG]) # Context exists

AGDS002A	Patch CT v. flight 1
AGDS003A	Patch SW v.2.3
AGDS035A	Go to Cover Mode
AGDF090A	Open cover
AGDS065A	Go to Safe mode
AGDS110A	Go to Normal mode (science enabled)
AGDS038A	Set **GDS L/R** receiver thresholds to **1.6/1.18 V**
AGDS037A	Set IS Off
AGDS036A	Set IS **PZTA/B/C/D/E** threshold to **0.05/0.05/0.15/0.05/0.20 V** **Range = L – Gain = H/H/H/H/H**
AGDS037A	Set IS On
AGDS120A	Calibrate GDS – IS – MBS at 5 min intervals
AGDF100A	Self-interference test
AGDF055A	MBS # 1-2-3-4-5 heating
AGDF060A	GIADA Switch-off (with Cover close operation in the Power-off OBCP)

followed by similar steps for the Red I/F (for the parameters values see timelines in Section 11.2):

Sequence	**Timeline GD01 – Redundant Interface**

AGDS001A	VGD0001B = "red. branch" [ENG] \ # GIADA on Red IF
	VGD0001A = "YES" [ENG]) # Context exists

AGDS002A	Patch CT v. flight 1
AGDS003A	Patch SW v.2.3
AGDS035A	Go to Cover Mode
AGDF090A	Open cover
AGDS065A	Go to Safe mode
AGDS110A	Go to Normal mode (science enabled)
AGDS038A	Set **GDS L/R** receiver thresholds to **1.6/1.18 V**
AGDS037A	Set IS Off

Sequence	**Timeline GD01 – Redundant Interface**
AGDS036A	Set IS **PZTA/B/C/D/E** threshold to **0.05/0.05/0.15/0.05/0.20 V** **Range** = **L** – **Gain** = **H/H/H/H/H**
AGDS037A	Set IS On
AGDS120A	Calibrate GDS – IS – MBS at 5 min intervals
AGDF100A	Self-interference test
AGDF055A	MBS # 1-2-3-4-5 heating
AGDF060A	GIADA Switch-off (with Cover close operation in the Power-off OBCP)

Settings of Thresholds and Parameters are reported in bold.

The two plans of activities referred to as active part of PC4 are reported below (for the parameters values see timelines in Sections 11.3 and 11.4):

Sequence	**Timeline GD02 – Main Interface**

AGDS001A	VGD0001B = "nom. branch" [ENG] \ # GIADA on Main IF
	VGD0001A = "YES" [ENG]) # Context exists

AGDS002A	Patch CT v. flight 1
AGDS003A	Patch SW v.2.3
AGDS035A	Go to Cover Mode
AGDF090A	Open cover
AGDS065A	Go to Safe mode
AGDS004A	GD Patch CT in RAM
AGDS006A	GD Patch CT in NVRAM
AGDS110A	Go to Normal mode (science enabled)
AGDS038A	Set **GDS L/R** receiver thresholds to **1.6/1.18 V**
AGDS037A	Set IS Off
AGDS036A	Set IS **PZTA/B/C/D/E** threshold to **0.05/0.05/0.15/0.05/0.20 V** **Range** = **L** – **Gain** = **H/H/H/H/H**
AGDS037A	Set IS On
AGDS120A	Calibrate GDS – IS – MBS at 5 min intervals
AGDF100A	Self-interference test
AGDF060A	GIADA Switch-off (with Cover close operation in the Power-off OBCP)

Sequence	**Timeline GD03 – Main Interface**

AGDS001A	VGD0001B = "nom. branch" [ENG] \ # GIADA on Main IF
	VGD0001A = "YES" [ENG]) # Context exists

AGDS003A	Patch SW v.2.3
AGDS035A	Go to Cover Mode
AGDF090A	Open cover
AGDS065A	Go to Safe mode
AGDS110A	Go to Normal mode (science enabled)
AGDS038A	Set **GDS L/R** receiver thresholds to **1.6/1.18 V**
AGDS037A	Set IS Off

Sequence	**Timeline GD03 – Main Interface**
AGDS036A	Set IS **PZTA/B/C/D/E** threshold to **0.05/0.05/0.15/0.05/0.20 V** **Range = L – Gain = H/H/H/H/H**
AGDS037A	Set IS On
AGDS120A	Calibrate GDS – IS – MBS at 5 min intervals
AGDF100A	Self-interference test
AGDF060A	GIADA Switch-off (with Cover close operation in the Power-off OBCP)

Newly defined FCPs are reported in bold-italic in the previous list; settings of Thresholds and Parameters are instead reported in bold.

The data were off-line elaborated on the PI IWS at INAF-OAC in Naples.

5. SUMMARY OF DATA ANALYSIS

The full sets of plots about Housekeeping and Science data are reported in Sections 7 and 9 respectively for the passive test (named GD01 in ESA documents) and the active test (GD02; GD03 was foreseen but not executed as explained below) on the Main I/F and in Section 8 for passive test on the Red I/F.

Here following the main findings are summarized.

5.1 GENERAL CONSIDERATIONS

The passive test started on "Fri Nov 24 2006 14:01:09.577264", when the first TM packet was received from GIADA switched on the Main interface. The last TM packet on the Main interface was received on "Sat Nov 25 2006 01:37:59.815116. The passive test on the Redundant interface started on "Sat Nov 25 2006 02:01:09.584893" (1st packet received) and ended on "Sat Nov 25 2006 13:37:59.322745" (last packet received).

The active test was performed on the Main interface; it started on "Mon Dec 04 2006 16:06:13.731161" (1st packet received) and ended on "Mon Dec 04 2006 19:53:03.405439" (last packet received).

The first expected packet **(Connection Report, service 17,2) was not received** in the time window of the test, probably because the DDS has marked it with a wrong UTC time, being an unsynchronised time tag (bad time quality) TM report. As understood after iteration with RMOC people, this is a nominal situation for unsynchronised TM packets that are not received in real time; in this condition the DDS system cannot distinguish for how long the packet was stored in SSMM.

All expected steps were correctly executed, but the **TC for patching the CF in NVRAM, that was refused by GIADA due to inconsistent memory address as defined in the TC**. This problem was traced by ESA in the anomaly report ROS_SC-117, issued 8-12-2006. The origin of the problem was clearly identified in a wrong definition of the "START_ADDRESS" value for NVRAM location of CF (correct value = 10000008 instead of 8 <dec>) It was agreed, for the future, to test this and any new TC on EQM before using it on the flying unit.

Note that during the active test on the Main I/F the patch status has changed his value from 7 to 1 on Mon Dec 04 2006 16:42:03, due to the TC patching the CF in NVRAM. This was expected.

At the 3rd IS power-on both on Main I/F (Sat Nov 25 2006 00:15:01) and Red I/F (Sat Nov 25 2006 12:15:00) for passive test and on Main I/F (Mon Dec 04 2006 19:30:01) for active test, the event **"*Hardware error in IS event detection circuitry. No IRQ received*."** was received (see TCTM report file resident in the log directory of GES). This is a false message produced by the ME of GIADA when the IS electronics is powered-on. This is a known problem.

Except for the mentioned "lost event", no packet were lost, neither HK nor SCI TM; this means that **SSMM memory allocated to GIADA (1 Mbytes) is not saturated.** About HK TM see Figure 7.1-8 and Figure 7.1-9 for Main I/F (passive test), Figure 8.1-8 and Figure 8.1-9 for Red I/F (passive test), Figure 9.1-8 and Figure 9.1-9 for Main I/F (active test). About SCI TM the previous considerations were deduced from TCTM report file resident in the log directory of GES.

The behaviour of the cover during the different open-close operations was monitored by the **"Cover Reports" (CREP)**. About these see Figure 7.2-1 and Figure 7.2-2 for Main–open and Main–close respectively (passive test), Figure 8.2-1 and Figure 8.2-2 for Red–open and Red–close respectively (passive test), Figure 9.2-1 and Figure 9.2-2 for Main–open and Main–close respectively (active test). The reports testify a **nominal behaviour** of the open-close operations, but the CREP generated by the EGSE SW shows an anomalous coincidence of "Begin time of operation" and "End time of operation" for both "open cover" (section 9.2.1) and "close cover" (section 9.2.2) on the Main I/F (active test). This problem was already flagged and explained during PC2 data analysis. In fact, a revision of on-ground data has demonstrated that this problem was already present in previous tests. A careful analysis of TM data has shown that the behaviour of GIADA is nominal and the time data provided by the experiment are as expected. The cause of the anomalous coincidence is identified in a bug in the conversion from the Hex time stamp values to the Dec time stamp values operated by the GES SW. Possibly it is due to the roundoff in the HEX to DEC conversion that can vary between 0 and 16 seconds. As a consequence, the identified problem in the GES was flagged in the GIADA User Manual and shall have to be recovered as soon as possible in future updating of the GIADA EGSE SW.

5.2 GIADA STATUS

The **current consumption** and **power supply temperatures** (Main on passive test: Figure 7.1-7; Red on passive test: Figure 8.1-7; Main on active test: Figure 9.1-7) are in line with nominal evolution of operative modes (Main on passive test: Figure 7.1-6; Red on passive test: Figure 8.1-6; Main on active test: Figure 9.1-6).

Power values must be compared with soft and hard limits reported in GIADA FS UM (**AD4**) and summarized in Table 5.2-1.

As reported in GIADA FS UM (AD4), the Soft and Hard Alarm Limits for Power consumption in Table 5.2-1 for parameters NGDD0086, NGDD0087 and/or NGDD0088 refer to the different GIADA operating modes. The Soft Alarm Limits in Normal and Flux Modes refer to nominal conditions, i.e. with all sub-systems switched ON. This means that when GIADA is in Normal Mode, but not with all sub-systems ON (or in Flux with MBS OFF), the Soft Alarm Limits indicated in the Table can be overcome. In order to avoid flood of Out Of Limits (OOL) alarms, it has been decided (July 2006) to refer the Hard Alarm Limits to the extreme instrument status for each mode (e.g., in normal mode, with all subsystems off – lower – or at maximum power consumption - upper). Other configurations not related to real GIADA failure may still give OOL, related to operation in non nominal temperature conditions, although such conditions have never been experienced so far.

In general, all **functional parameters** measured during the PC4 test behave as expected.

In previous in flight tests different values of **current on the 5 V line** between Main (1050 mA) and Red (< 1000 mA) I/Fs were measured. A deeper analysis of the causes of this effect has evidenced a ***wrong digitalization of the CAL factors*** in the conversion tables of the PI EGSE SW. This problem has been fixed starting from the analysis of the PC2 data, so that the inconsistency between Main (Figure 7.1-6, Figure 9.1-6) and Redundant (Figure 8.1-6) I/Fs has been removed and the measured values of current on the 5 V line are now only slightly different: Main ≈ 1100 mA, Red ≈ 1080 mA.

QUANTITY	NAME	LNAME	SOFT ALARM LIMITS		HARD ALARM LIMITS	
			Lower	Higher	Lower	Higher
+5V Power Consumption ([1])	NGDD0086	Current +5V	110 mA	150 mA	80 mA	180 mA
+15V Power Consumption ([1])	NGDD0087	Current +15V	30 mA	60 mA	20 mA	70 mA
-15V Power Consumption ([1])	NGDD0088	Current -15V	50 mA	90 mA	40 mA	100 mA
+5V Power Consumption ([2])	NGDD0086	Current +5V	110 mA	150 mA	80 mA	180 mA
+15V Power Consumption ([2])	NGDD0087	Current +15V	30 mA	600 mA	20 mA	700 mA
-15V Power Consumption ([2])	NGDD0088	Current -15V	50 mA	600 mA	40 mA	700 mA
+5V Power Consumption ([3])	NGDD0086	Current +5V	800 mA	1600 mA	100 mA	1800 mA
+15V Power Consumption ([3])	NGDD0087	Current +15V	350 mA	550 mA	20 mA	600 mA
-15V Power Consumption ([3])	NGDD0088	Current -15V	250 mA	350 mA	50 mA	400 mA
+5V Power Consumption ([4])	NGDD0086	Current +5V	110 mA	170 mA	100 mA	1500 mA
+15V Power Consumption ([4])	NGDD0087	Current +15V	140 mA	200 mA	20 mA	220 mA
-15V Power Consumption ([4])	NGDD0088	Current -15V	75 mA	135 mA	50 mA	155 mA

Table 5.2-1. Hard and Soft limits for GIADA FS power consumption

([1]) Safe mode ([2]) Cover mode ([3]) Normal mode ([4]) Flux mode

All **Temperatures** behave as expected (Main on passive test: Figure 7.1-2, Figure 7.1-3, Figure 7.1-4; Red on passive test: Figure 8.1-2, Figure 8.1-3, Figure 8.1-4; Main on active test: Figure 9.1-2, Figure 9.1-3, Figure 9.1-4). The trend of the IS Temperature is more noisy with the Main than with the Red I/F (Main on passive test: Figure 7.4-4; Red on passive test: Figure 8.4-4; Main on active test: Figure 9.4-4).

In previous in flight tests the behaviour of the **GDS Laser 1 Monitor vs. Temperature** presented an *offset* between Main and Red measurements. This effect was simply due to a ***wrong digitalization of the CAL factors*** in the conversion tables of the PI EGSE SW and has been fixed for the analysis of the PC4 data (see Figure 7.3-5, Figure 8.3-5, Figure 9.3-5 and Figure 10.1-1).

The detection **Thresholds** applied on GDS are shown in Figure 7.3-2 (Main on passive test), Figure 8.3-2 (Red on passive test) and Figure 9.3-2 (Main on active test), while those applied to PZT3 and PZT5 of IS are shown in Figure 7.4-2 and Figure 7.4-3 (Main on passive test), Figure 8.4-2 and Figure 8.4-3 (Red on passive test), Figure 9.4-2 and Figure 9.4-3 (Main on active test). Moreover, Range and Gain for IS are set as shown in Table 5.2-2.

RANGE	GAIN				
	PZTA	PZTB	PZTC	PZTD	PZTE
Low	High	High	High	High	High

Table 5.2-2. IS Range and Gain configuration

About **scientific data** we notice the following points.

During PC4 the Sun was not in the GDS detectors FoV, so that saturation of GDS output did NOT occur. Therefore, it is possible to evaluate the effect of internal stray-light. The **GDS CAL data** show for the **GDS Left side** an output level of about **0.7-0.8 V** and for the **GDS Right side** a level around **0.18 V** (Main on passive test: Figure 7.3-10; Red on passive test: Figure 8.3-10; Main on active test: Figure 9.3-10). These values are compatible with previous measurements.

Since there is NO saturation, some **GDS scientific events** are detected. On the Main I/F (passive test) 113 events are detected on the GDS Left detector and 26 on the GDS Right detector (Figure 7.3-9); on the Red I/F (passive test) 56 events are detected on the GDS Left detector and 15 on the GDS Right detector (Figure 8.3-9); on the Main I/F (active test) 103 events are detected on the GDS Left detector and 4 on the GDS Right detector (Figure 9.3-9). Most of them are at the saturation limit of 6.9 V and do not occur in coincidence with other GIADA transitions.

The "**Dust Monitor**" presents the following results: 12 single detections, 9 double detections and 6 triple detection on the Main I/F – passive test (Figure 7.4-12); 27 single detections and 6 double detections on the Red I/F – passive test (Figure 8.4-12); 33 single detections and 6 double detections on the Main I/F – active test (Figure 9.4-12). During PC2 test hundreds of single detections occurred; these were related to the detections by the PZT-E (or 5) at 0.15 V level. In this Payload Checkout test the detection threshold on the PZT-E (or 5) has been increased from 0.15 V to 0.20 V, so that the single detections are considerably reduced.

It must be recalled that the Dust Monitor counts IS events even when the Scientific TM is not enabled. One IS event is marked when one (the first) PZT signal crosses the threshold (with the filtering). So it is possible to have Dust Monitor > 0 even if **no IS** event has been **detected** simultaneously by ALL the PZTs.

An analysis of the occurrence of the **IS scientific events** for the Main and Red I/Fs is reported in Section 5.2.1 for the Main I/F – passive test (Figure 7.4-6), in Section 5.2.2 for the Red I/F – passive test (Figure 8.4-6) and in Section 5.2.3 for the Main I/F – active test (Figure 9.4-6).

The last IS CAL (8 steps rather than 4) are performed at 9.6 V amplitude instead of 10 V as the others. This is linked to the different setting of the calibrations. Thus, the IS outputs of the stimuli are lower than in the former cases (see Main I/F on passive test: from Figure 7.4-19 to Figure 7.4-23; Red I/F on passive test: from Figure 8.4-19 to Figure 8.4-23; Main I/F on active test: from Figure 9.4-19 to Figure 9.4-23).

The frequency level of all MBS, but of MBS 1, has not changed with respect to the PC2 test. MBS 1 has increased its frequencies by an amount of 20-30 Hz (Figure 10.3-7). The frequency – temperature behaviour is not changed since previous in-flight tests: see Figure 10.3-1 for MBS 1, Figure 10.3-2 and Figure 10.3-8 for MBS 2, Figure 10.3-3 and Figure 10.3-9 for MBS 3, Figure 10.3-4 and Figure 10.3-10 for MBS 4 and Figure 10.3-5 and Figure 10.3-12 for MBS 5.

5.2.1 Analysis of IS SCI events on the Main I/F (passive test)

Here following is an analysis of the IS SCI events detected on the Main I/F (passive test).

IS Events detected by Channel A (Figure 7.4-7)
- 5 events detected at IS_Event_Time = 123032974.32, 123034773.30, 123034773.31, 123034839.28, 123035433.40 s
- all events detected by Ch-A but 1 are also detected by Ch-B
- all events detected by Ch-A but 1 are also detected by Ch-C
- all events detected by Ch-A are the same detected by Ch-D
- no event detected by Ch-A is also detected by Ch-E

IS Events detected by Channel B (Figure 7.4-8)
- 4 events detected at IS_Event_Time = 123032974.32, 123034773.31, 123034839.28, 123035433.40 s
- all events detected by Ch-B are also detected by Ch-A
- 3 events detected by Ch-B are also detected by Ch-C
- all events detected by Ch-B are also detected by Ch-D
- no event detected by Ch-B is also detected by Ch-E

IS Events detected by Channel C (Figure 7.4-9)
- 4 events detected at IS_Event_Time = 123032974.32, 123034773.30, 123034839.28, 123035433.40 s
- all events detected by Ch-C are also detected by Ch-A
- 3 events detected by Ch-C are also detected by Ch-B
- all events detected by Ch-C are also detected by Ch-D
- no event detected by Ch-C is also detected by Ch-E

IS Events detected by Channel D (Figure 7.4-10)
- 5 events detected at IS_Event_Time = 123032974.32, 123034773.30, 123034773.31, 123034839.28, 123035433.40 s
- all events detected by Ch-D are the same detected by Ch-A
- all events detected by Ch-D but 1 are also detected by Ch-B
- all events detected by Ch-D but 1 are also detected by Ch-C
- no event detected by Ch-D is also detected by Ch-E

IS Events detected by Channel E (Figure 7.4-11)
- no event detected

Conclusions:
- Ch-A and Ch-D detect the same (five) events
- 3 events are simultaneously detected by Ch-A-B-C-D, but not by Ch-E, at IS_Event_Time = 123032974.32, 123034839.28, 123035433.40 s
- 4 event are simultaneously detected by Ch-A-B-D, but not by Ch-C-E, at IS_Event_Time = 123032974.32, 123034773.31, 123034839.28, 123035433.40 s
- 4 event is simultaneously detected by Ch-A-C-D, but not by Ch-B-E, at IS_Event_Time = 123032974.32, 123034773.30, 123034839.28, 123035433.40 s
- No event detected by Ch-E

The 5 events detected by Channels A-B-C-D are summarized in Table 5.2-3. All events occur in coincidence with other GIADA transitions (switching on/off of the GDS lasers).

IS	Time	Event
A, B, C, D	123032974.32	Laser OFF
A, C, D	123034773.30	Laser Power ON
A, B, D	123034773.31	Laser Power ON
A, B, C, D	123034839.28	Laser ON
A, B, C, D	123035433.40	Laser OFF

Table 5.2-3. IS SCI Events from PZTs A-B-C-D

The 428 events detected by Ch-E during the PC2 test, probably due to some noise effect on that channel, did not occur in this Payload Checkout test. This behaviour was expected because the threshold of Ch-E was increased from 15 (0.15 V) to 20 (0.20 V) digital units from PC2 to PC4.

5.2.2 Analysis of IS SCI events on the Redundant I/F (passive test)

Here following is an analysis of the IS SCI events detected on the Redundant I/F (passive test).

IS Events detected by Channel A (Figure 8.4-7)
- 5 events detected at IS_Event_Time = 123076173.30, 123077973.29, 123077973.30, 123078039.27, 123078633.39 s
- 3 events detected by Ch-A are also detected by Ch-B
- no event detected by Ch-A is also detected by Ch-C-D-E

IS Events detected by Channel B (Figure 8.4-8)
- 3 events detected at IS_Event_Time = 123076173.30, 123077973.29, 123078039.27 s
- all events detected by Ch-B are also detected by Ch-A
- no event detected by Ch-B is also detected by Ch-C-D-E

IS Events detected by Channel C (Figure 8.4-9)
- no event detected

IS Events detected by Channel D (Figure 8.4-10)
- 1 event detected at IS_Event_Time = 123049548.81 s
- no event detected by Ch-D is also detected by Ch-A-B-C-E

IS Events detected by Channel E (Figure 8.4-11)
- no event detected

Conclusions:
- 3 events are simultaneously detected by Ch-A-B, but not by Ch-C-D-E, at IS_Event_Time = 123076173.30, 123077973.29, 123078039.27 s
- 2 events are only detected by Ch-A at IS_Event_Time = 123077973.30, 123078633.39 s
- 1 event is only detected by Ch-D at IS_Event_Time = 123049548.81 s
- No event detected by Ch-C-E

The 6 events detected by Channels A-B-D are summarized in Table 5.2-4. 5 of these events occur in coincidence with other GIADA transitions (switching on/off of the GDS lasers). The other one (only detected by Ch-D) does not seem correlated to any other GIADA event and cannot be easily identified.

IS	Time	Event
D	123049548.81	
A, B	123076173.30	Laser OFF
A, B	123077973.29	Laser Power ON
A	123077973.30	Laser Power ON
A, B	123078039.27	Laser ON
A	123078633.39	Laser OFF

Table 5.2-4. IS SCI Events from PZTs A-B-D

5.2.3 Analysis of IS SCI events on the Main I/F (active test)

Here following is an analysis of the IS SCI events detected on the Main I/F (active test).

IS Events detected by Channel A (Figure 9.4-7)
- 5 events detected at IS_Event_Time = 123878179.25, 123879873.34, 123881673.31, 123881673.32, 123881739.29 s
- all events detected by Ch-A are the same detected by Ch-B
- all events detected by Ch-A but 1 are also detected by Ch-C
- 3 events detected by Ch-A are also detected by Ch-D
- no event detected by Ch-A is also detected by Ch-E

IS Events detected by Channel B (Figure 9.4-8)
- 5 events detected at IS_Event_Time = 123878179.25, 123879873.34, 123881673.31, 123881673.32, 123881739.29 s
- all events detected by Ch-B are the same detected by Ch-A
- all events detected by Ch-B but 1 are also detected by Ch-C
- 3 events detected by Ch-B are also detected by Ch-D
- no event detected by Ch-B is also detected by Ch-E

IS Events detected by Channel C (Figure 9.4-9)
- 4 events detected at IS_Event_Time = 123878179.25, 123879873.34, 123881673.31, 123881739.29 s
- all events detected by Ch-C are also detected by Ch-A
- all events detected by Ch-C are also detected by Ch-B
- 3 events detected by Ch-C are also detected by Ch-D
- no event detected by Ch-C is also detected by Ch-E

IS Events detected by Channel D (Figure 9.4-10)
- 4 events detected at IS_Event_Time = 123875071.13, 123879873.34, 123881673.31, 123881739.29 s
- 3 events detected by Ch-D are also detected by Ch-A
- 3 events detected by Ch-D are also detected by Ch-B
- 3 events detected by Ch-D are also detected by Ch-C
- no event detected by Ch-D is also detected by Ch-E

IS Events detected by Channel E (Figure 9.4-11)
- no event detected

Conclusions:
- Ch-A and Ch-B detect the same (five) events
- 3 events are simultaneously detected by Ch-A-B-C-D, but not by Ch-E, at IS_Event_Time = 123879873.34, 123881673.31, 123881739.29 s
- 4 event are simultaneously detected by Ch-A-B-C, but not by Ch-D-E, at IS_Event_Time = 123878179.25, 123879873.34, 123881673.31, 123881739.29 s
- 5 event are simultaneously detected by Ch-A-B, but not by Ch-C-D-E, at IS_Event_Time = 123878179.25, 123879873.34, 123881673.31, 123881673.32, 123881739.29 s

- 1 event is only detected by Ch-D at IS_Event_Time = 123875071.13 s
- No event detected by Ch-E

The 6 events detected by Channels A-B-C-D are summarized in Table 5.2-5. 4 of these events occur in coincidence with other GIADA transitions (switching on/off of the GDS lasers). The other two (one of these is only detected by Ch-D) do not seem correlated to any other GIADA event and cannot be easily identified.

IS	**Time**	**Event**
D	123875071.13	
A, B, C	123878179.25	
A, B, C, D	123879873.34	Laser OFF
A, B, C, D	123881673.31	Laser Power ON
A, B,	123881673.32	Laser Power ON
A, B, C, D	123881739.29	Laser ON

Table 5.2-5. IS SCI Events from PZTs A-B-C-D

6. CONCLUSIONS

According to the above data elaboration and results, the following conclusions can be drawn about the Active Payload Checkout 4:

- **No loss of science TM** was observed and no flood of ghost events was produced by GIADA.
- The not synchronised TM report (i.e., Connection report 17,2 which is the first packet produced by GIADA after the switch-on) had a wrong UTC time and this can result in absence of this packet in the time window of the test. **This issue has been understood**: if the packet is received on VC0, the delay of the time stamping is about some seconds, because the RMOC is able to calculate quite accurately when the packet was generated on-board. When the packet is received on VC1, the Mission Control Centre is not able to calculate the generation time since the packet could have been generated many days before.
- All operations were correctly executed, all functional parameters measured during the PC4 test behaved as expected, but the **TC for patching the CF in NVRAM that was refused by GIADA due to inconsistent memory address as defined in the TC**.
- During the active test on Main I/F the patch status has changed his value from 7 to 1 due to the TC patching the CF in NVRAM. This behaviour is expected and normal.
- At the 3rd IS power-on both on Main and Red I/Fs, the event "*Hardware error in IS event detection circuitry. No IRQ received*" was received. This is a known problem that may happen @ IS power-on.
- The CREP generated by the EGSE S/W shows an anomalous coincidence of "Begin time of operation" and "End time of operation" for both "open cover" and "close cover" on the Main I/F (active test). This coincidence is due to a bug in the conversion from the Hex time stamp values to the CREP time stamp values in the EGSE SW. **The problem shall be fixed in future GES update.**
- The internal (Impact Sensor, Laser and Power Supply) and external (Frangibolt and MBS's) temperatures were in the nominal range, as well as the current consumption during all the phases of the test. The GIADA cover operations followed the nominal behaviour.
- The GDS was not saturated, so that GDS CAL data gave information about internal stray-light levels, that are similar to those measured in previous on-ground and in-flight tests.
- The GDS produced some scientific "ghost events". Most of them are at the saturation level.
- The "Dust Monitor" measured some detections, due to the IS events detected by one or more PZTs when a PZT signal crosses its threshold.
- The IS produced some "ghost events"; most of them occurred in coincidence with other GIADA transitions. The results of the IS calibration are the same as measured during the other tests.
- MBS frequency and frequency-temperature trends are as in previous tests. MBS 1 has increased his frequency by about 20 Hz with respect to PC2 test.

7. PC4 DATA ANALYSIS – MAIN INTERFACE (PASSIVE TEST)

7.1 GIADA STATUS

Figure 7.1-1. HK Status of GIADA and S/S vs. time - Main

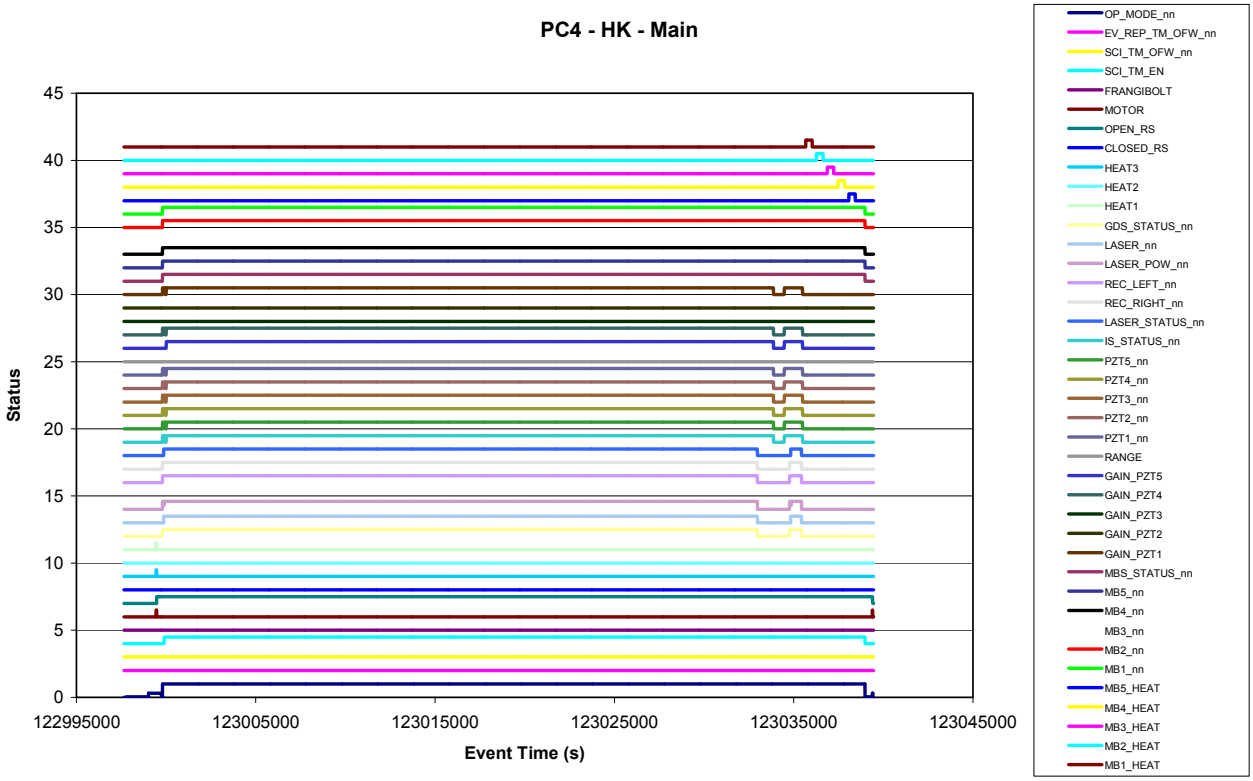


Figure 7.1-2. Evolution of all temperatures vs. time - HK, HK-SCI, SCI - Main

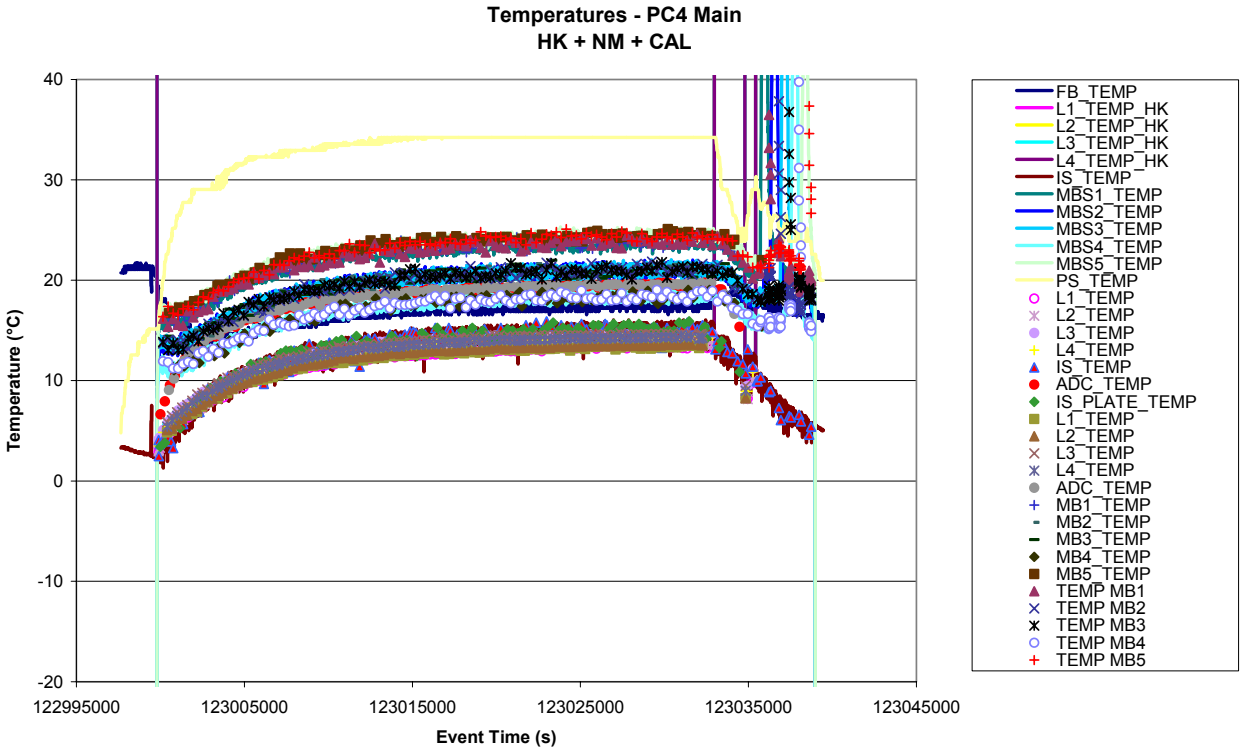


Figure 7.1-3. Evolution of temperatures of system elements vs. time - HK, HK-SCI, SCI - Main

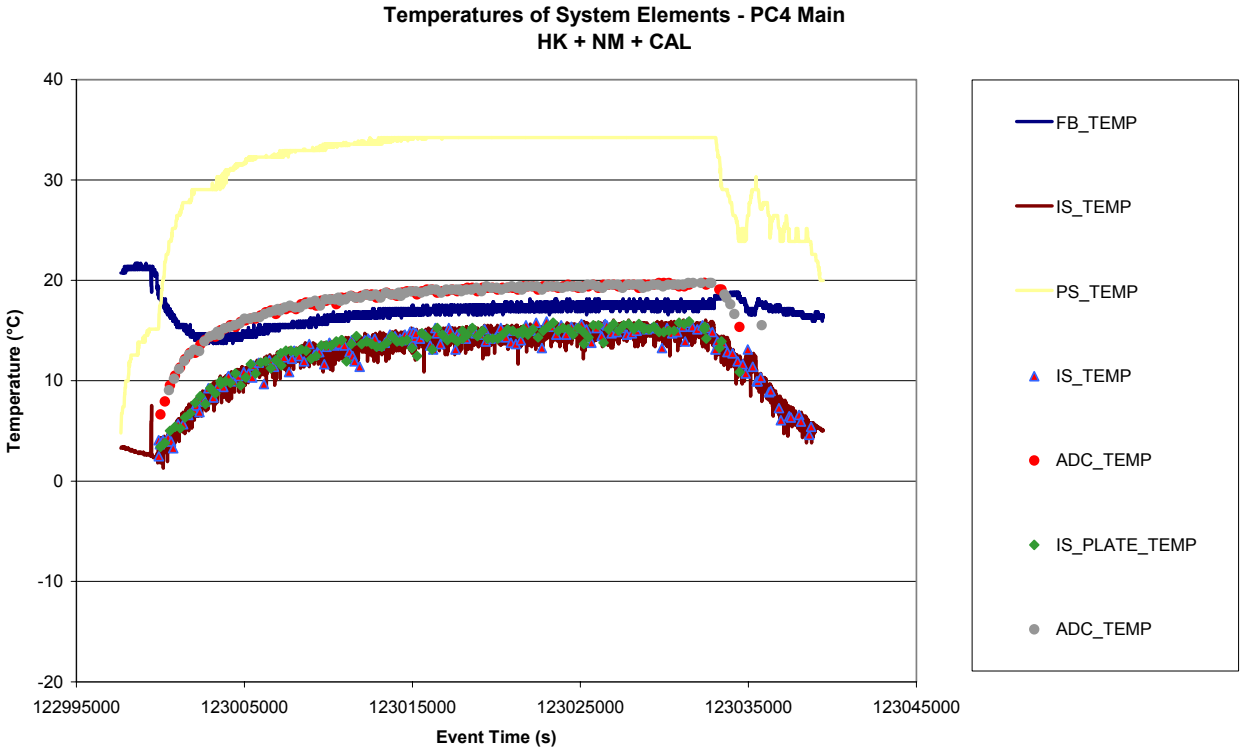


Figure 7.1-4. Evolution of temperatures of sub-systems vs. time - HK, HK-SCI, SCI - Main

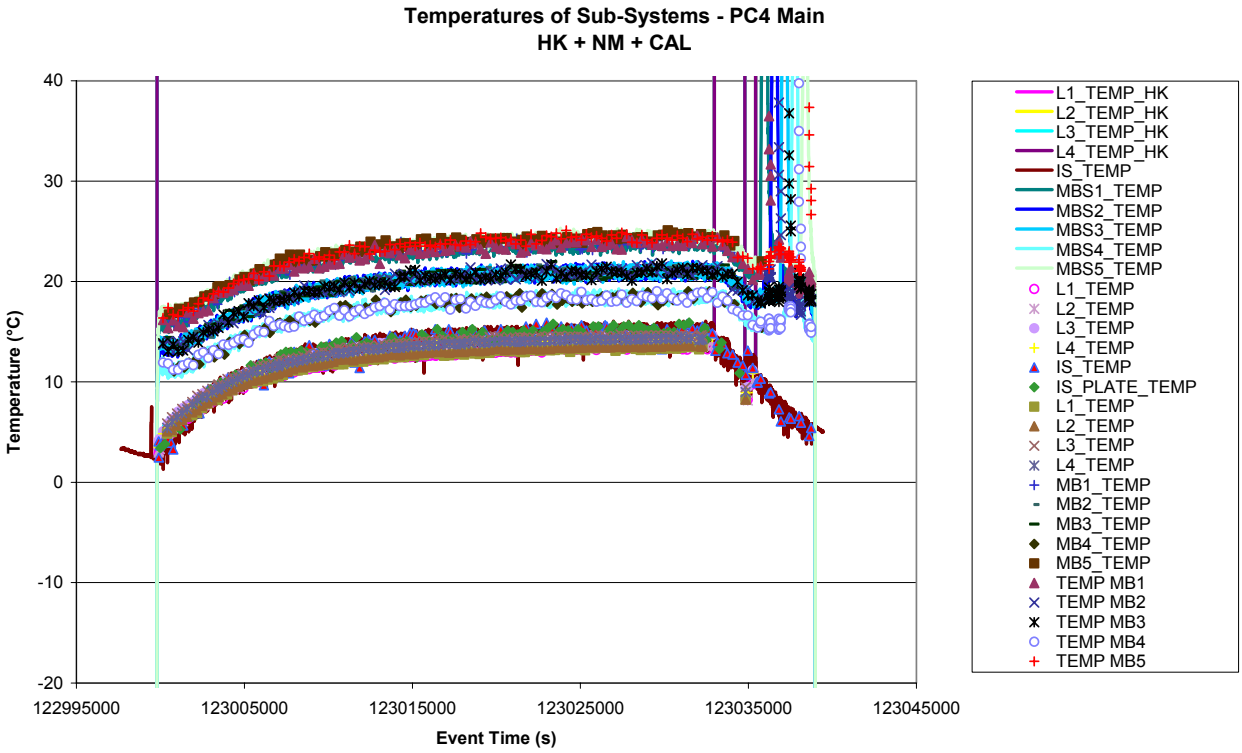


Figure 7.1-5. Operation Status vs. time - Main

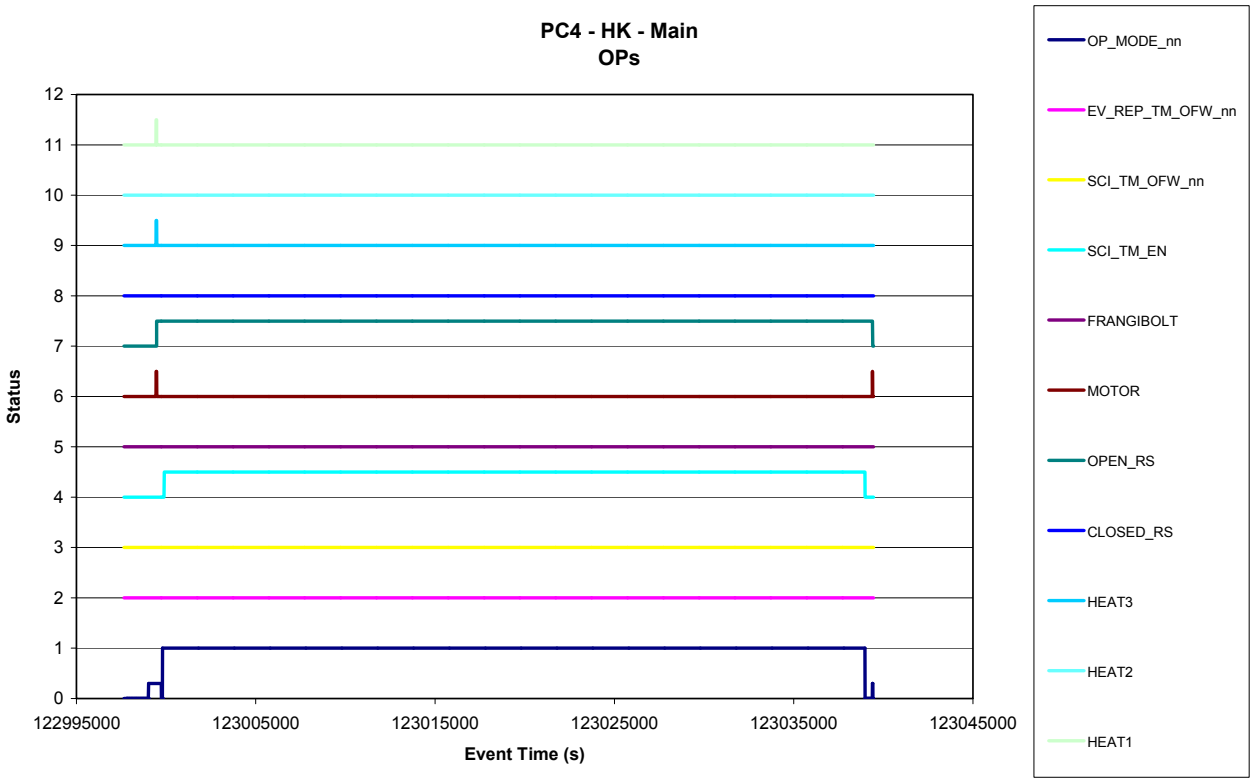


Figure 7.1-6. Power behaviour - Main

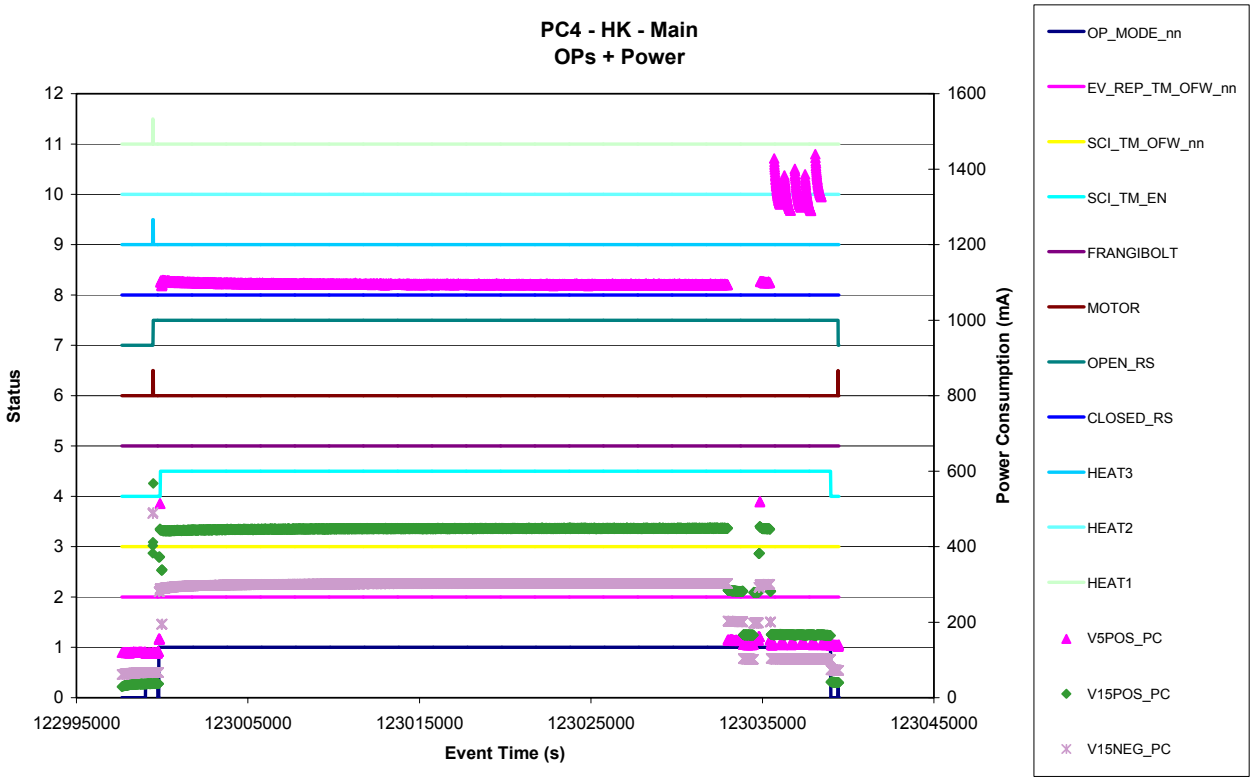


Figure 7.1-7. Power and PS temperature behaviour - Main

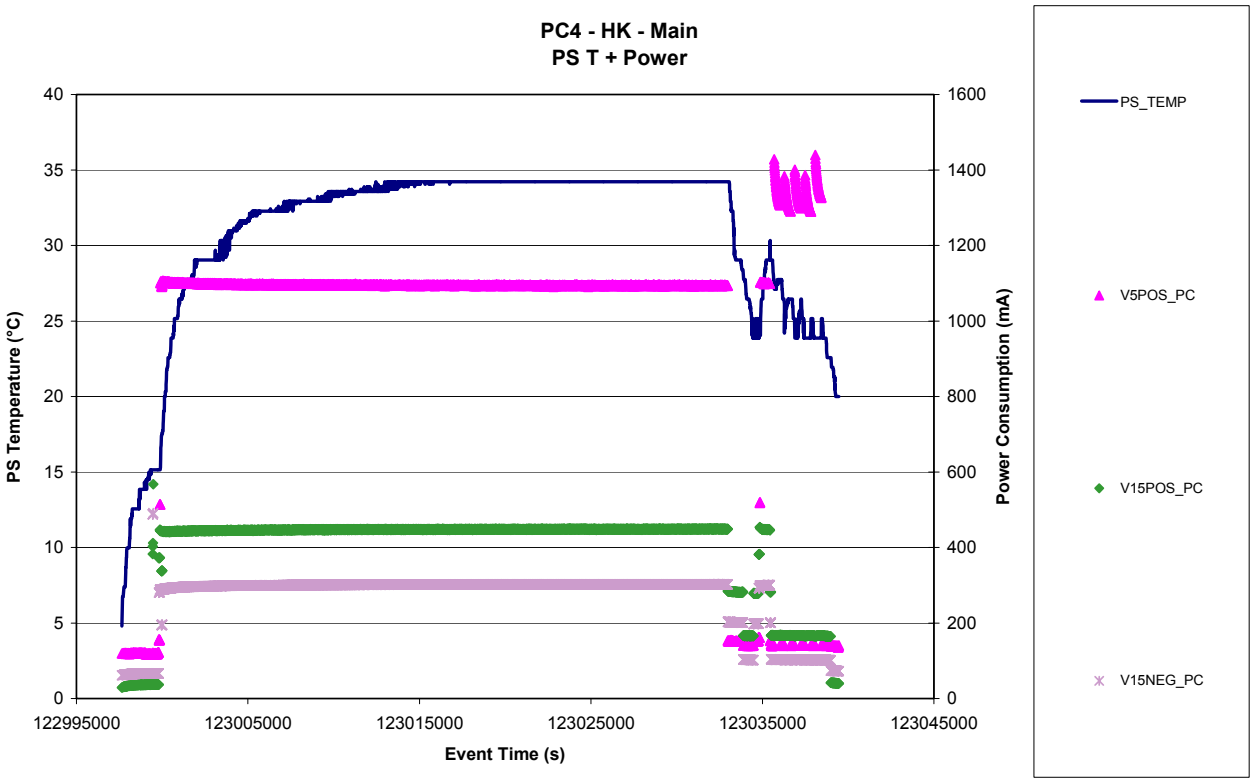


Figure 7.1-8. Source Sequence Count (SSC) of HK Telemetry vs. Time - Main

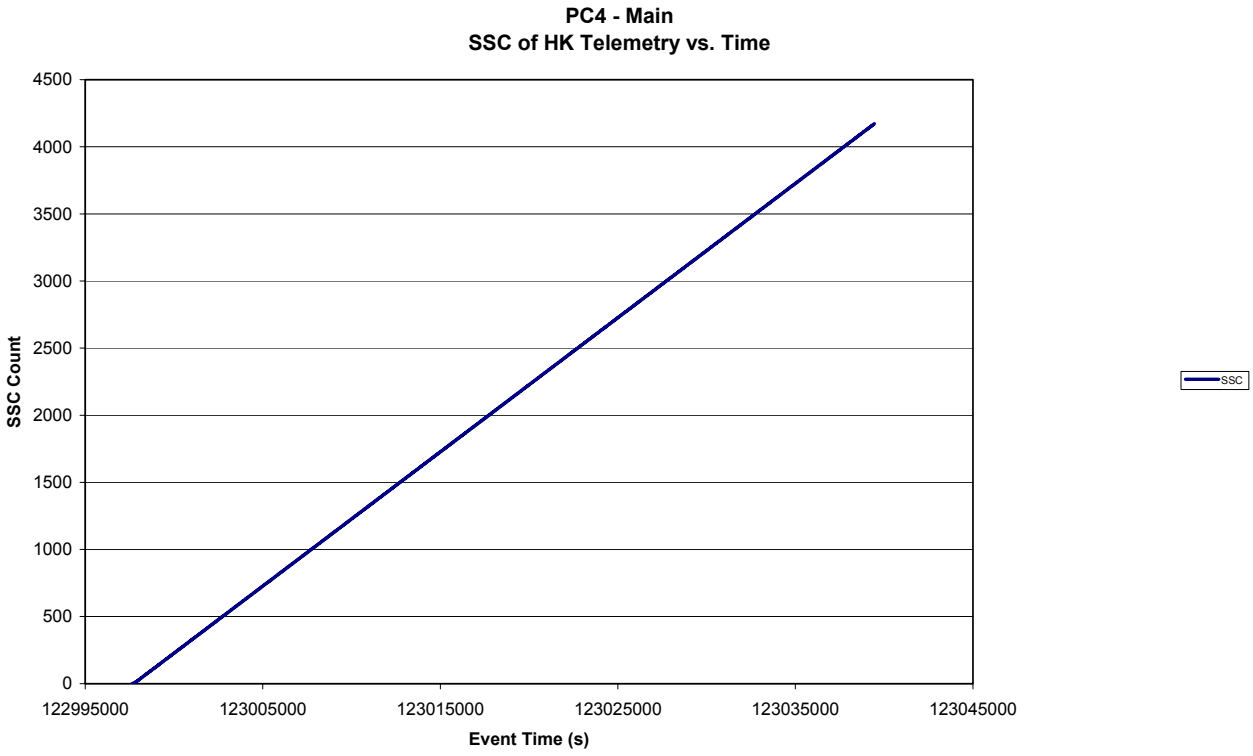


Figure 7.1-9. Source Sequence Count (SSC) of HK Telemetry vs. Number - Main

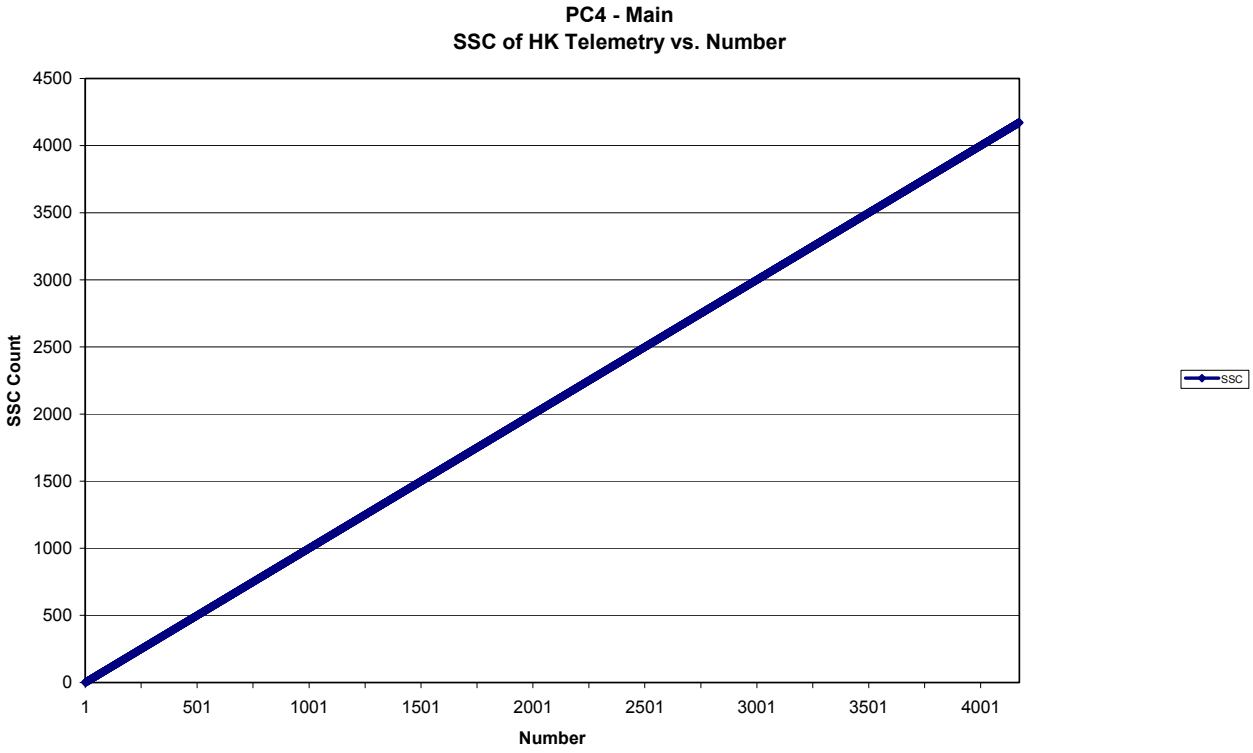


Figure 7.1-10. Source Sequence Count (SSC) of SCI Telemetry vs. Time - Main

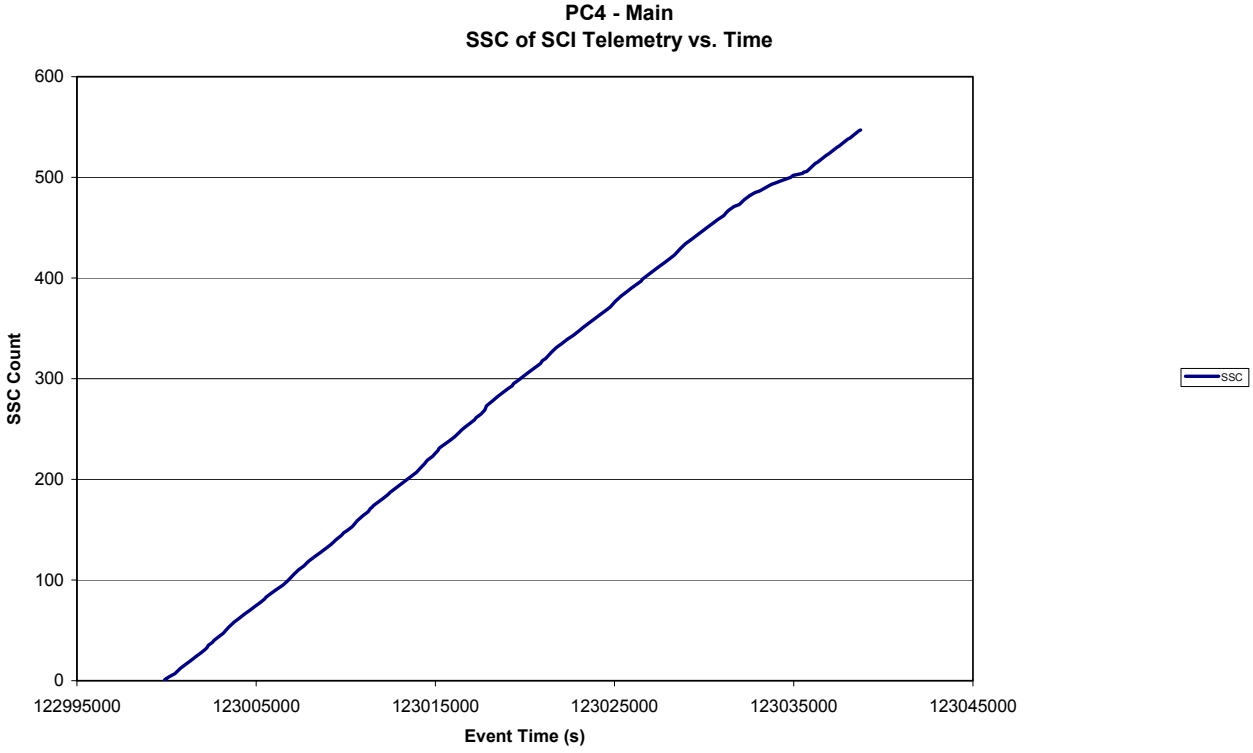
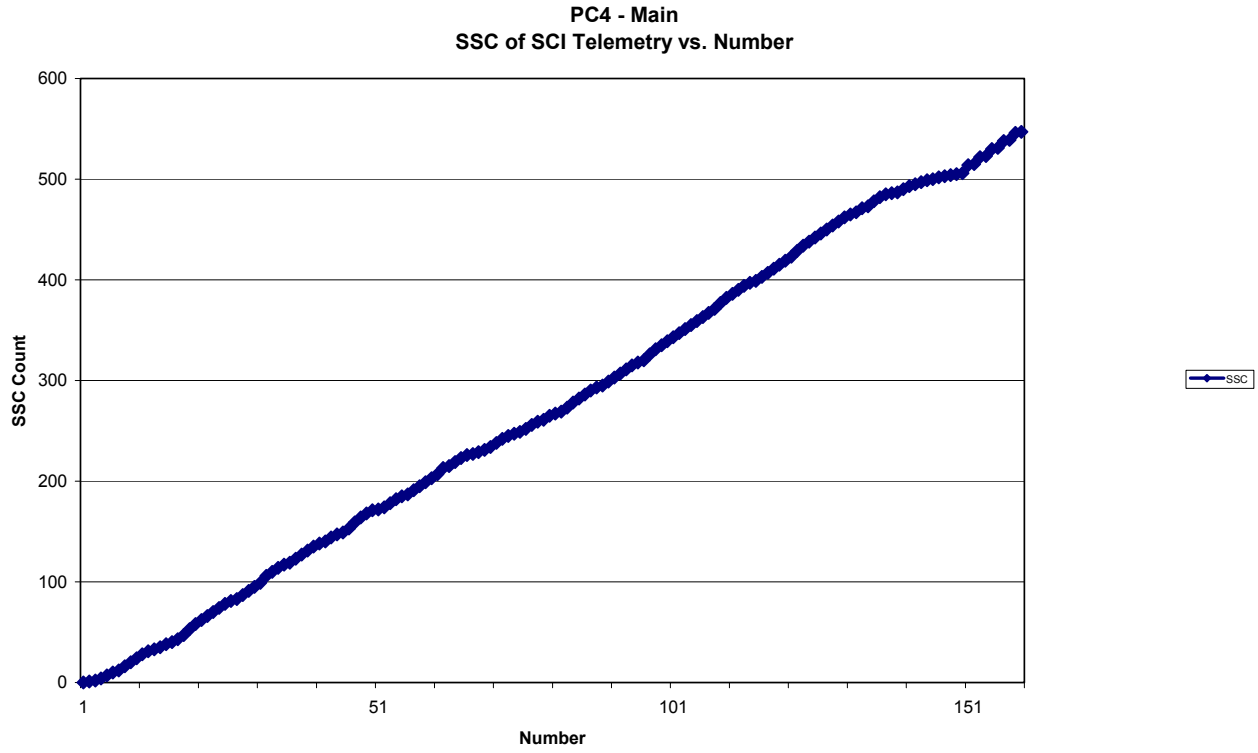


Figure 7.1-11. Source Sequence Count (SSC) of SCI Telemetry vs. Number - Main

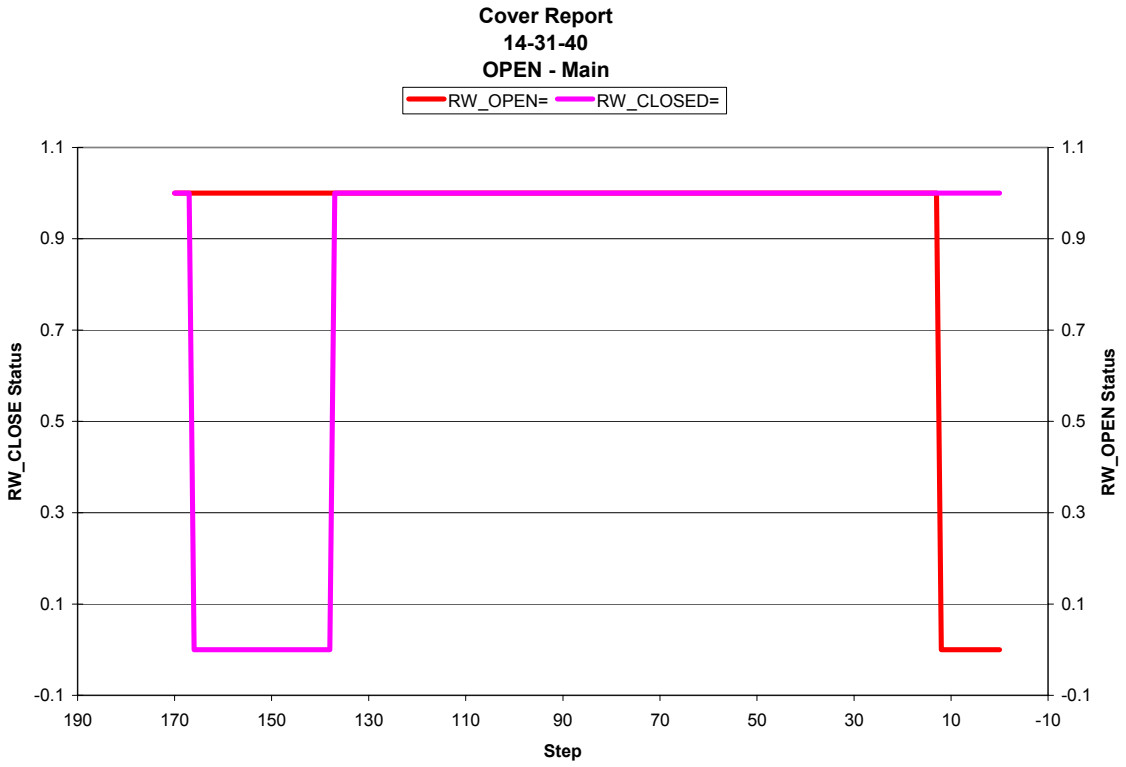


7.2 COVER REPORTS

7.2.1 Open Cover

```
HEADER_START
CREATION_TIME=2006-11-24T14:31:40Z
USER=AA0000
HEADER_END
//
// Generated by 'GIADA_EGSE_SW '
//
MOVEMENT DIRECTION: To open
BEGIN TIME OF OPERATION: 122999464.000000
END TIME OF OPERATION: 122999472.000000
```

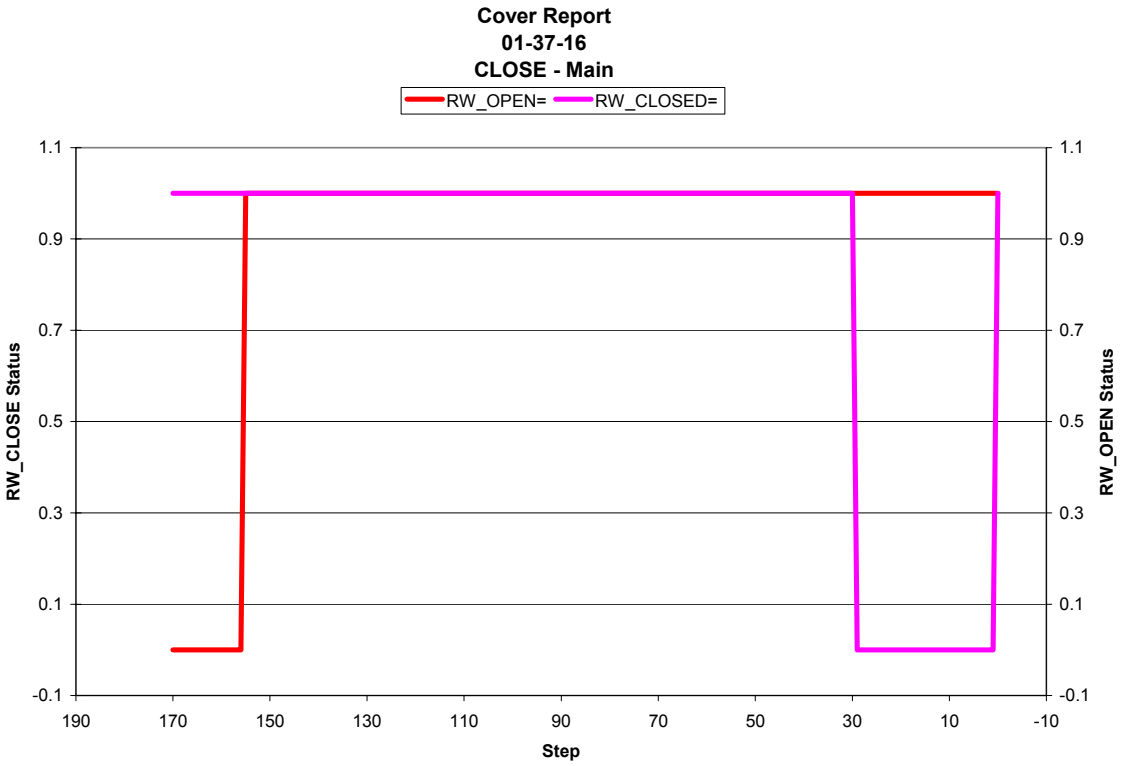
Figure 7.2-1 Cover Report – Open - Main



7.2.2 Close Cover

```
HEADER_START
CREATION_TIME=2006-11-25T01:37:16Z
USER=AA0000
HEADER_END
//
// Generated by 'GIADA_EGSE_SW '
//
MOVEMENT DIRECTION: To close
BEGIN TIME OF OPERATION: 123039400.000000
END TIME OF OPERATION: 123039408.000000
```

Figure 7.2-2 Cover Report – Close - Main



7.3 GRAIN DETECTION SYSTEM (GDS)

7.3.1 GDS – Status

Figure 7.3-1. GDS Operation Status vs. time - Main

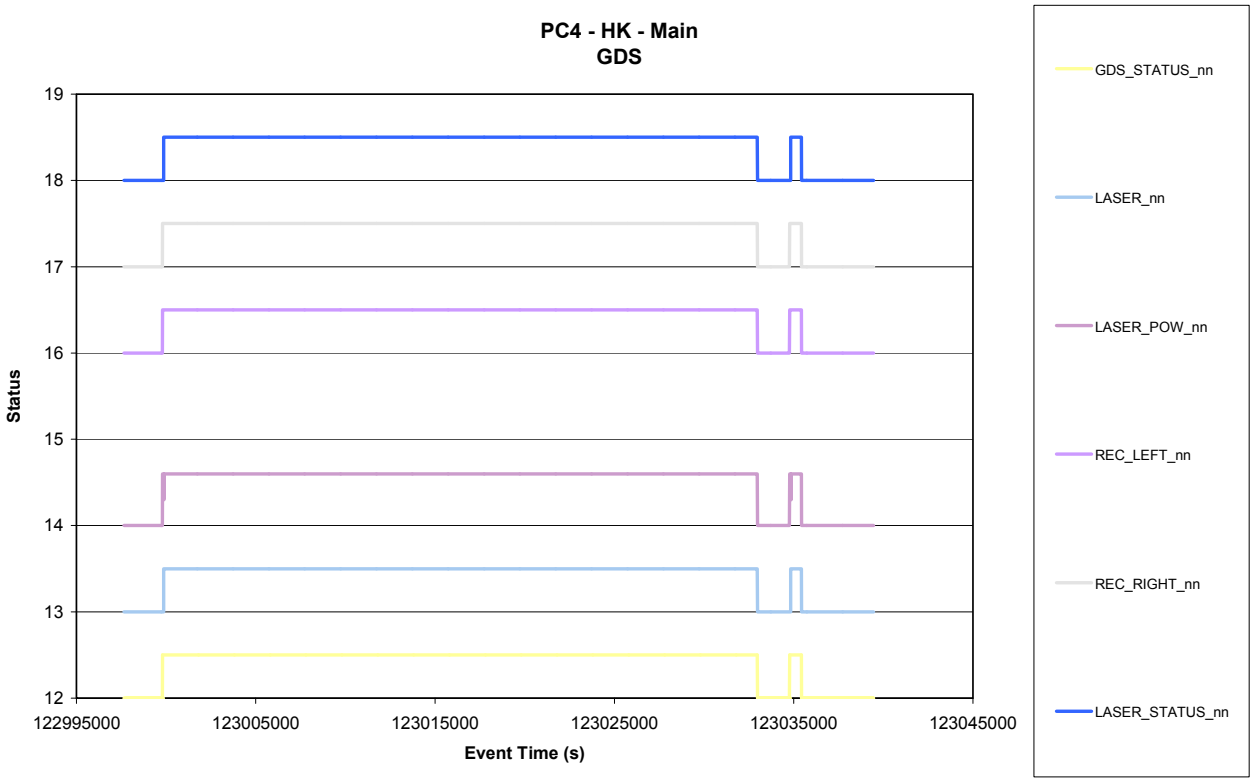


Figure 7.3-2. GDS Thresholds change vs. time - Main

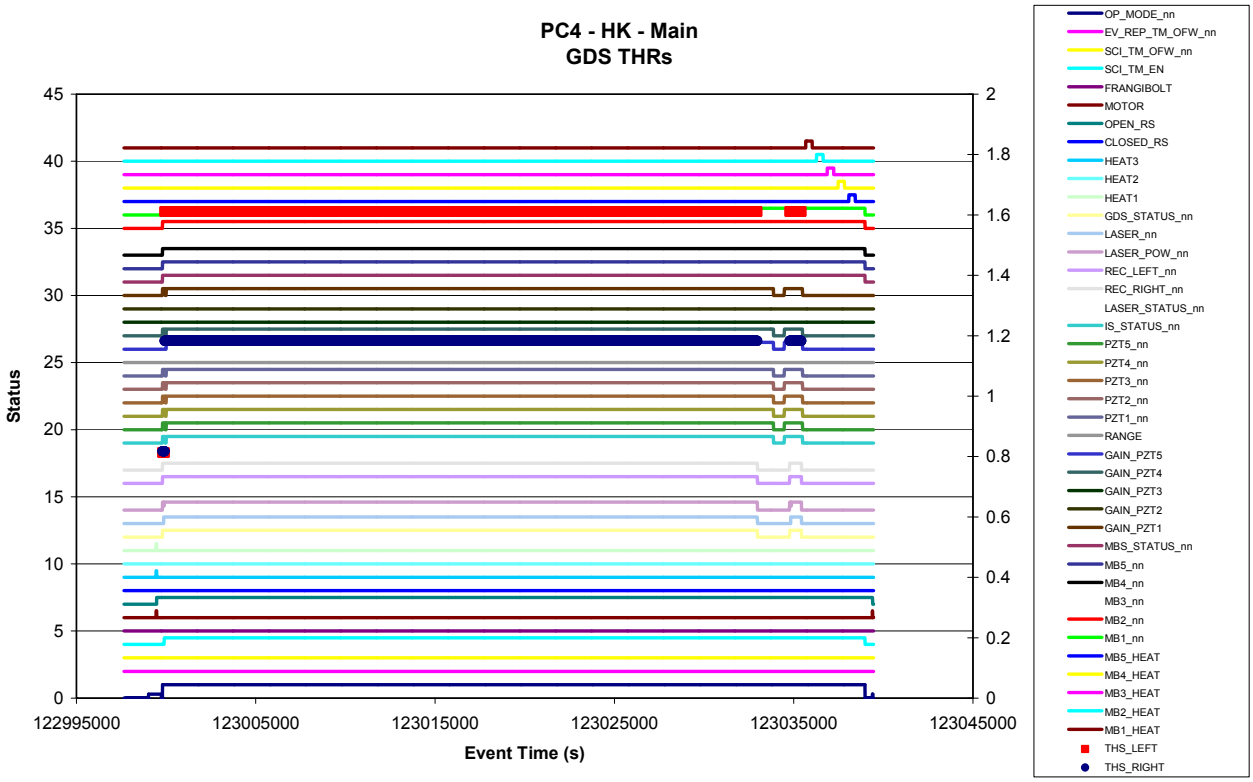


Figure 7.3-3. GDS Laser Temperatures vs. time (HK, HK-SCI, SCI) - Main

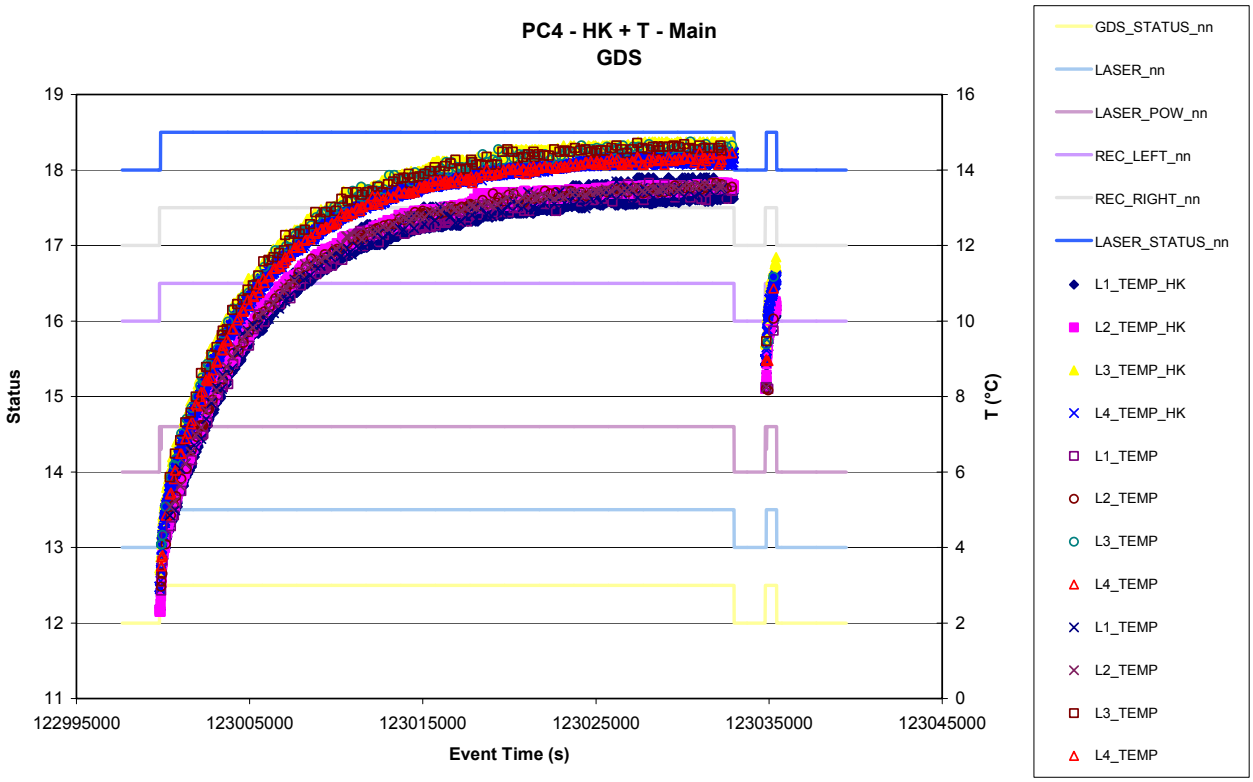


Figure 7.3-4. GDS Laser Monitor vs. time (HK, HK-SCI, SCI) - Main

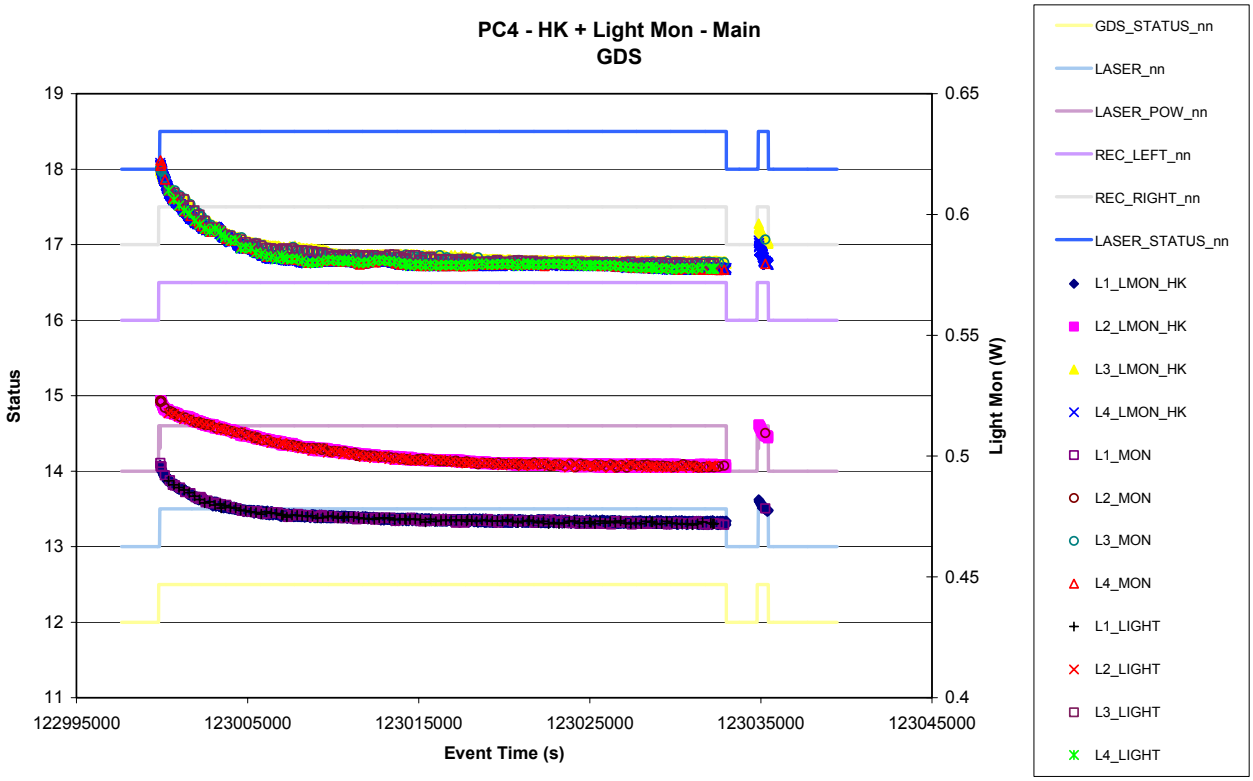


Figure 7.3-5. Laser 1 Light Monitor versus Temperature (HK, HK-SCI, SCI) - Main

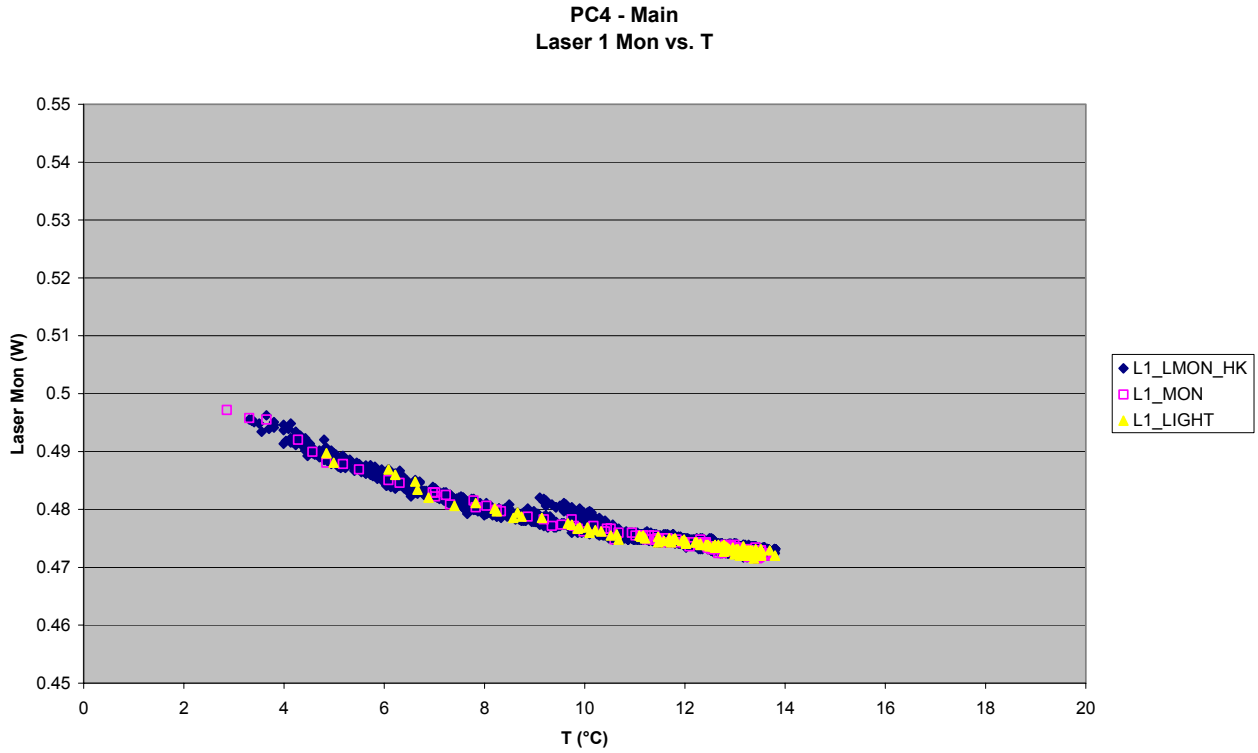


Figure 7.3-6. Laser 2 Light Monitor versus Temperature (HK, HK-SCI, SCI) - Main

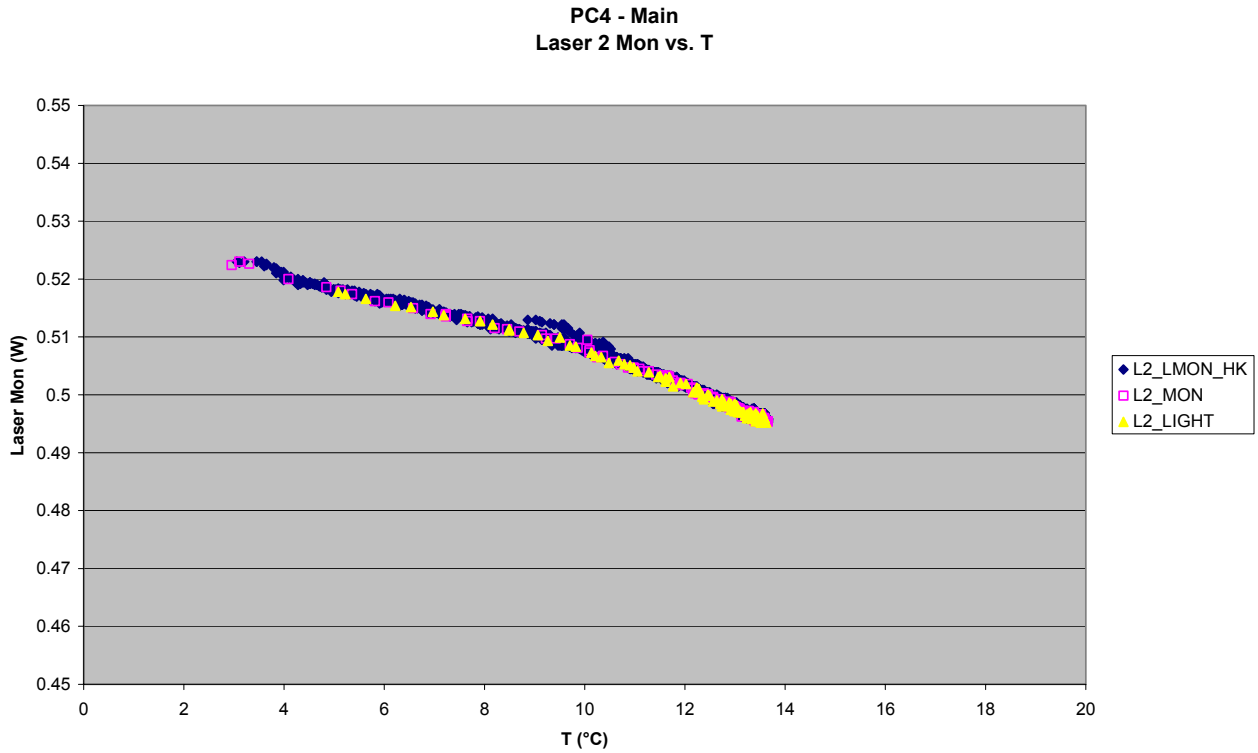


Figure 7.3-7. Laser 3 Light Monitor versus Temperature (HK, HK-SCI, SCI) - Main

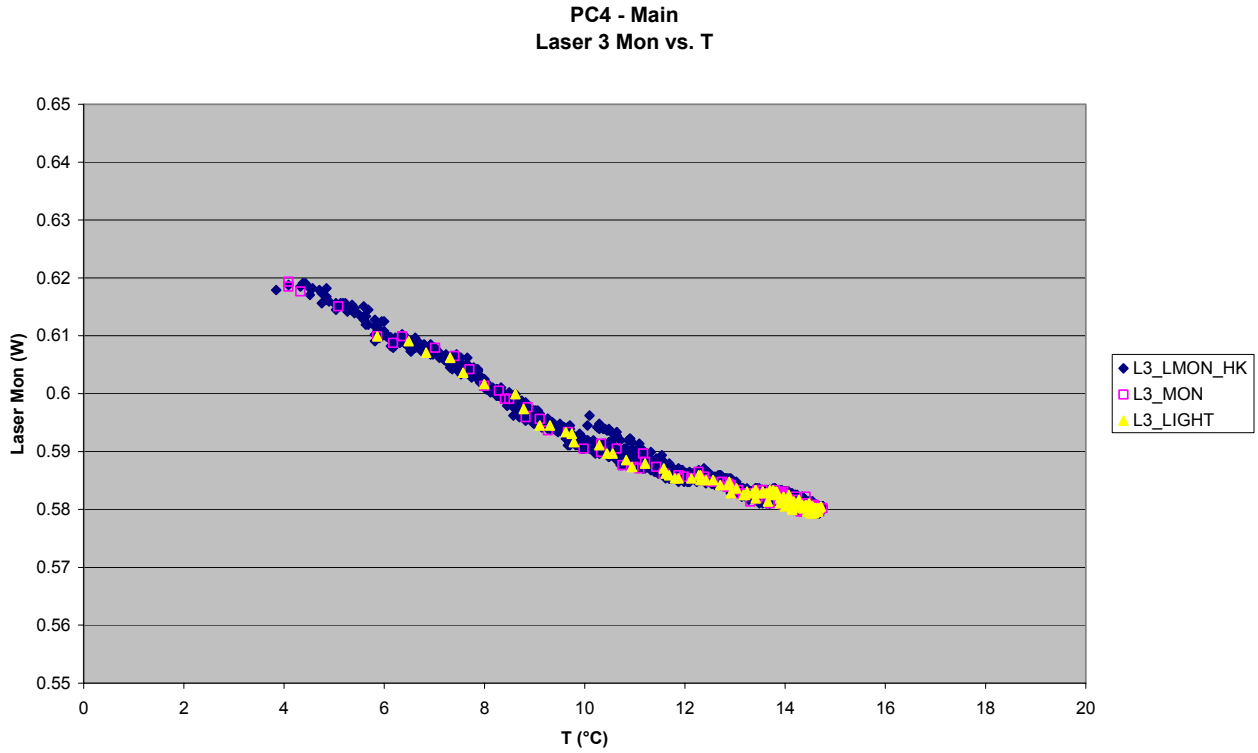
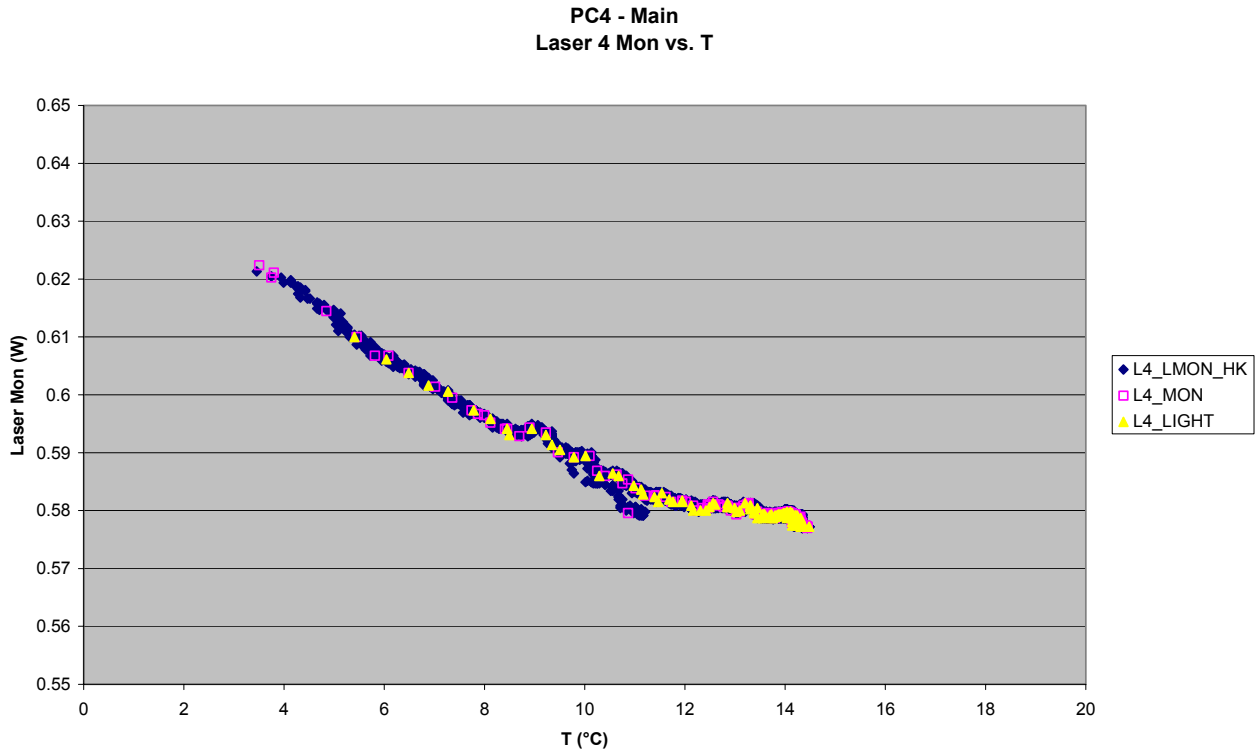


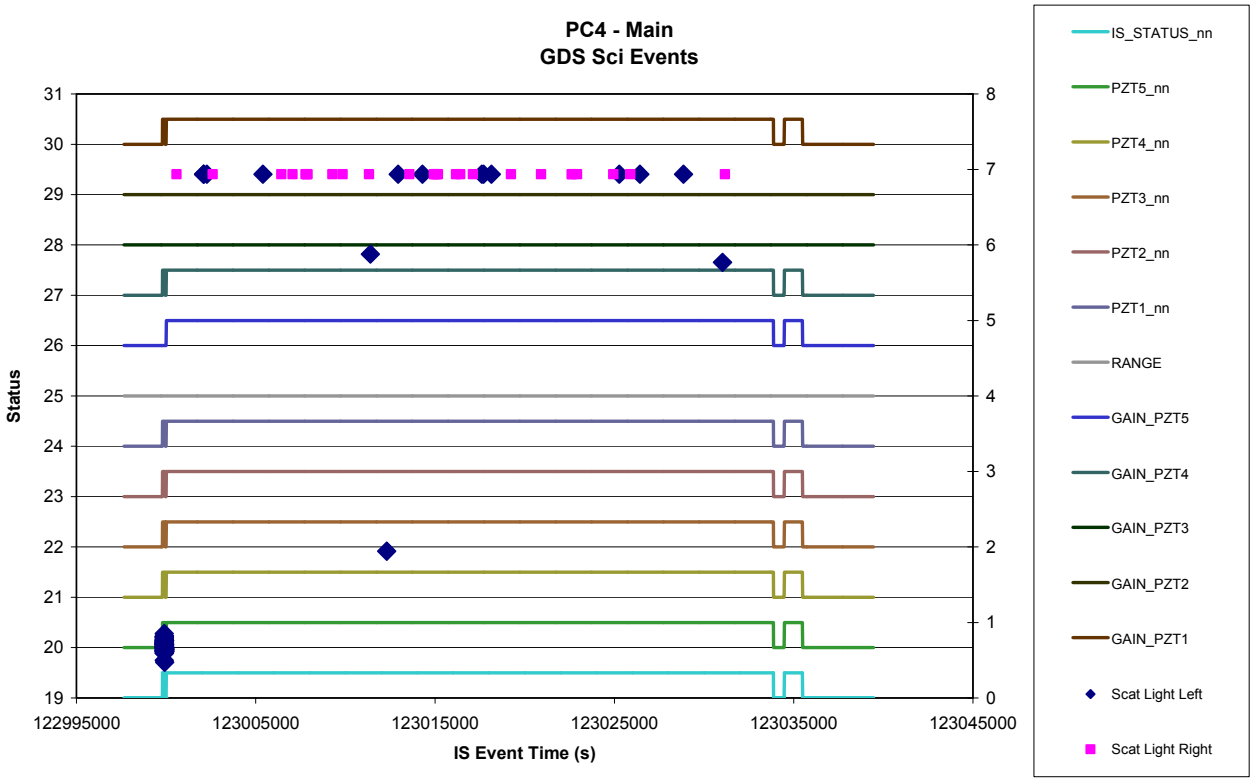
Figure 7.3-8. Laser 4 Light Monitor versus Temperature (HK, HK-SCI, SCI) - Main



7.3.2 GDS – Behaviour

7.3.2.1 Science Events

Figure 7.3-9. GDS Left and Right SCI events vs. time - Main

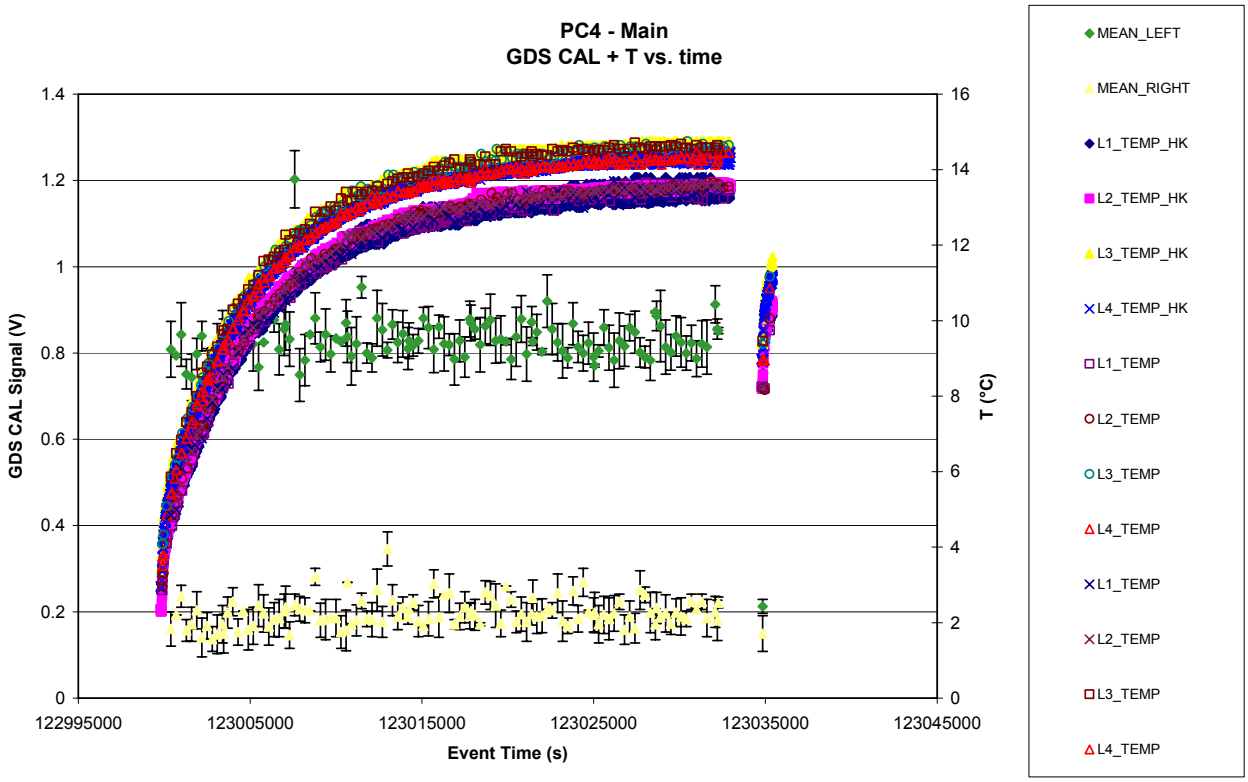


7.3.2.2 Event Rates

Not applicable

7.3.2.3 CAL

Figure 7.3-10. Evolution of GDS CAL Left and Right signals (and T) vs. time (Main)



7.4 IMPACT SENSOR (IS)

7.4.1 IS – Status

Figure 7.4-1. IS Operation Status vs. time - Main

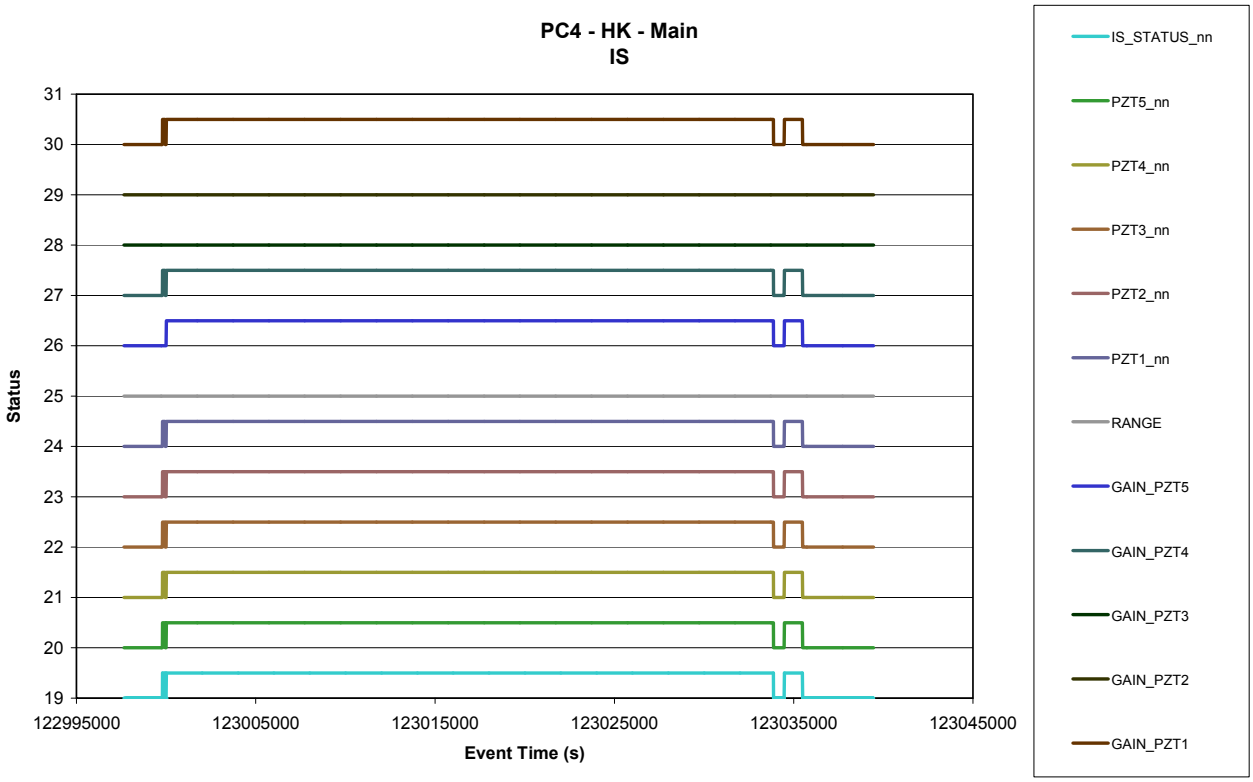


Figure 7.4-2. IS PZT 3 Thresholds change vs. time - Main

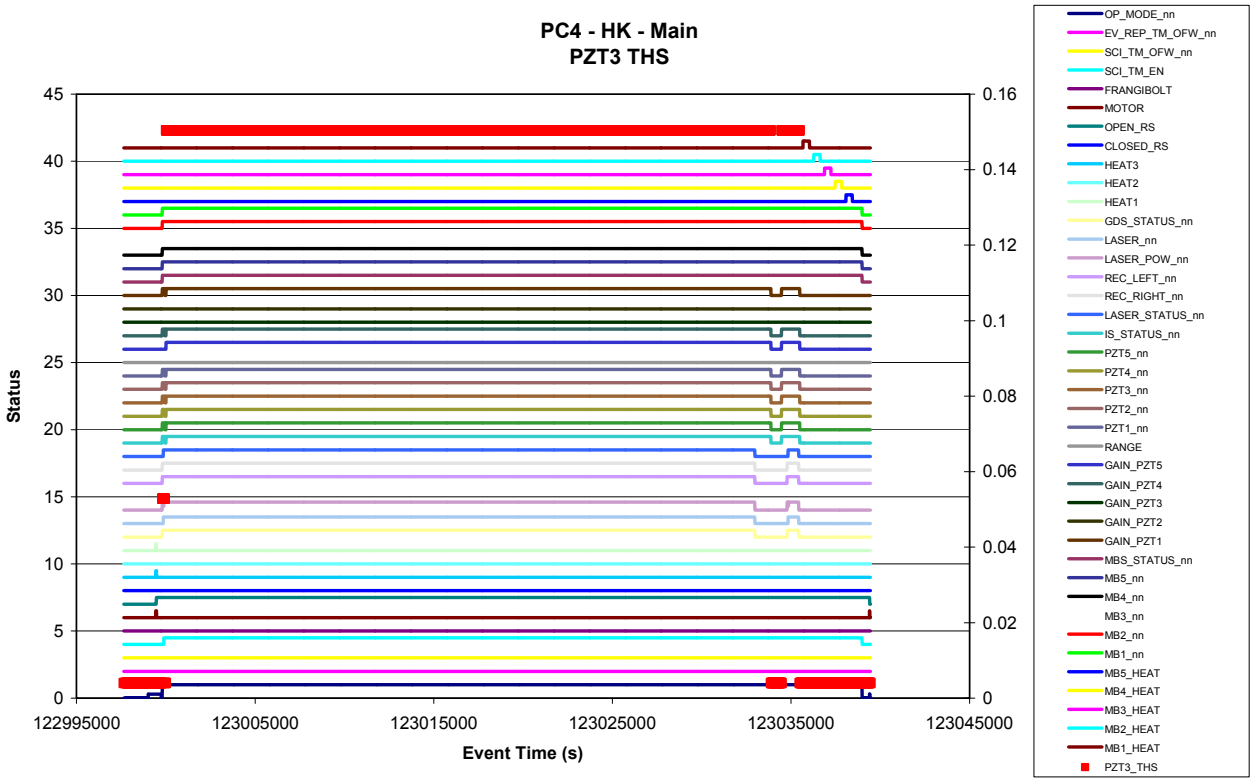


Figure 7.4-3. IS PZT 5 Thresholds change vs. time - Main

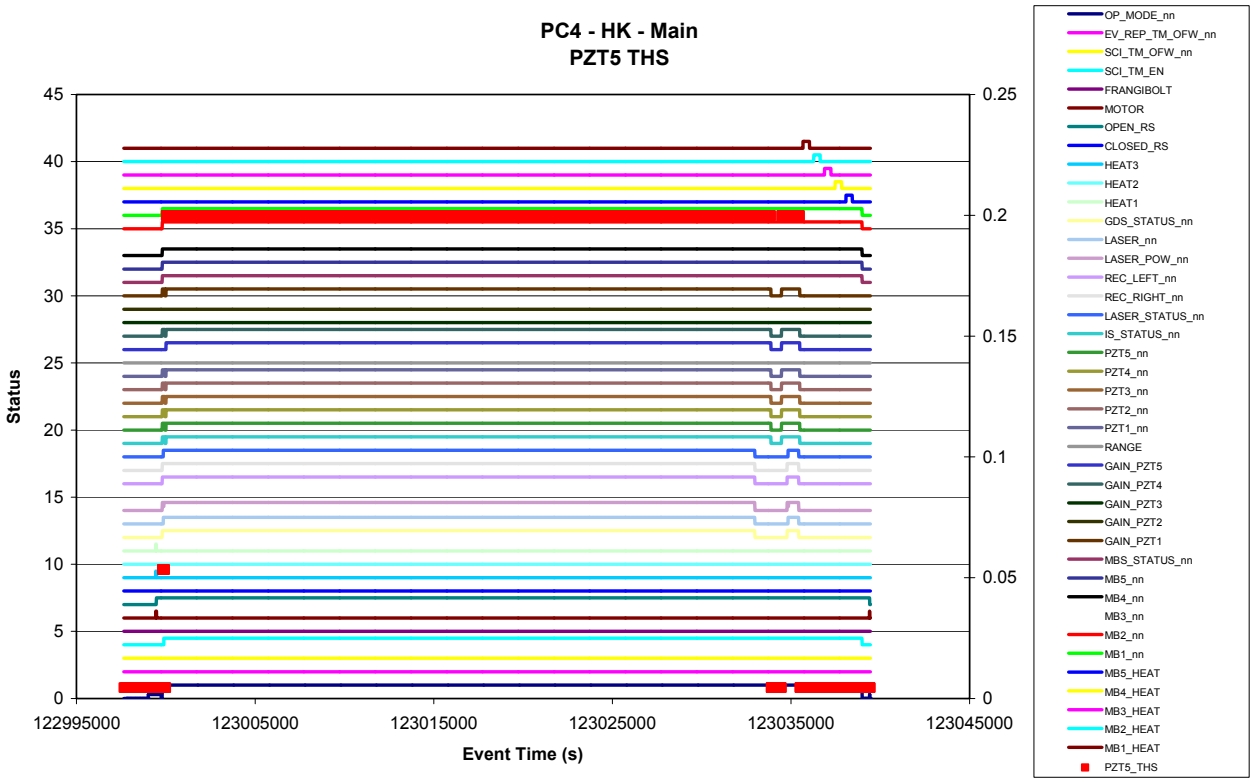
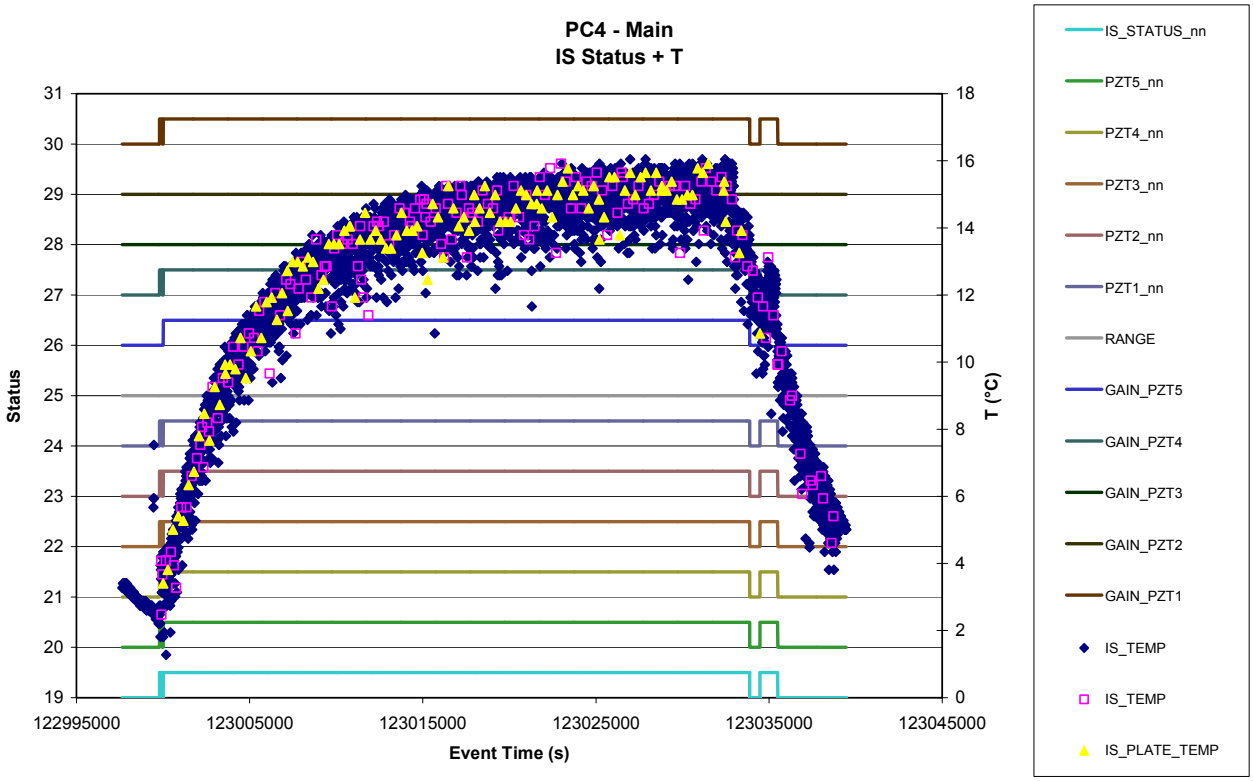


Figure 7.4-4. IS Temperature vs. time (HK, HK-SCI, SCI) - Main



7.4.2 IS – Behaviour

7.4.2.1 Science Events

Figure 7.4-5. All PZT Events (det and non-det) vs. time - Main

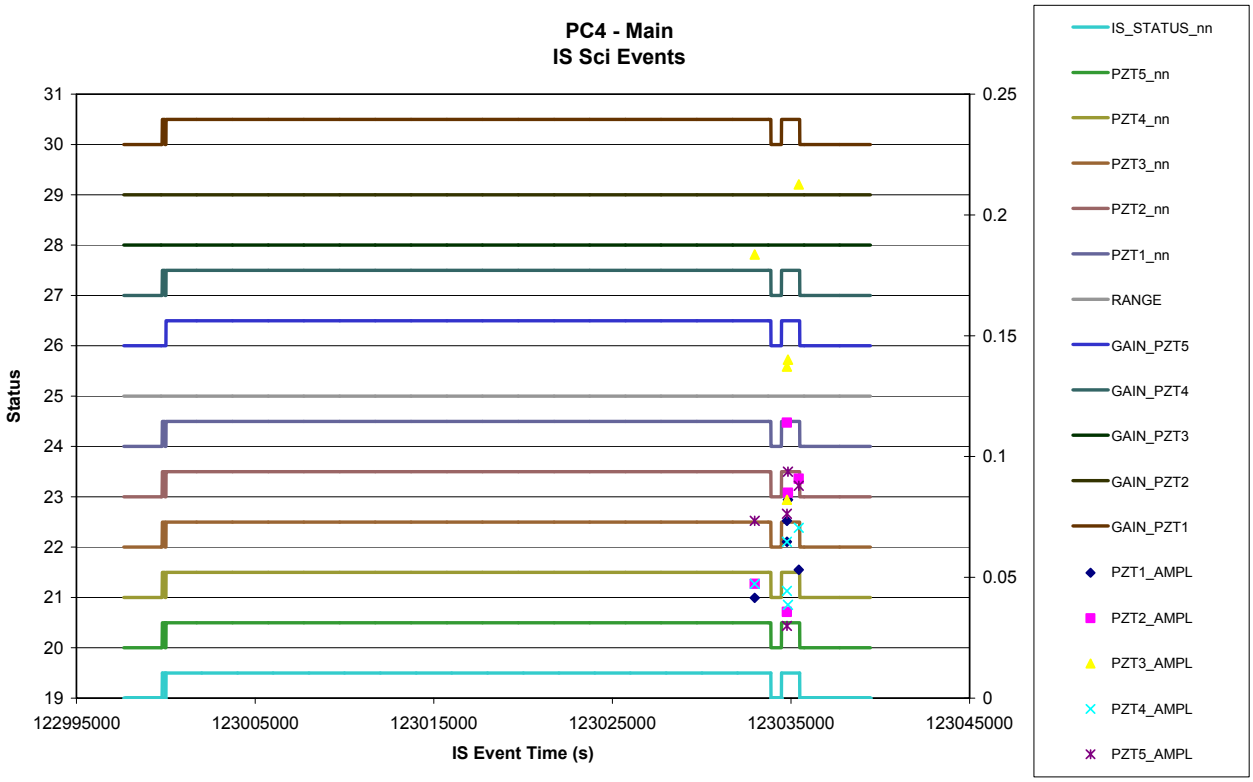


Figure 7.4-6. PZT 1-2-3-4-5 Detected Events vs. time - Main

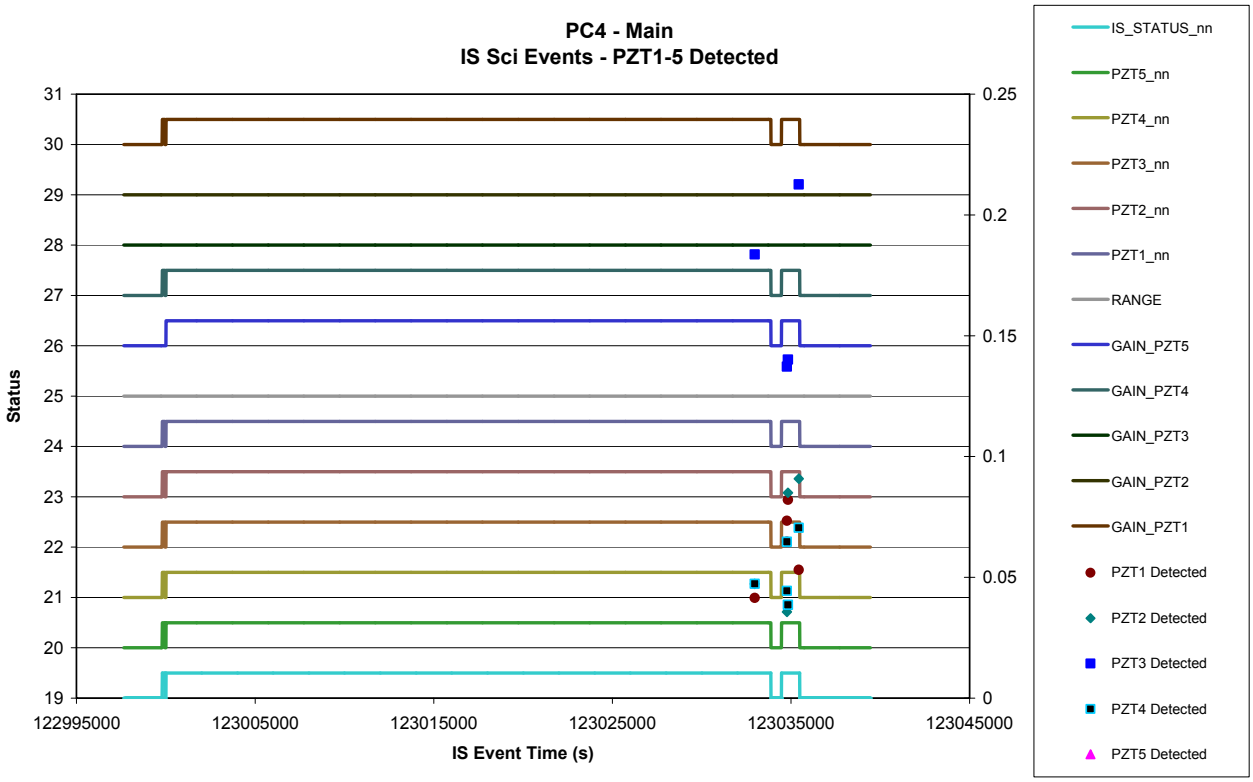


Figure 7.4-7. PZT 1 Detected Events vs. time - Main

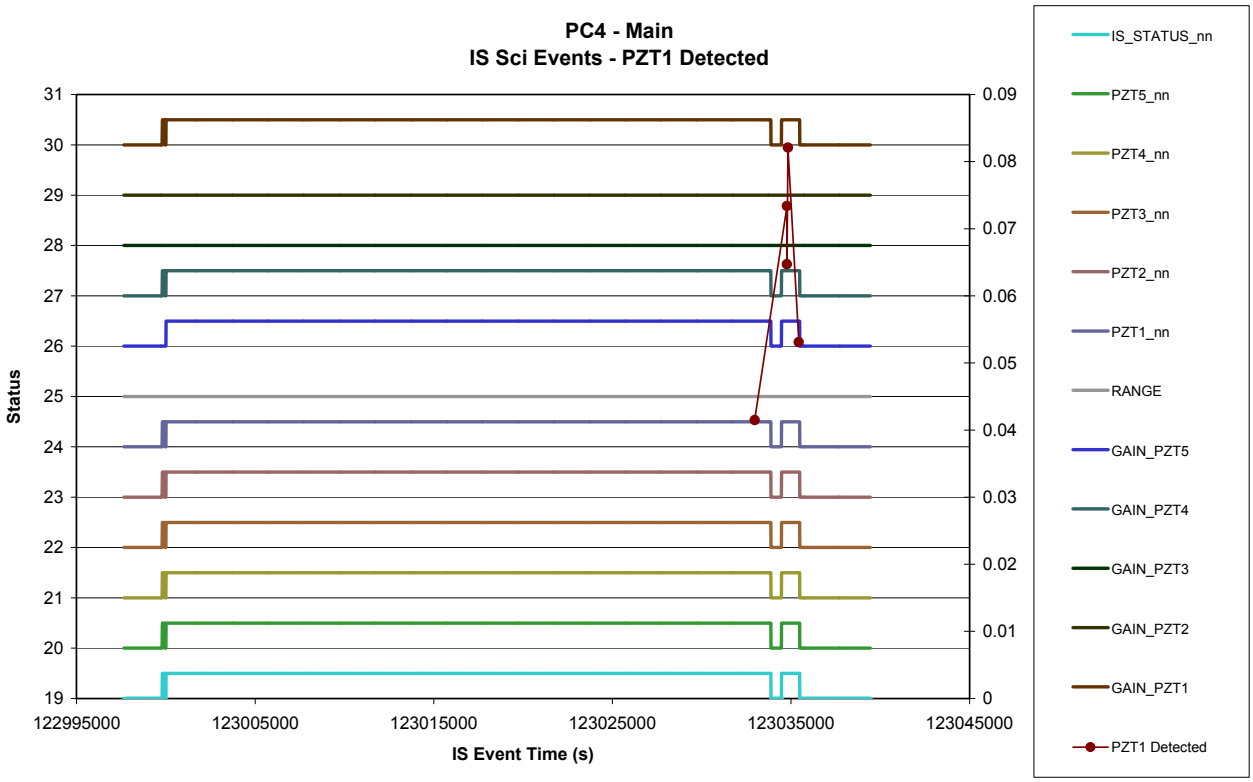


Figure 7.4-8. PZT 2 Detected Events vs. time - Main

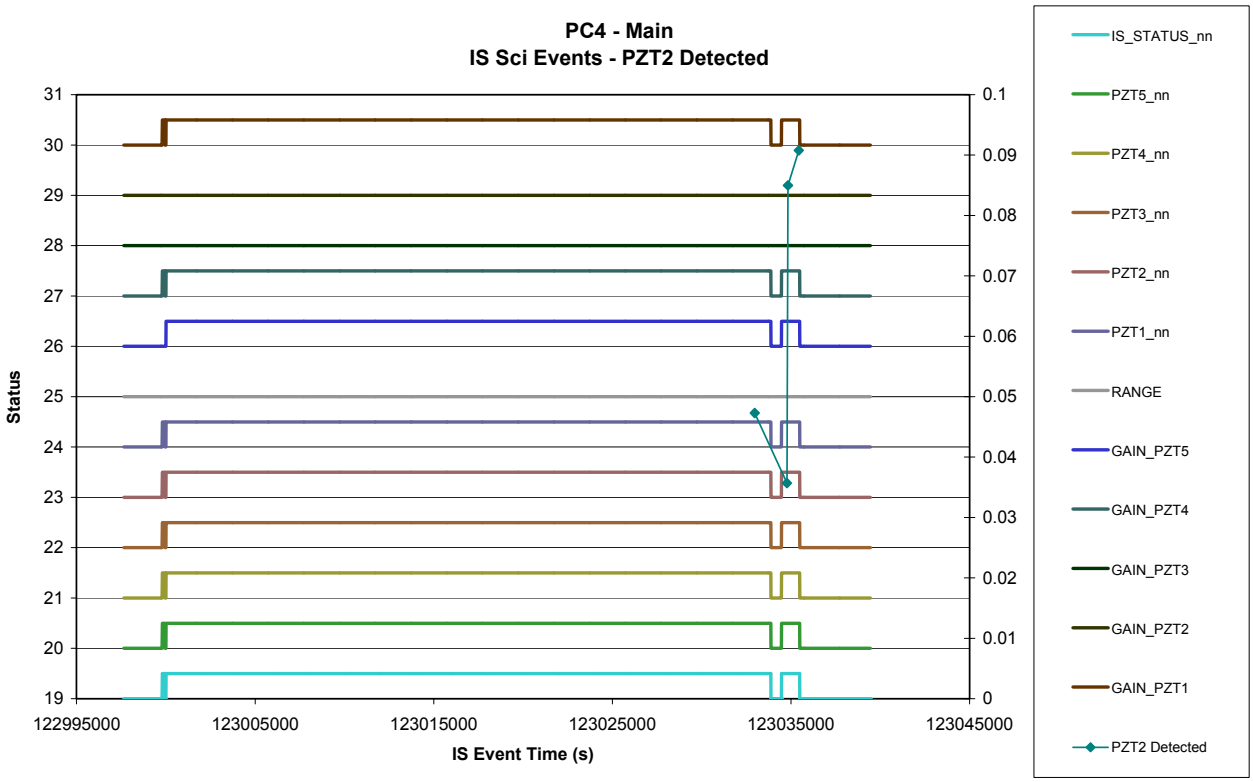


Figure 7.4-9. PZT 3 Detected Events vs. time - Main

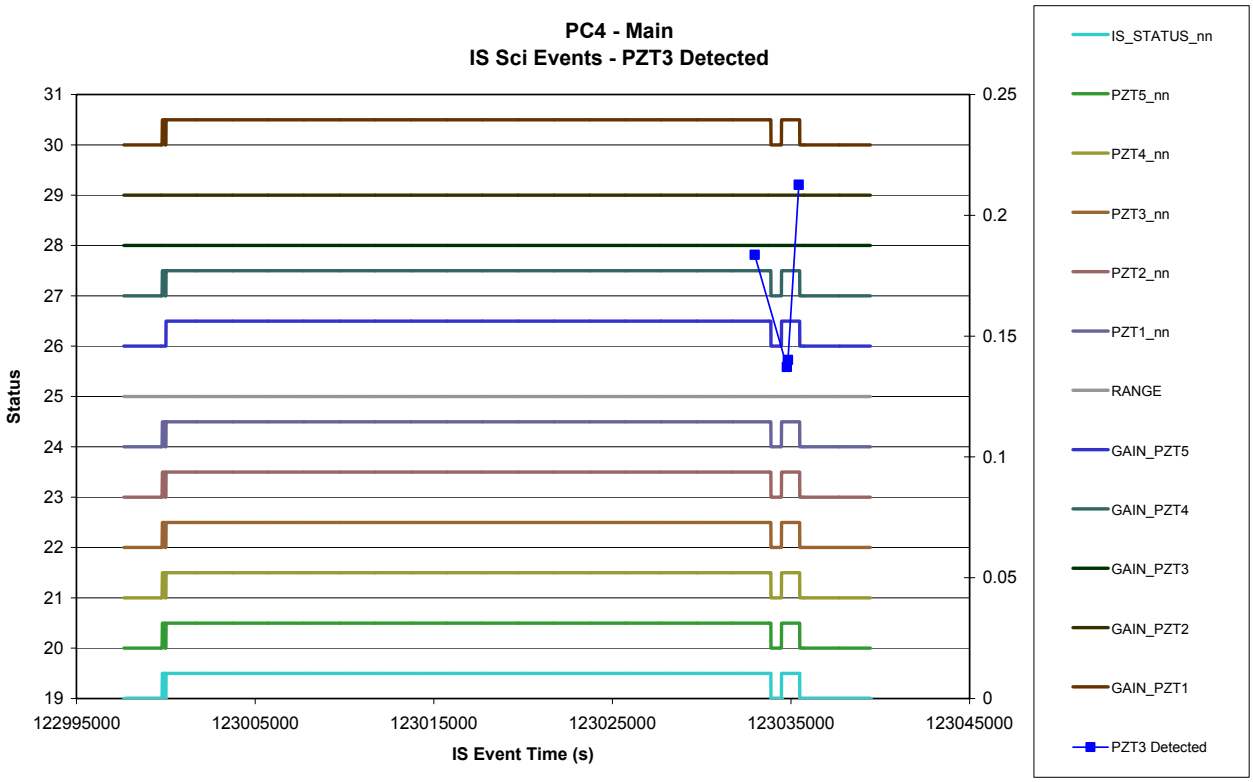


Figure 7.4-10. PZT 4 Detected Events vs. time - Main

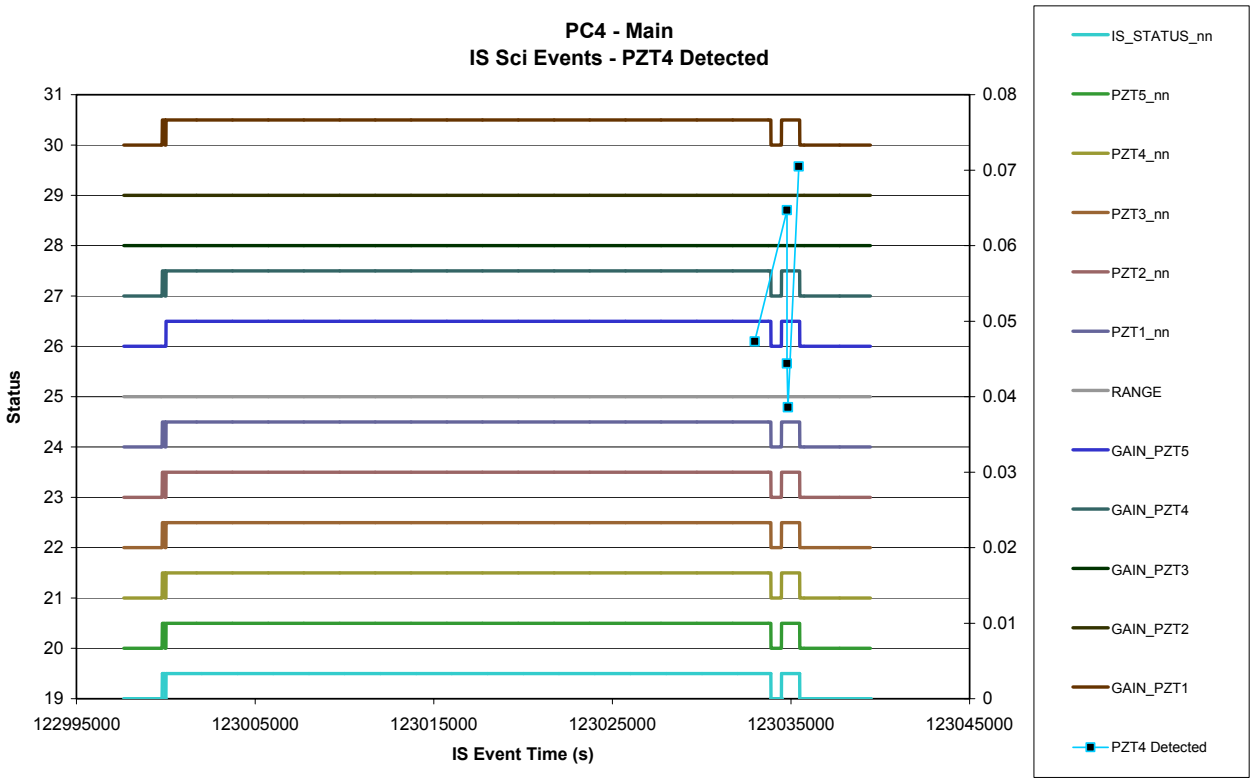


Figure 7.4-11. PZT 5 Detected Events vs. time - Main

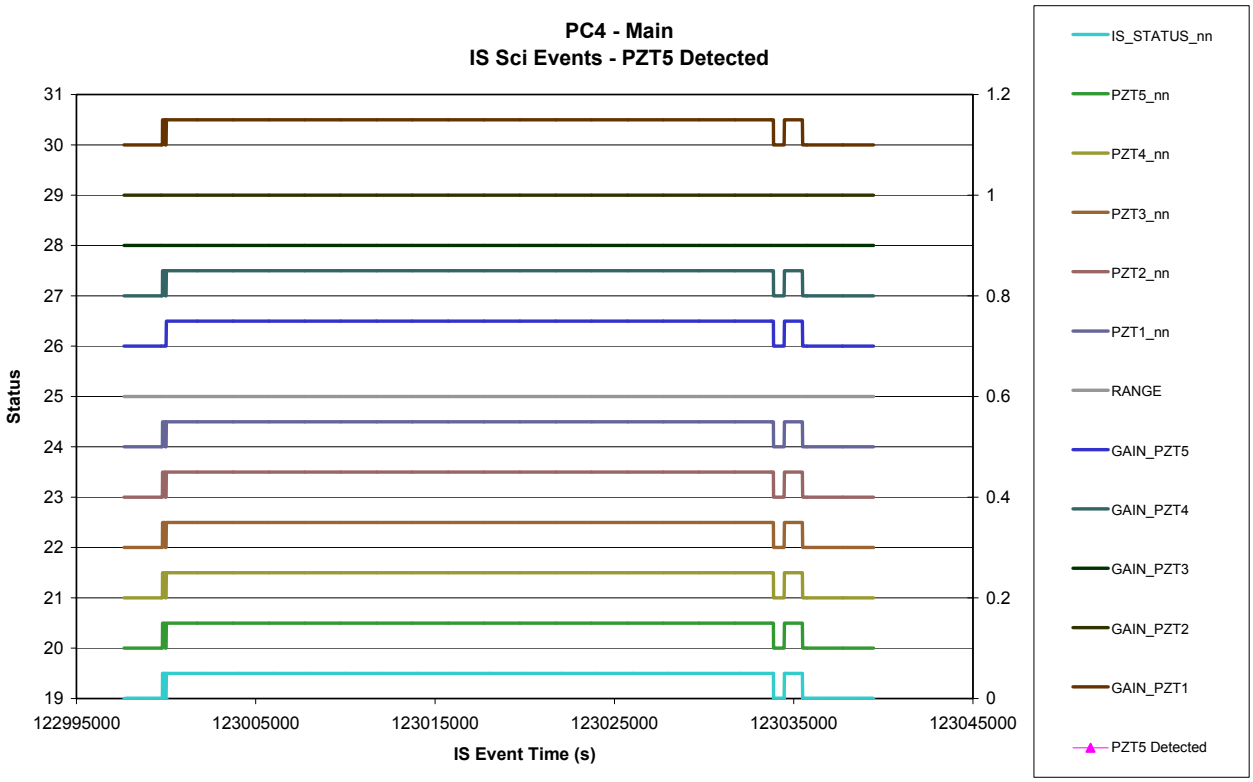
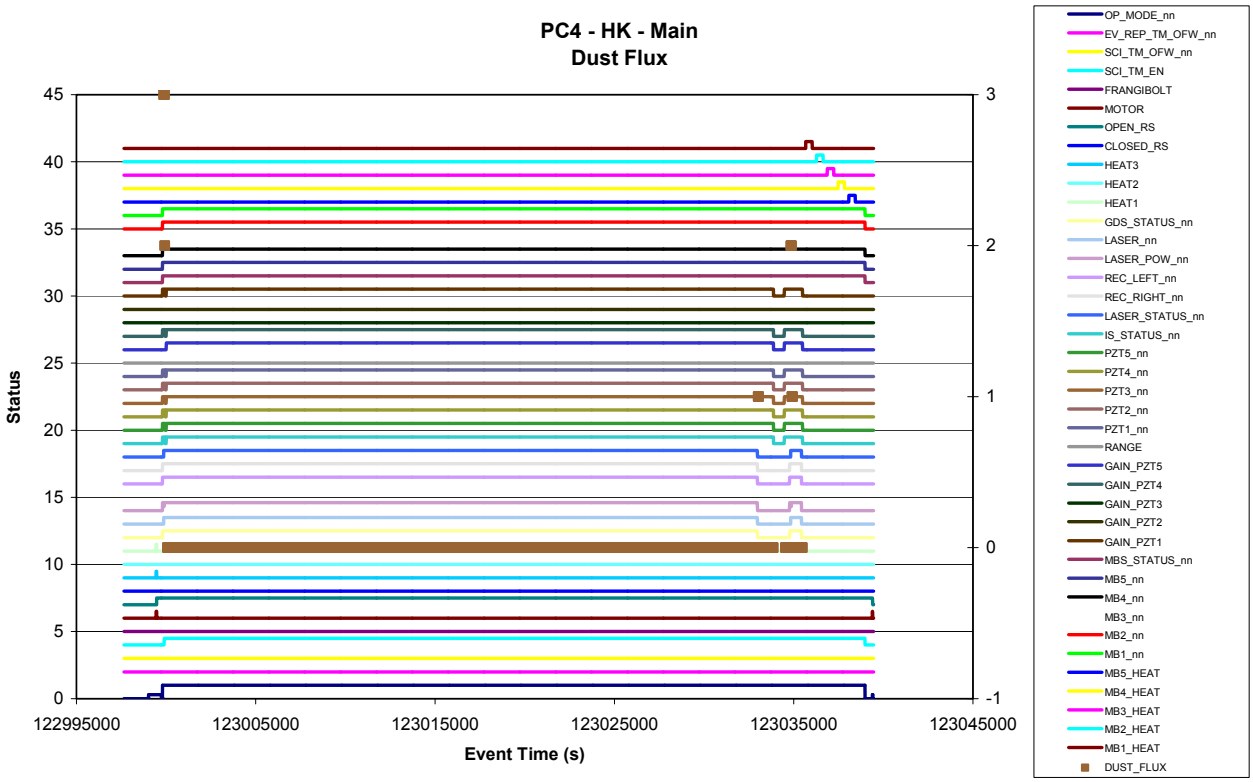


Figure 7.4-12. Dust Flux vs. time - Main



7.4.2.2 Event Rates

Not applicable

7.4.2.3 CAL

Figure 7.4-13. PZT 1 Mean and St Dev. CAL vs. time - Main

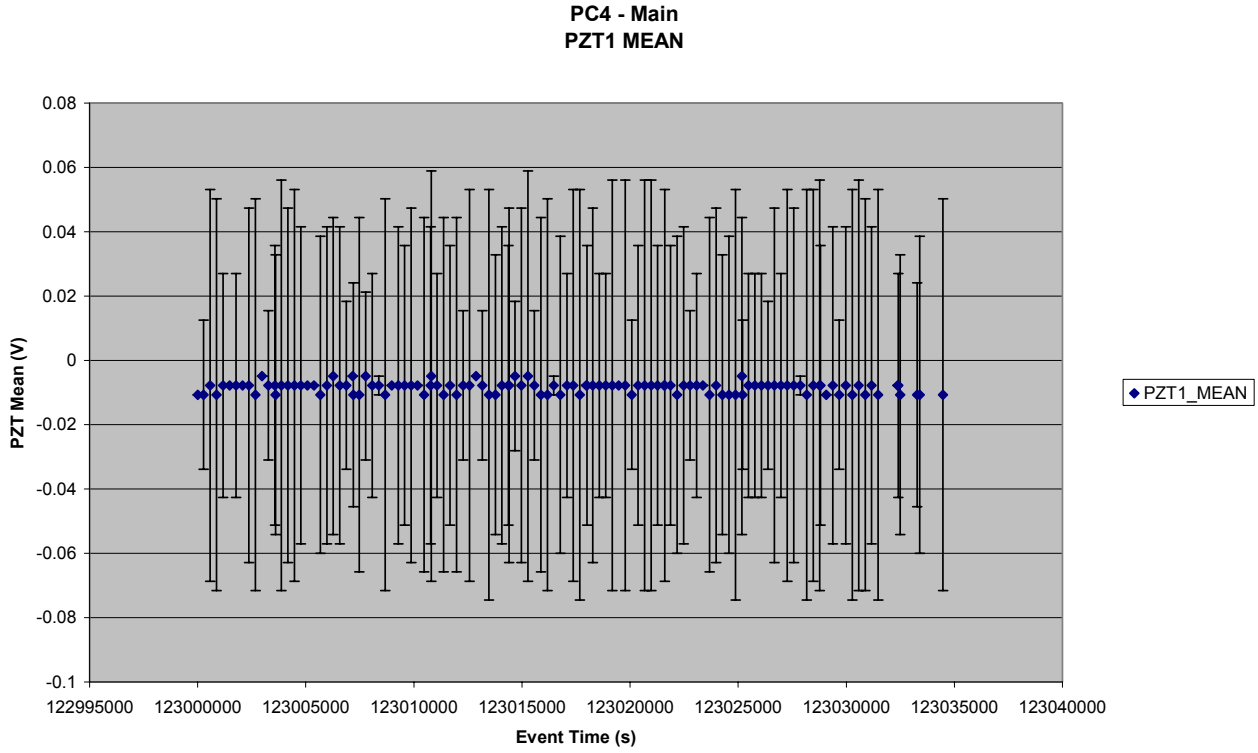


Figure 7.4-14. PZT 2 Mean and St Dev. CAL vs. time - Main

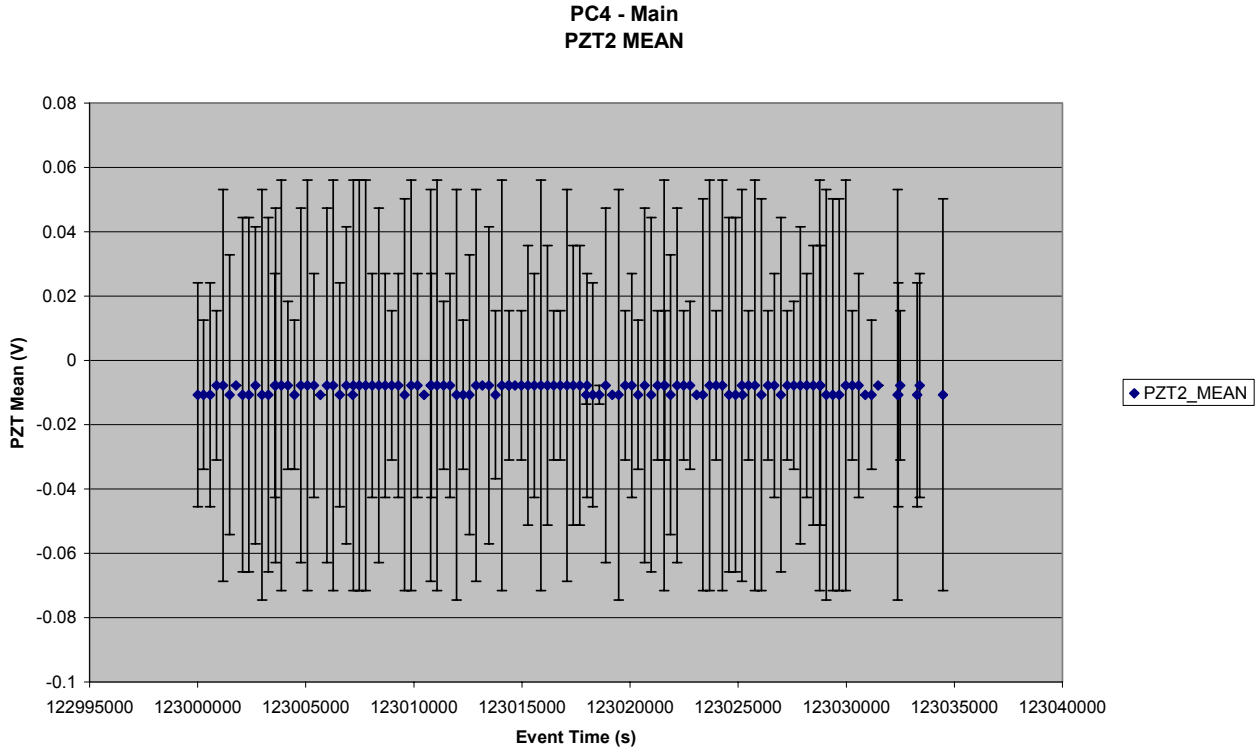


Figure 7.4-15. PZT 3 Mean and St Dev. CAL vs. time - Main

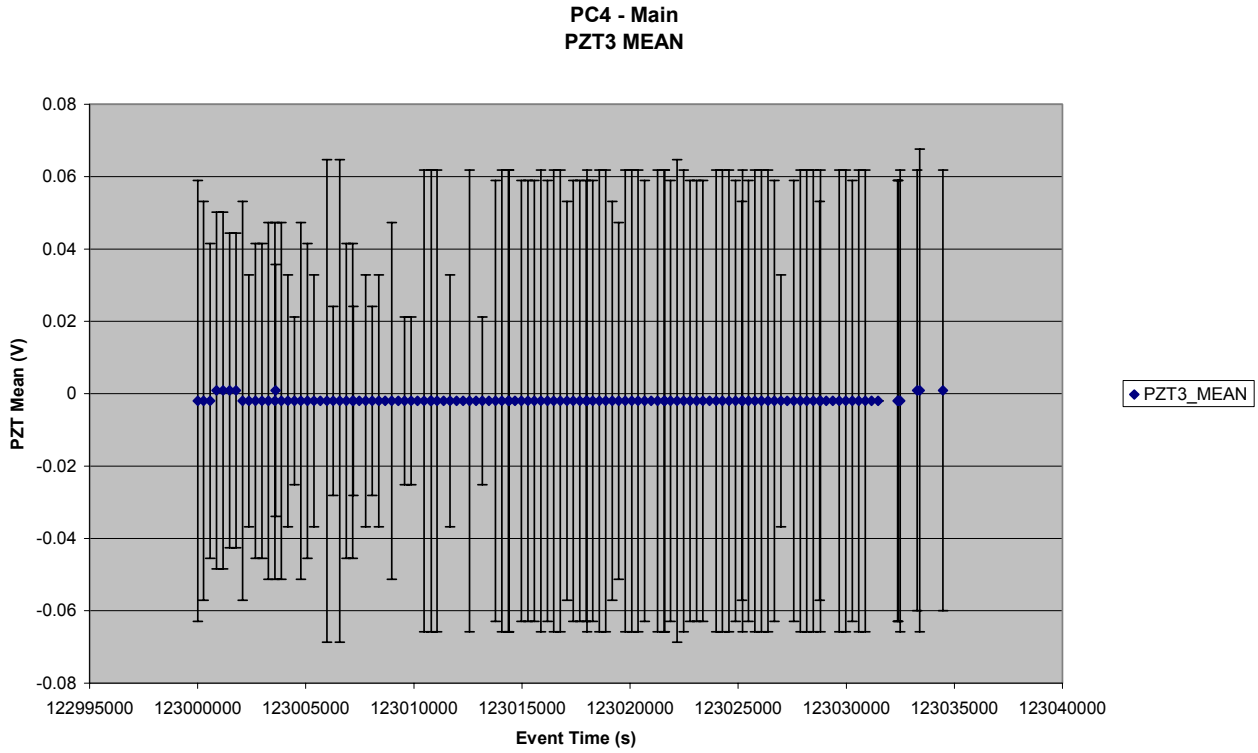


Figure 7.4-16. PZT 4 Mean and St Dev. CAL vs. time - Main

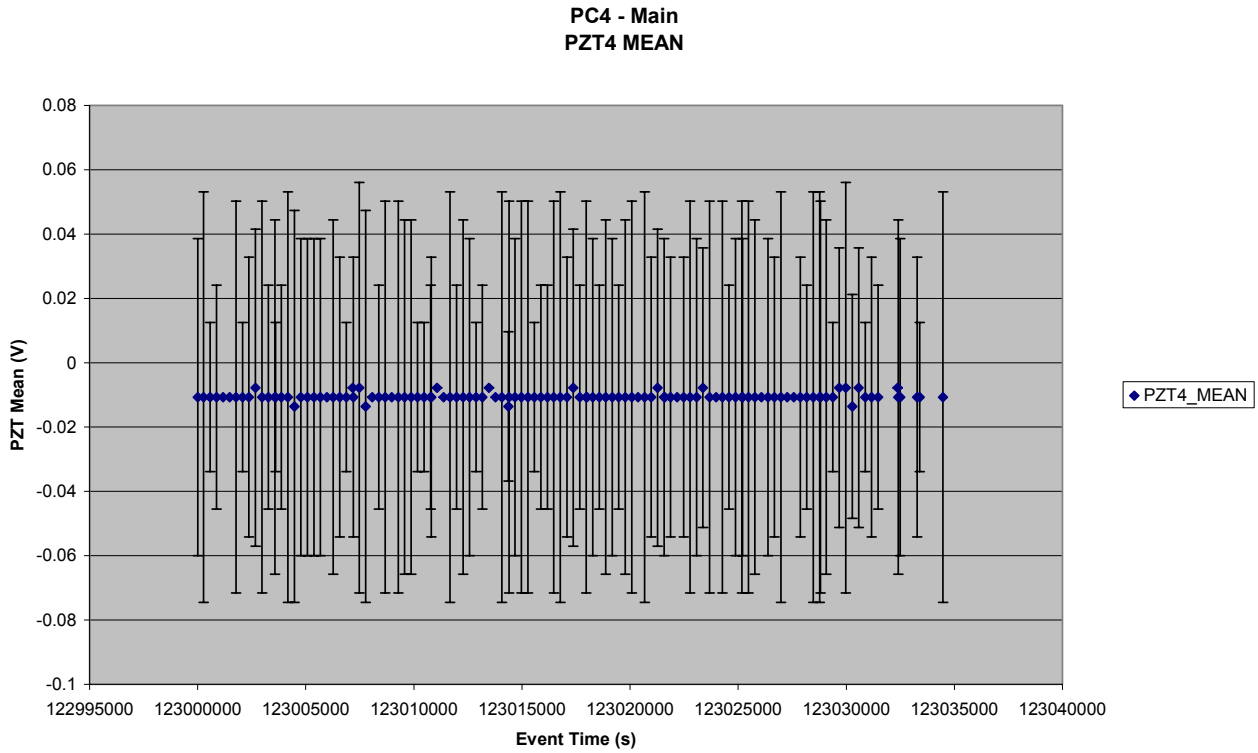


Figure 7.4-17. PZT 5 Mean and St Dev. CAL vs. time - Main

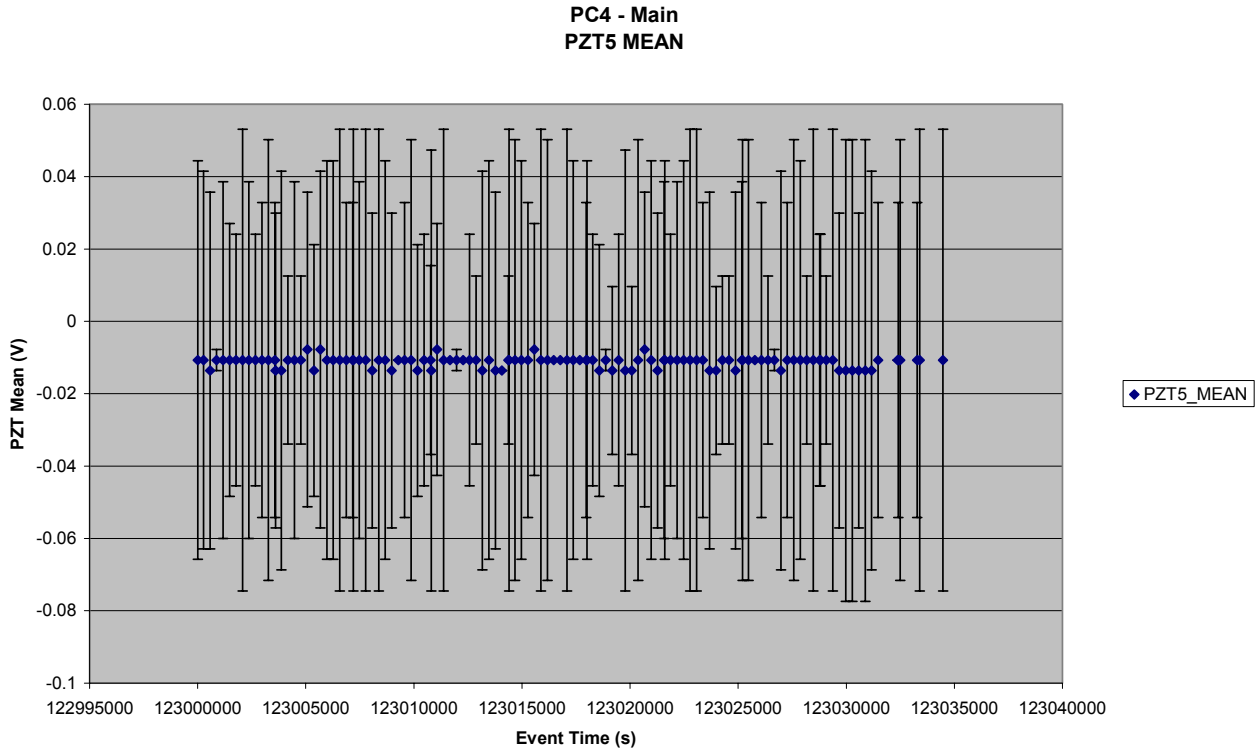


Figure 7.4-18. Reference Voltages for IS calibration vs. time - Main

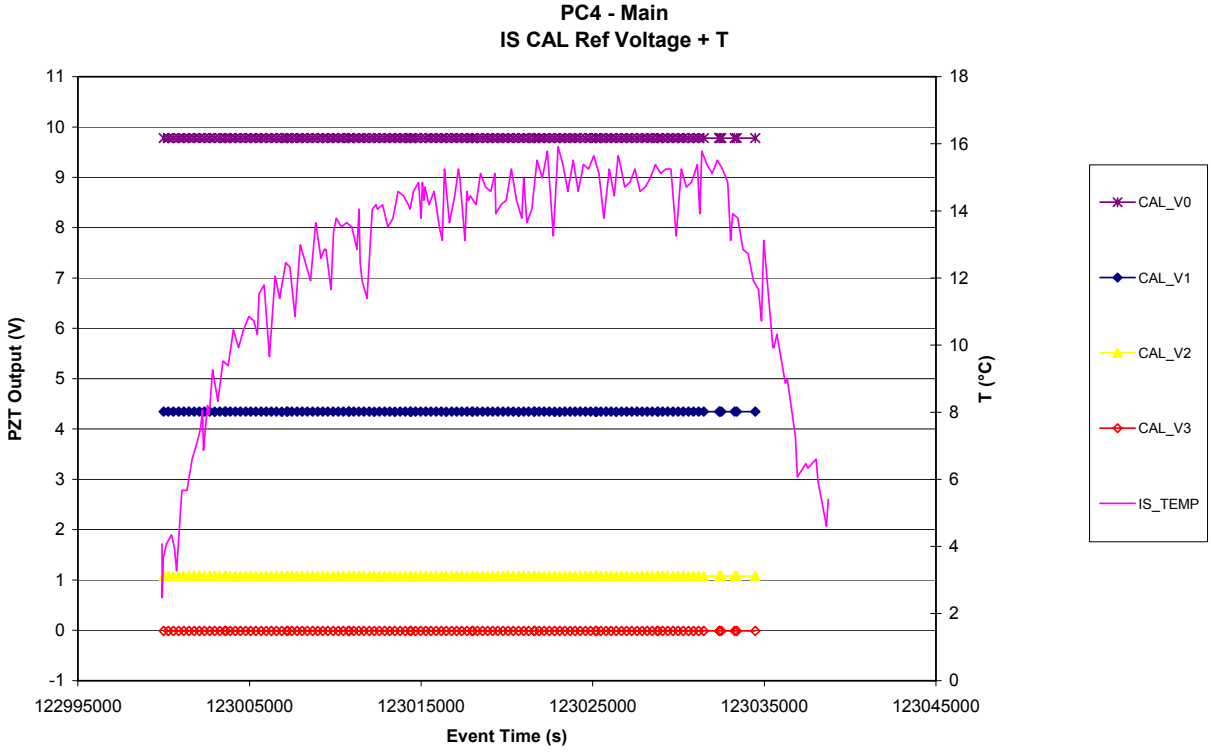


Figure 7.4-19. PZT 1 CAL Signal vs. time - Main

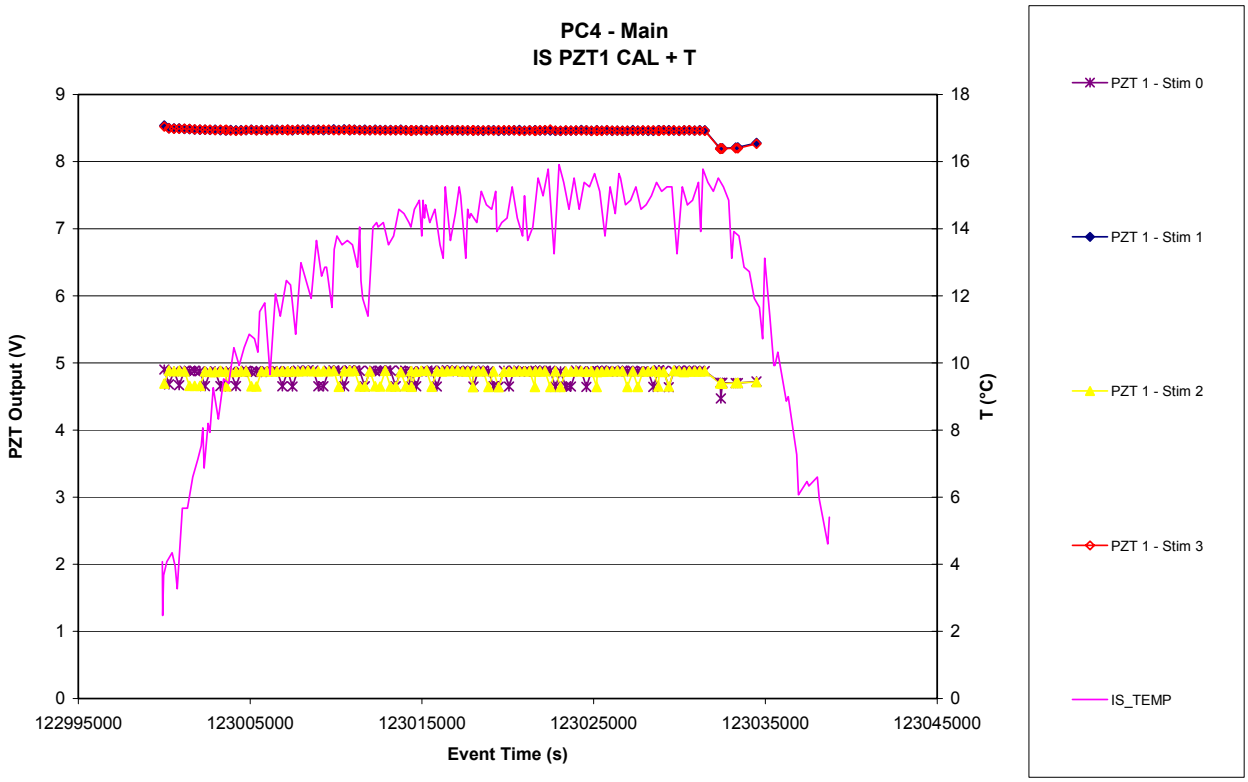


Figure 7.4-20. PZT 2 CAL Signal vs. time - Main

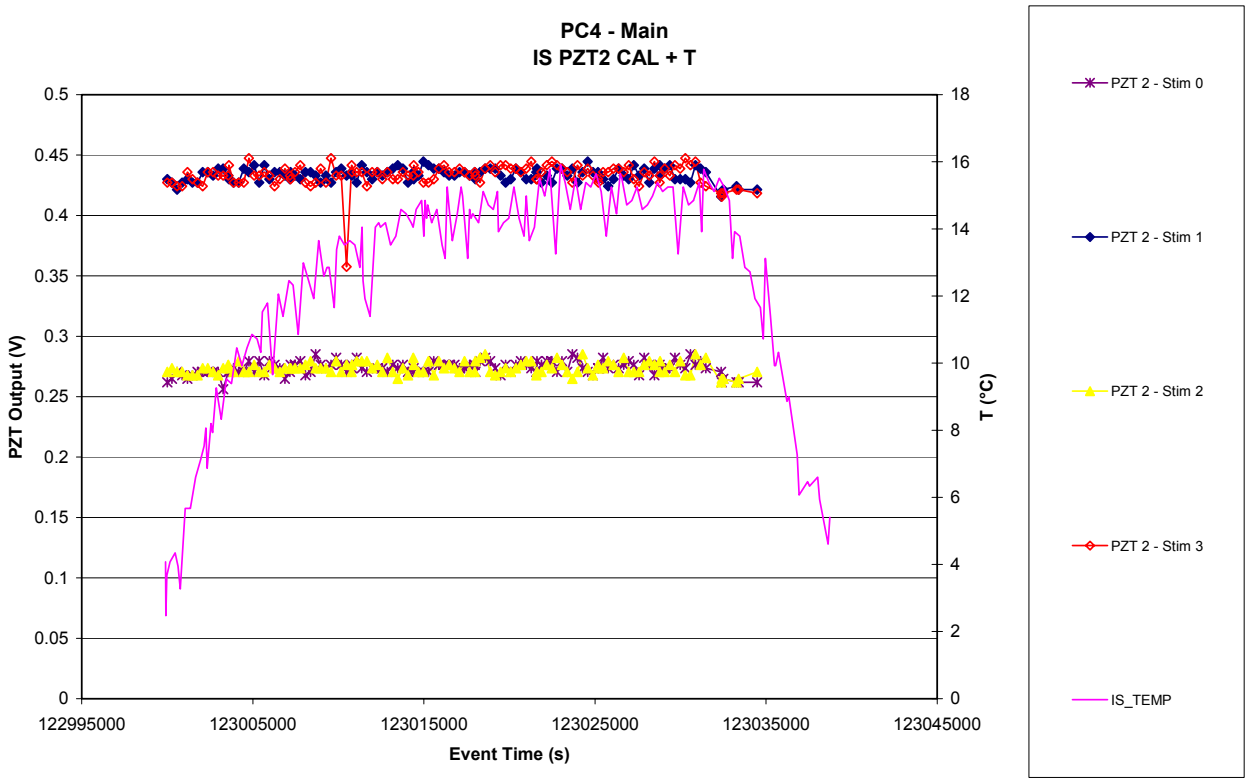


Figure 7.4-21. PZT 3 CAL Signal vs. time - Main

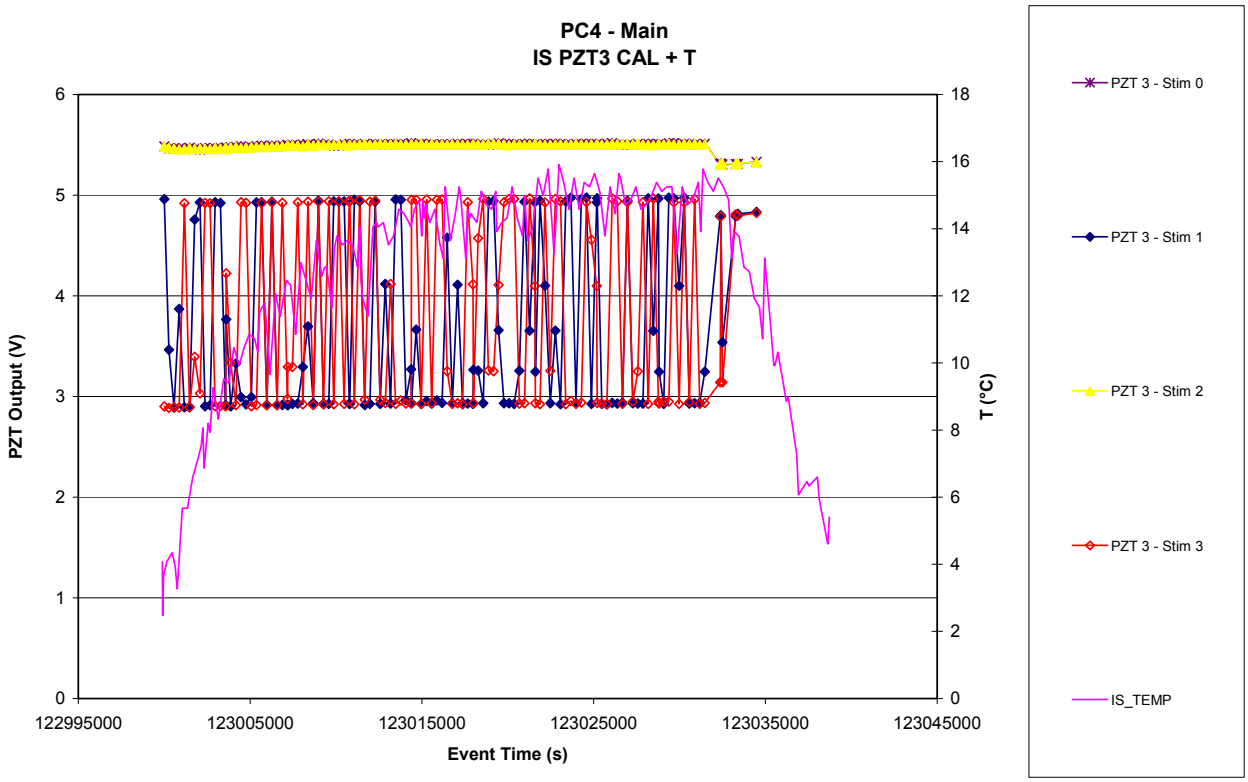


Figure 7.4-22. PZT 4 CAL Signal vs. time - Main

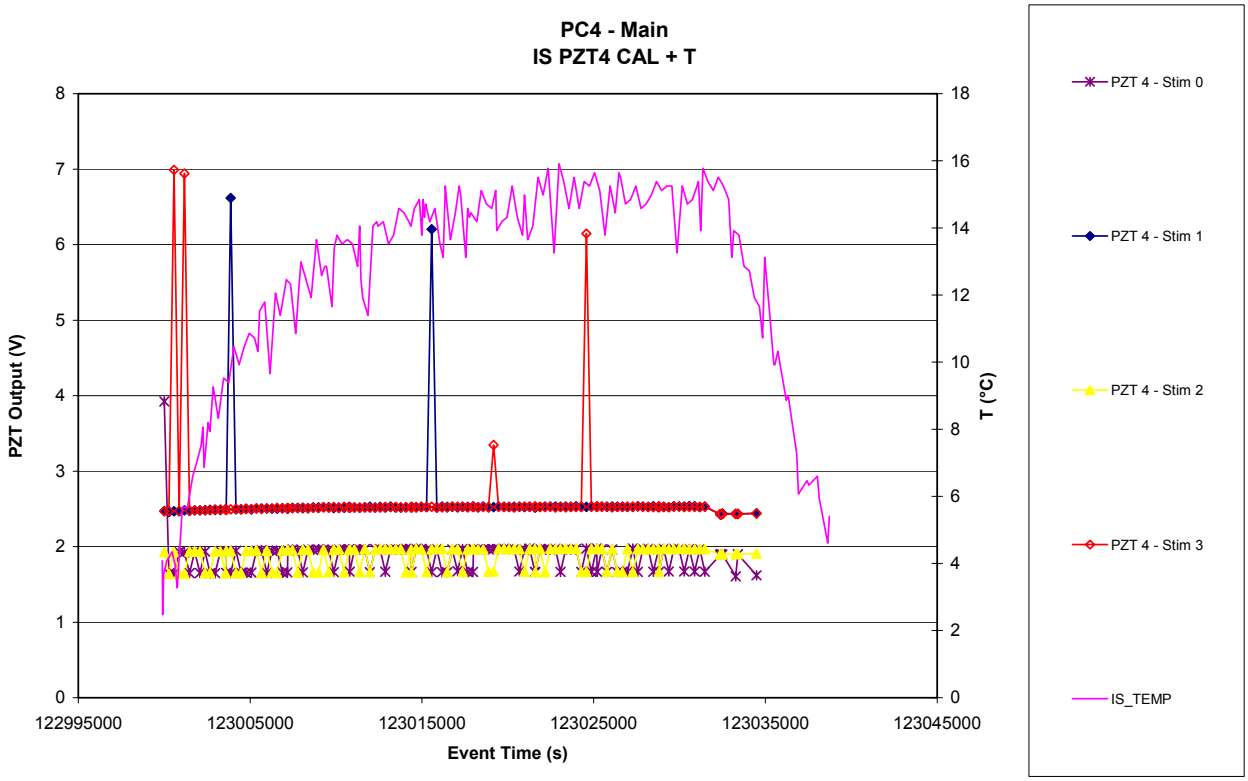


Figure 7.4-23. PZT 5 CAL Signal vs. time - Main

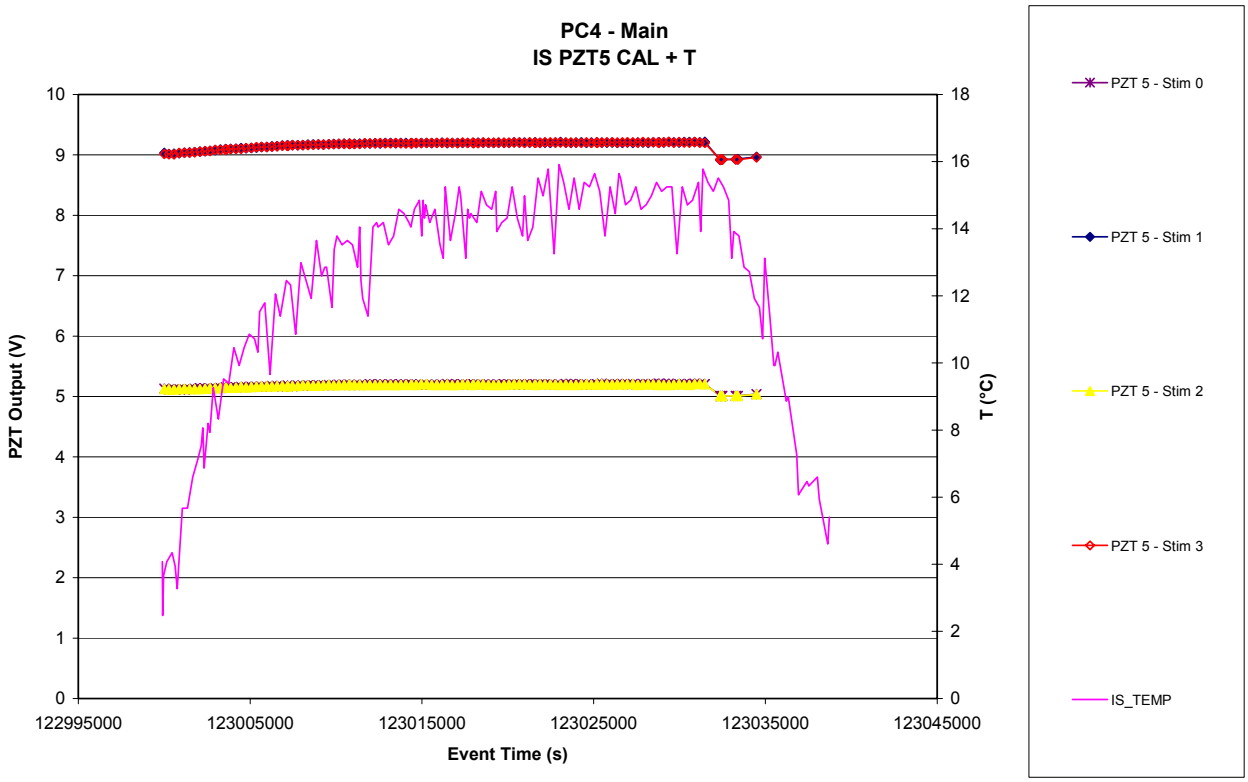


Figure 7.4-24. PZT 1 CAL Time delay vs. time - Main

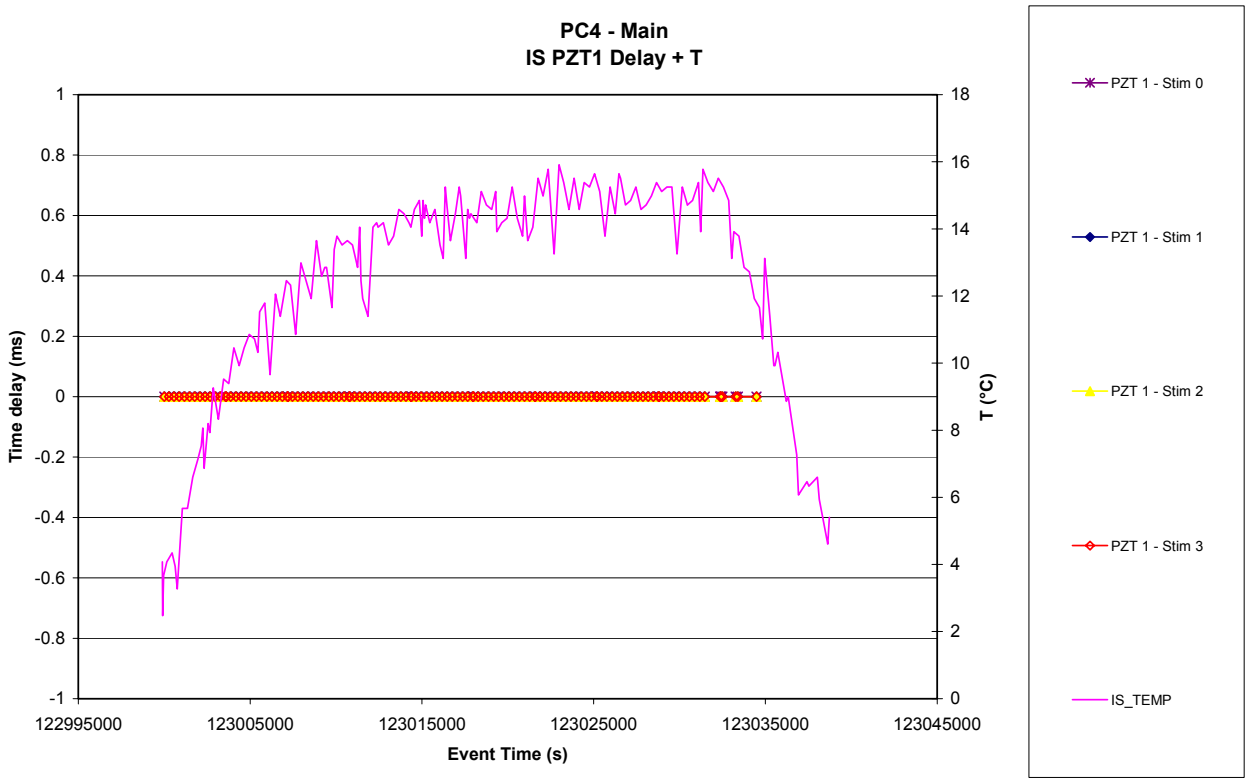


Figure 7.4-25. PZT 2 CAL Time delay vs. time - Main

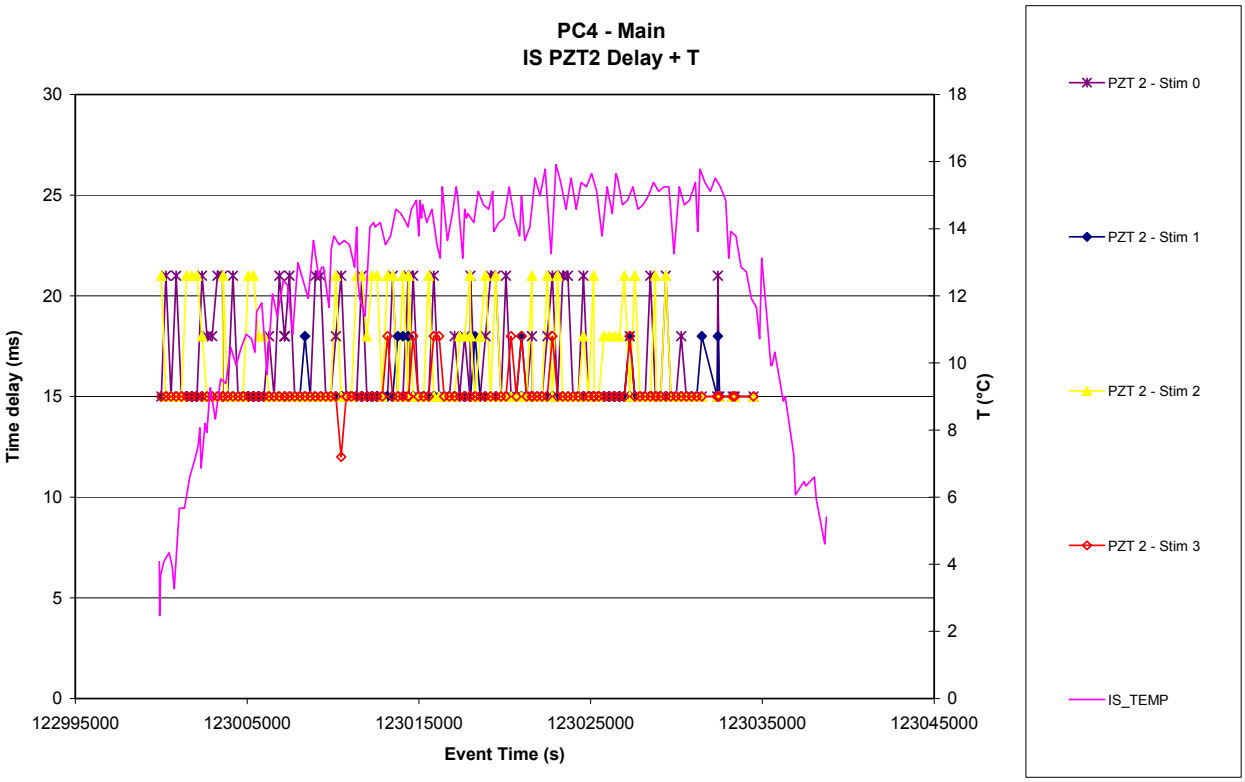


Figure 7.4-26. PZT 3 CAL Time delay vs. time - Main

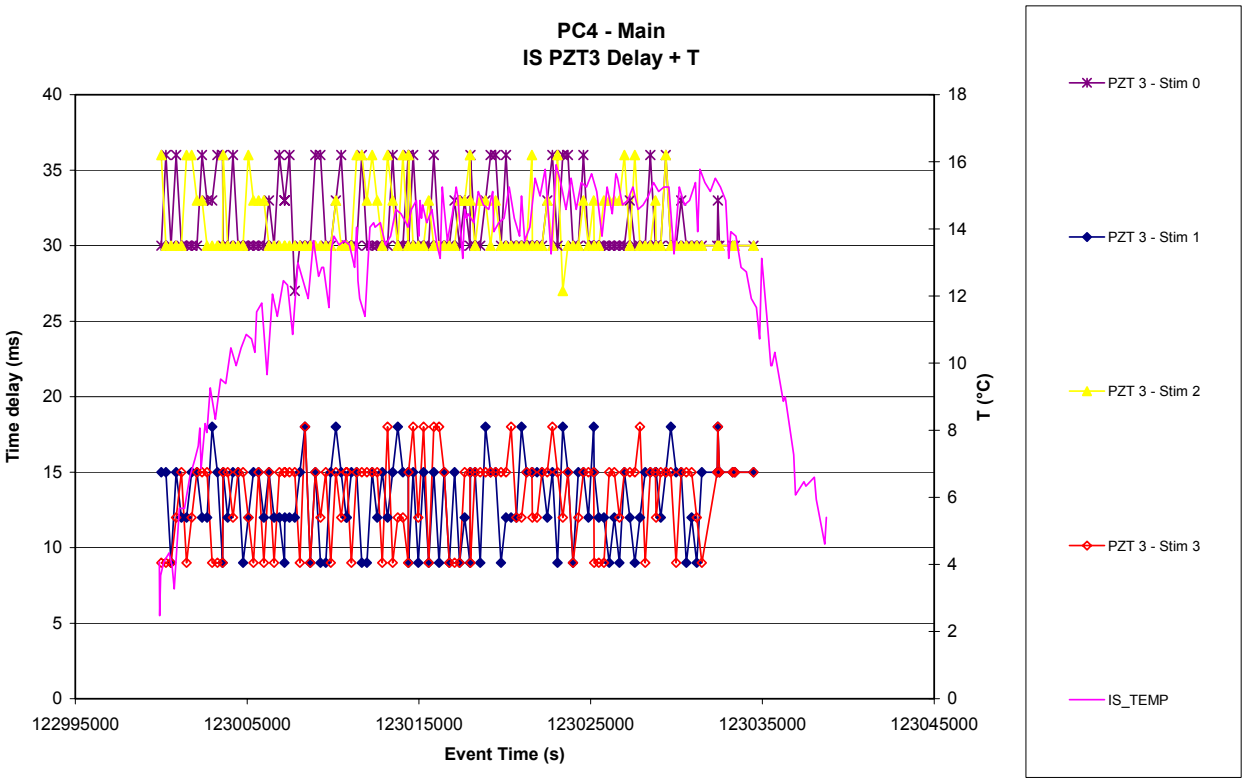


Figure 7.4-27. PZT 4 CAL Time delay vs. time - Main

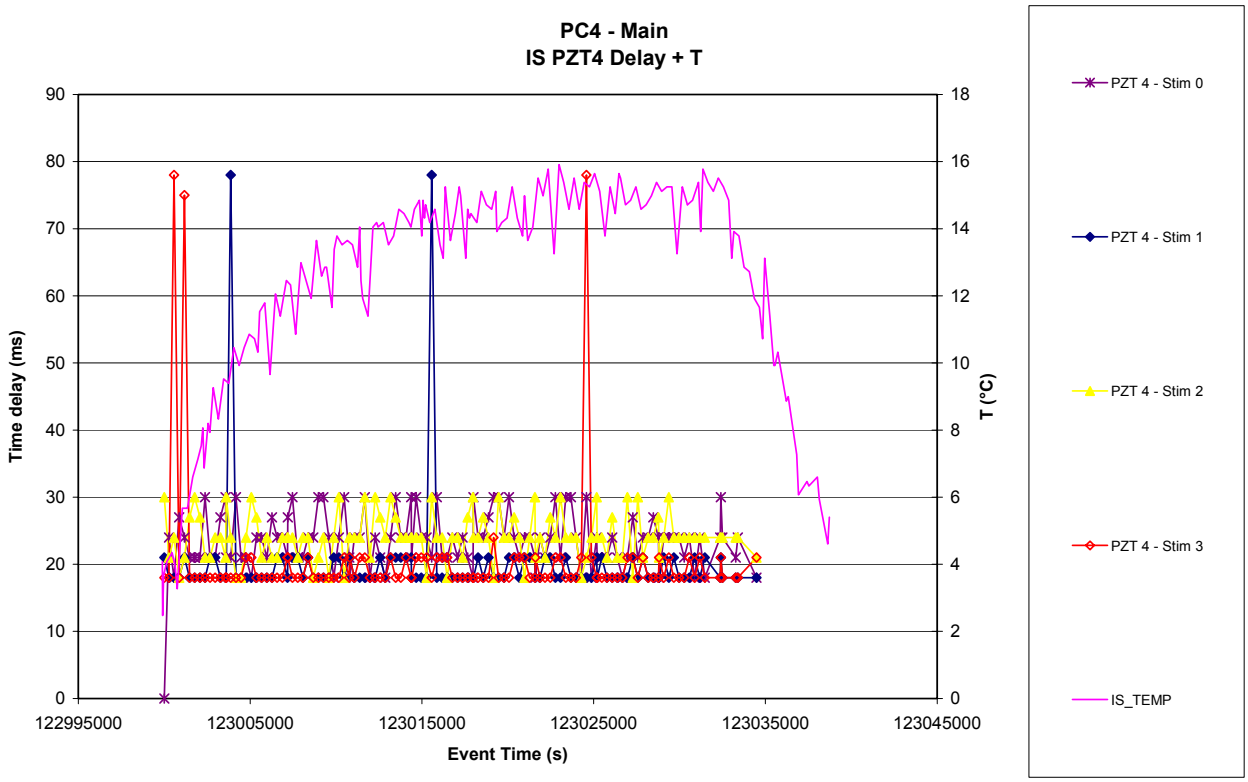


Figure 7.4-28. PZT 5 CAL Time delay vs. time - Main

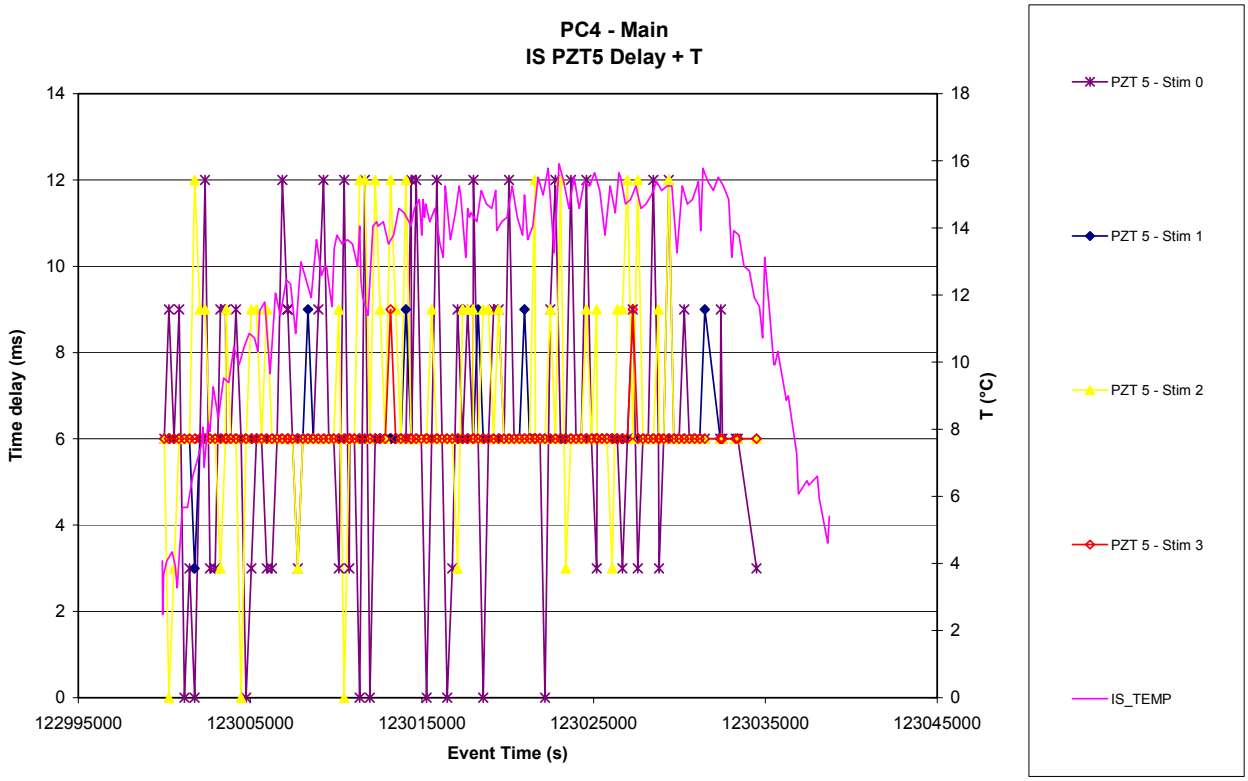


Figure 7.4-29. PZT 1 CAL Signal vs. stimulus – Main

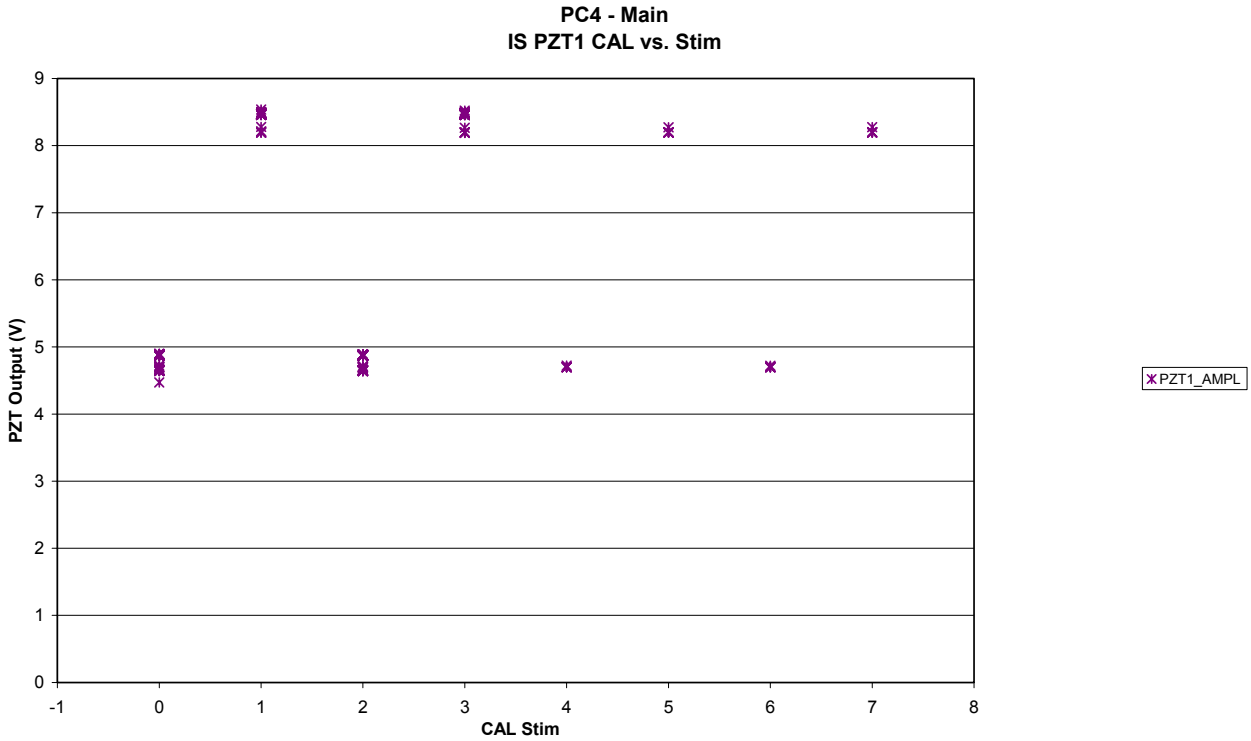


Figure 7.4-30. PZT 2 CAL Signal vs. stimulus – Main

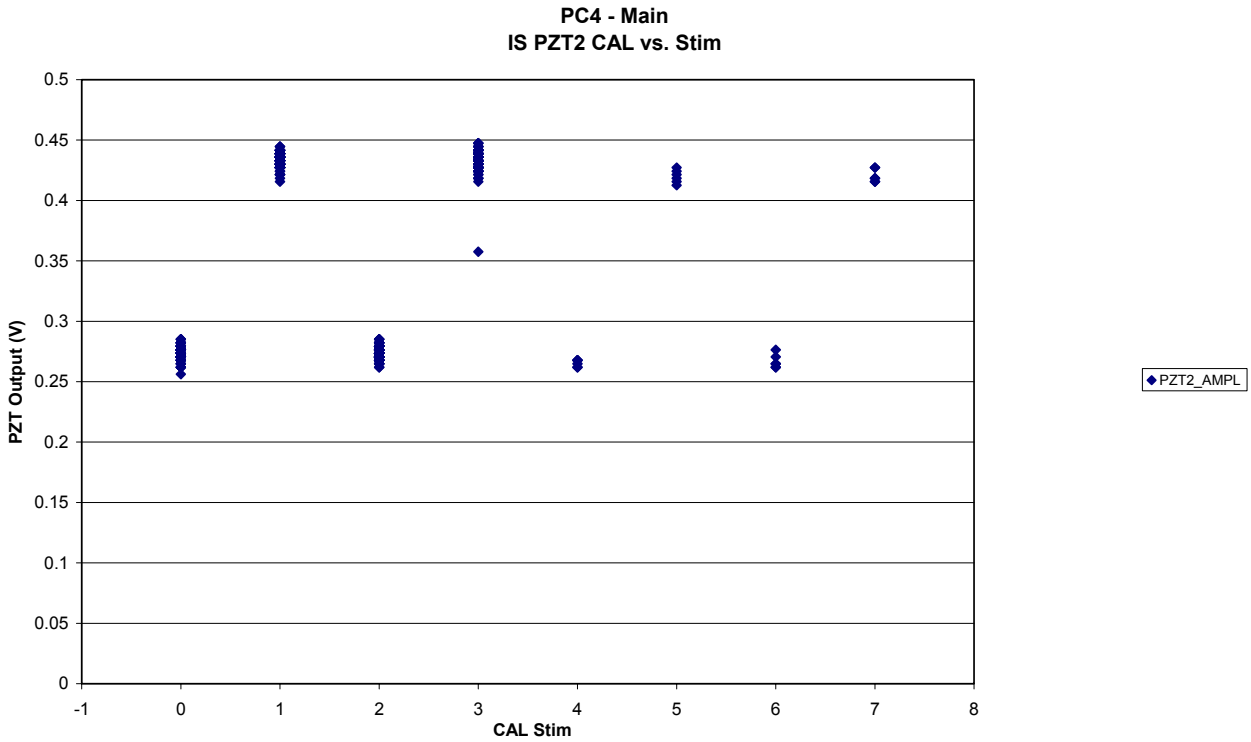


Figure 7.4-31. PZT 3 CAL Signal vs. stimulus – Main

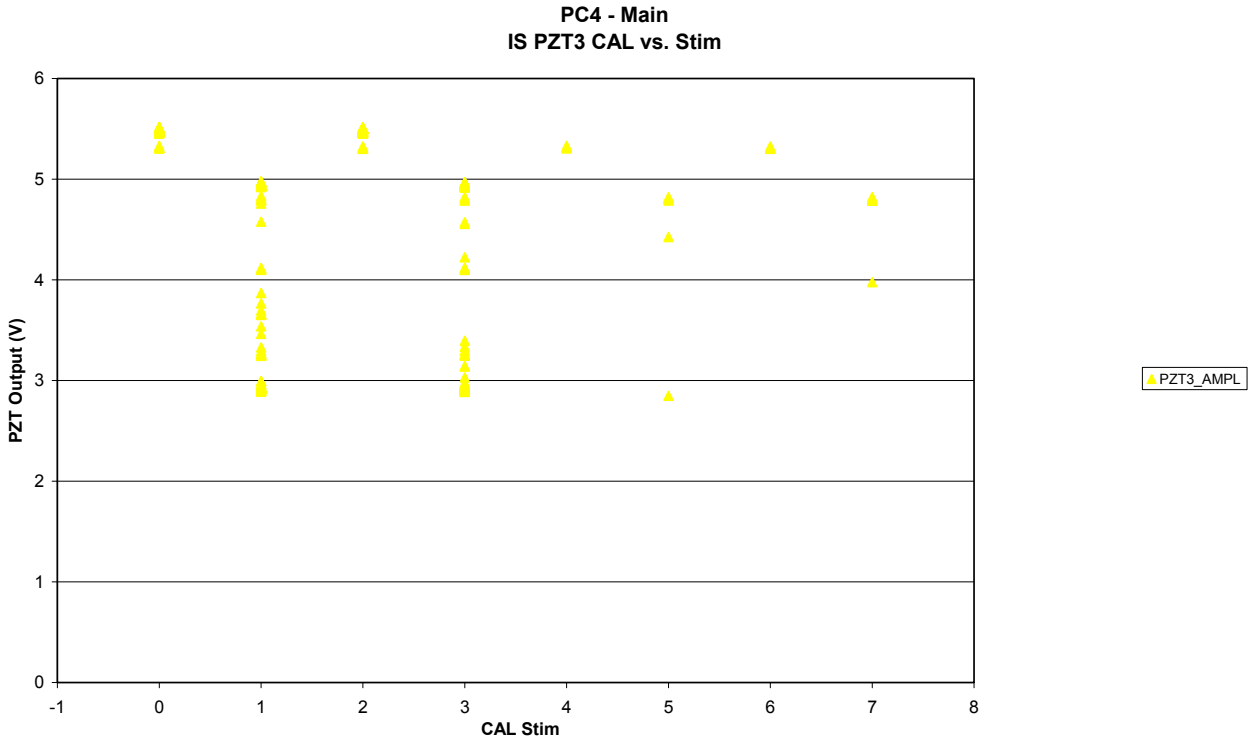


Figure 7.4-32. PZT 4 CAL Signal vs. stimulus – Main

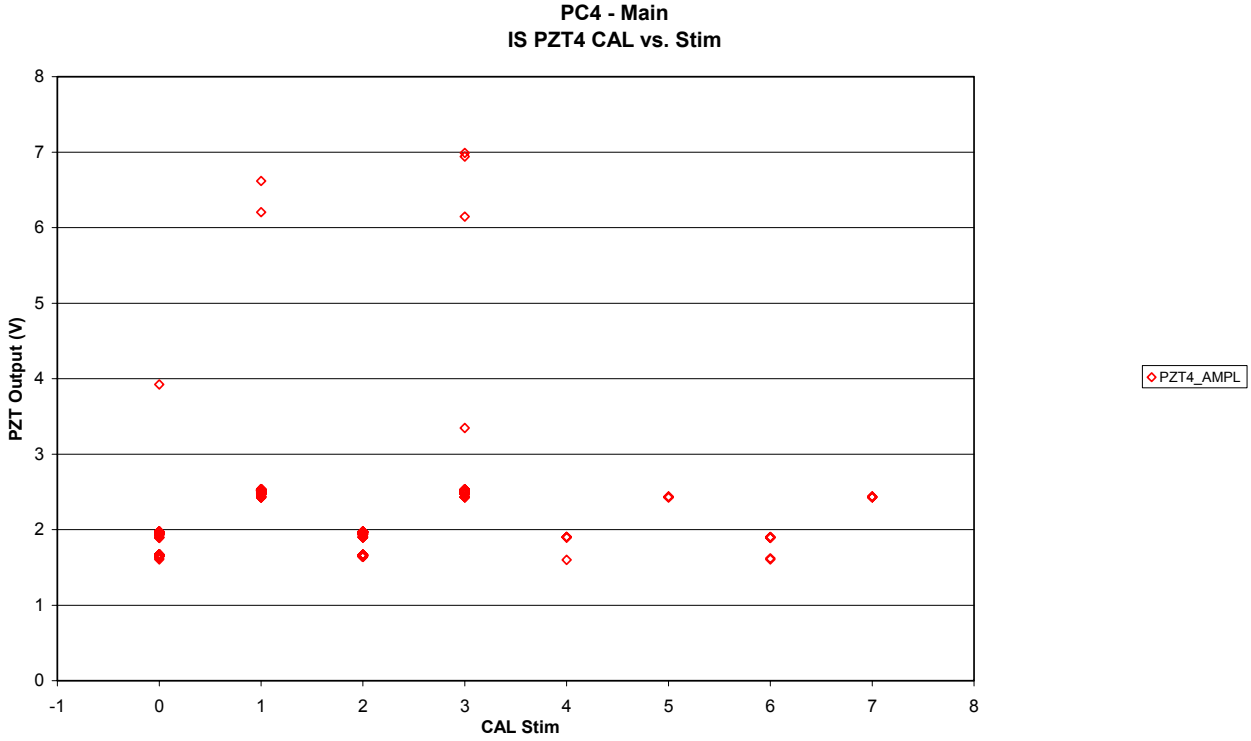


Figure 7.4-33. PZT 5 CAL Signal vs. stimulus – Main

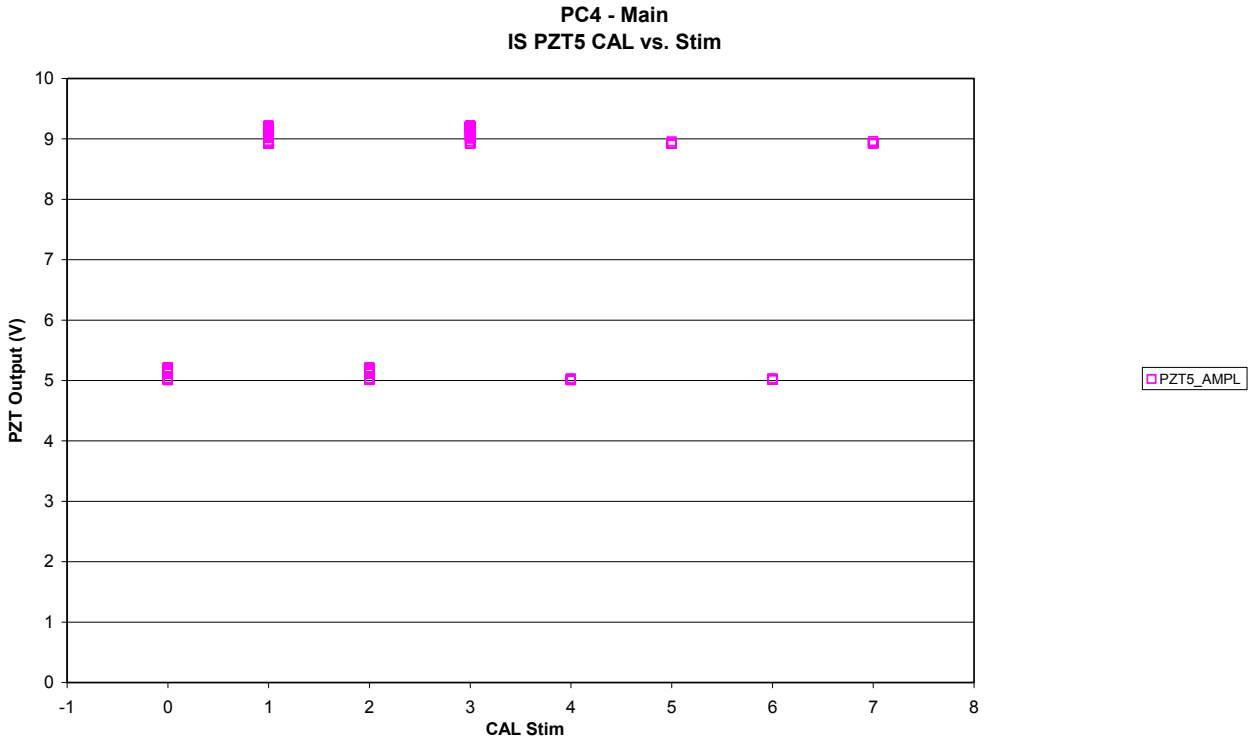


Figure 7.4-34. PZT 1 CAL Time delay vs. stimulus – Main

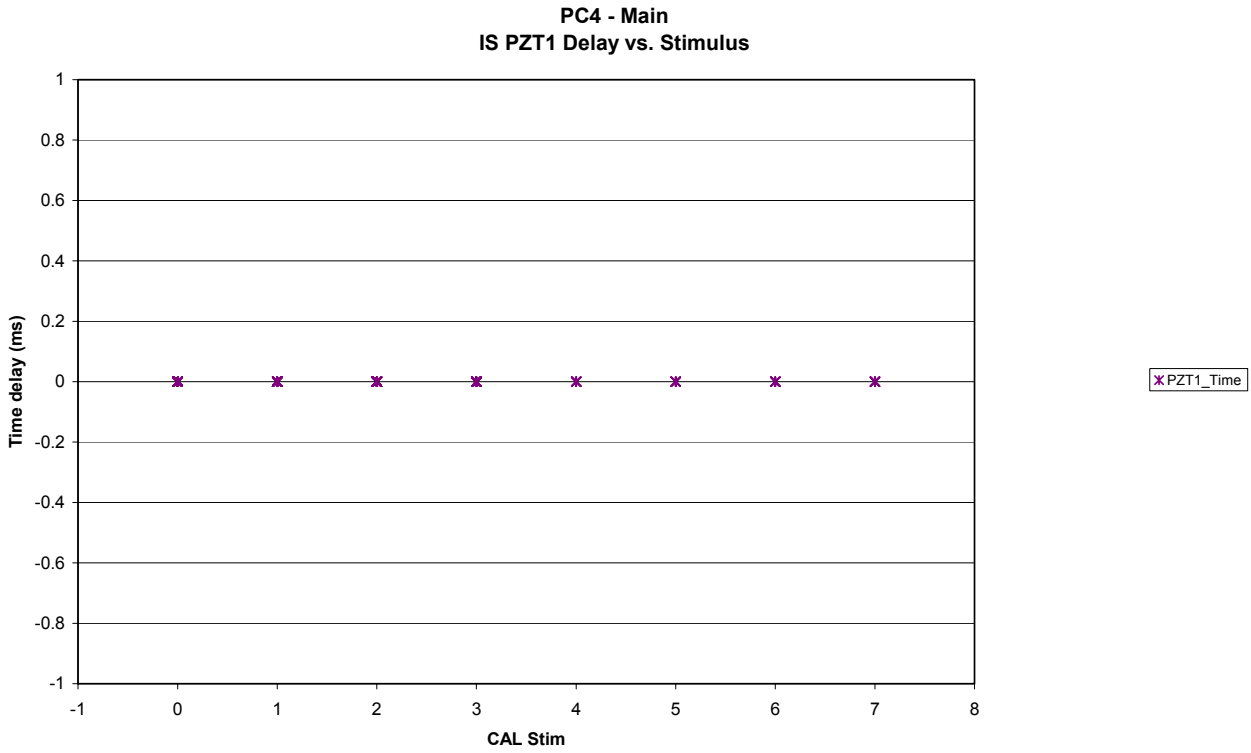


Figure 7.4-35. PZT 2 CAL Time delay vs. stimulus - Main

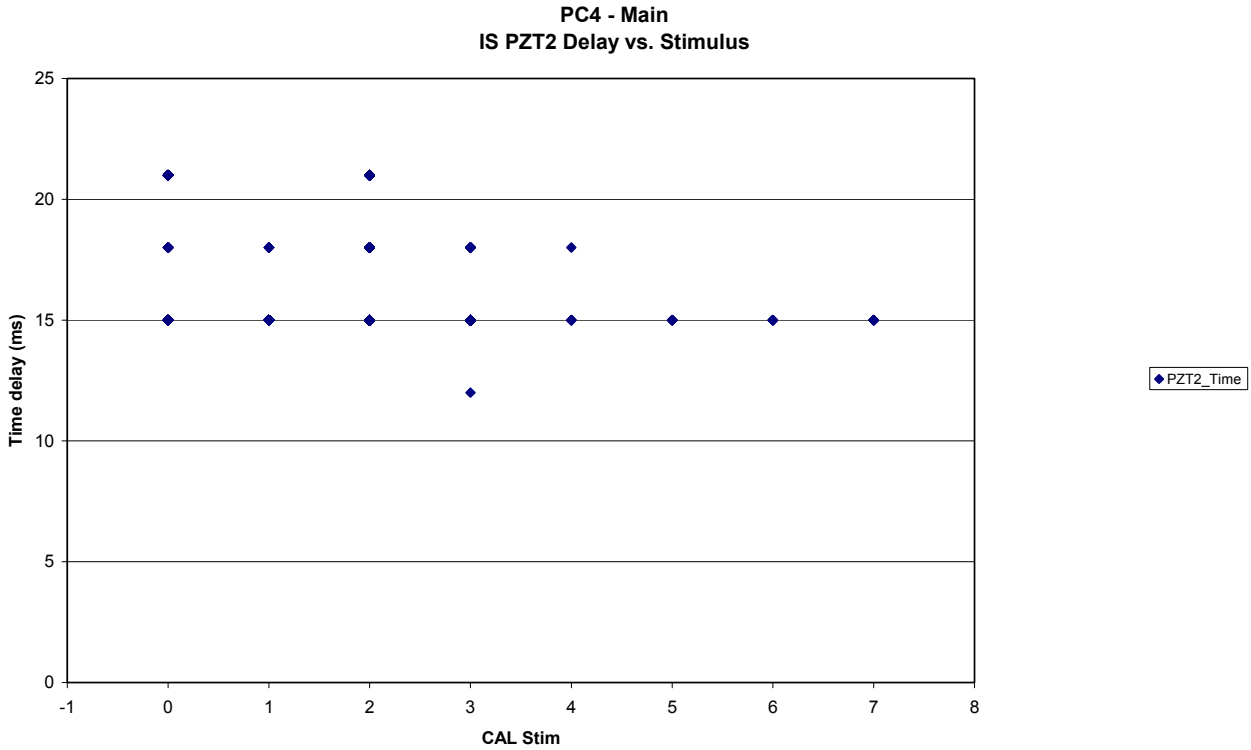


Figure 7.4-36. PZT 3 CAL Time delay vs. stimulus - Main

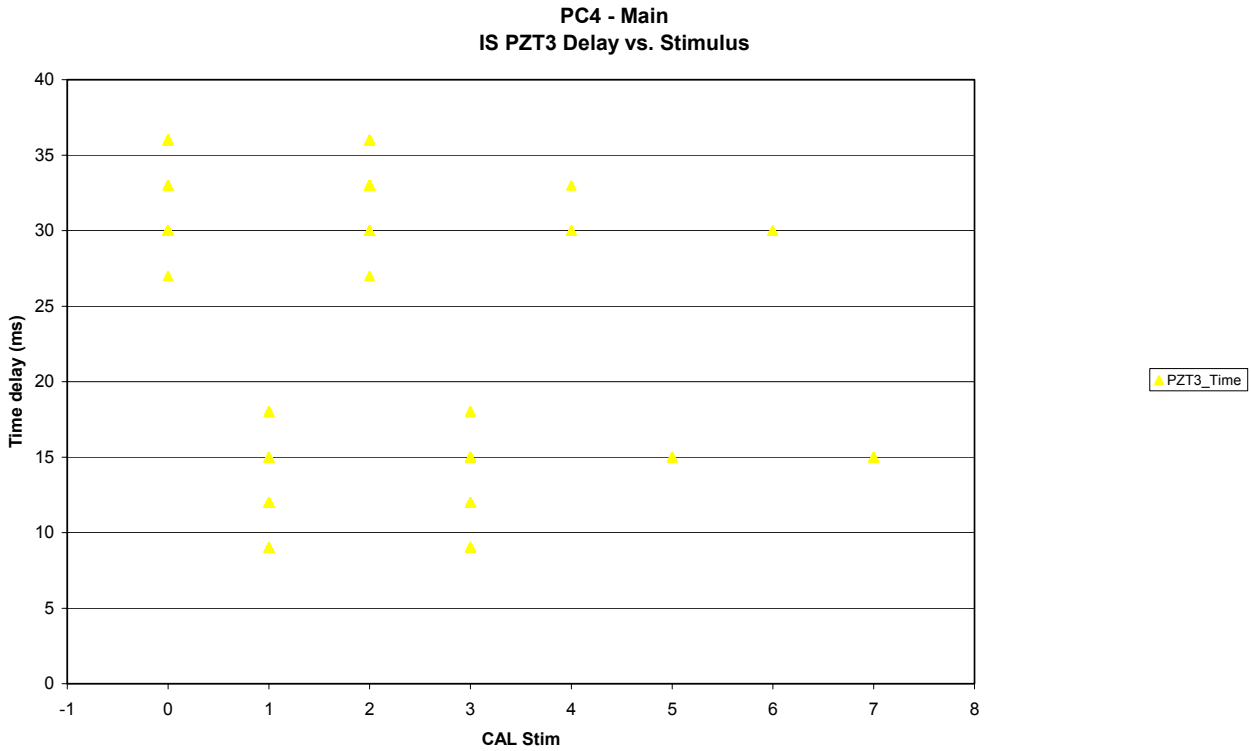


Figure 7.4-37. PZT 4 CAL Time delay vs. stimulus - Main

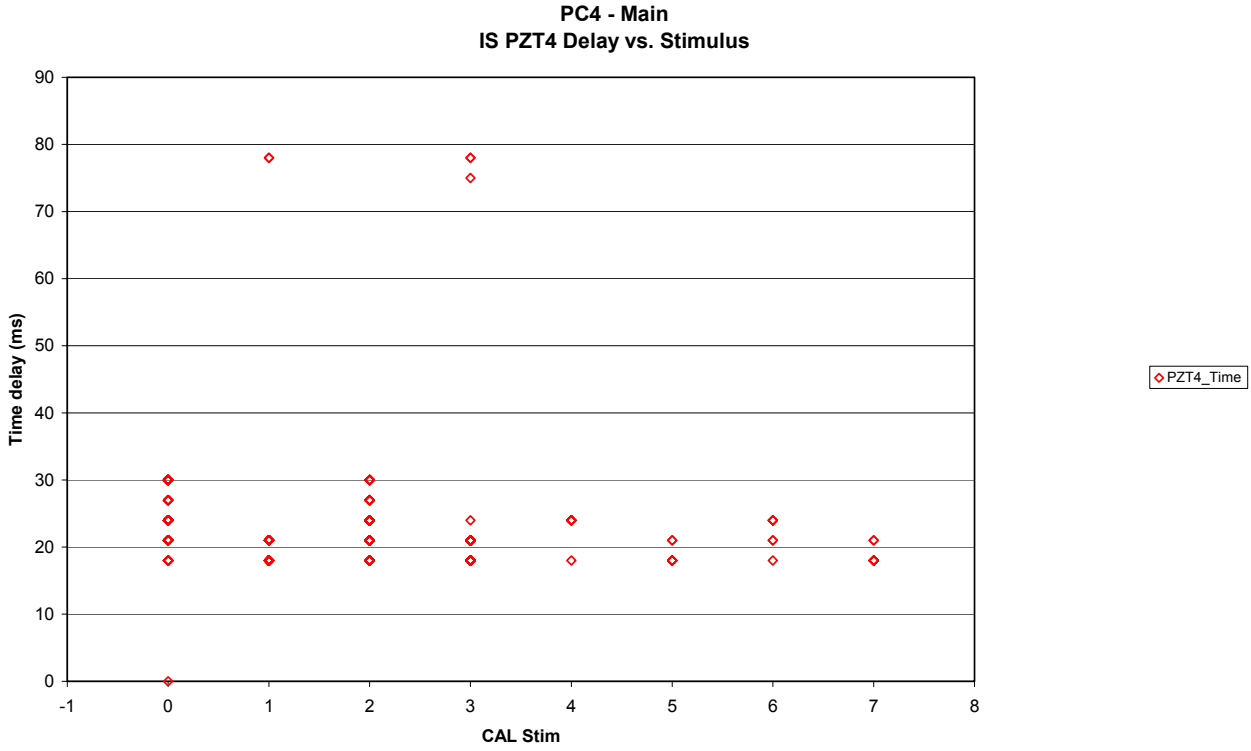
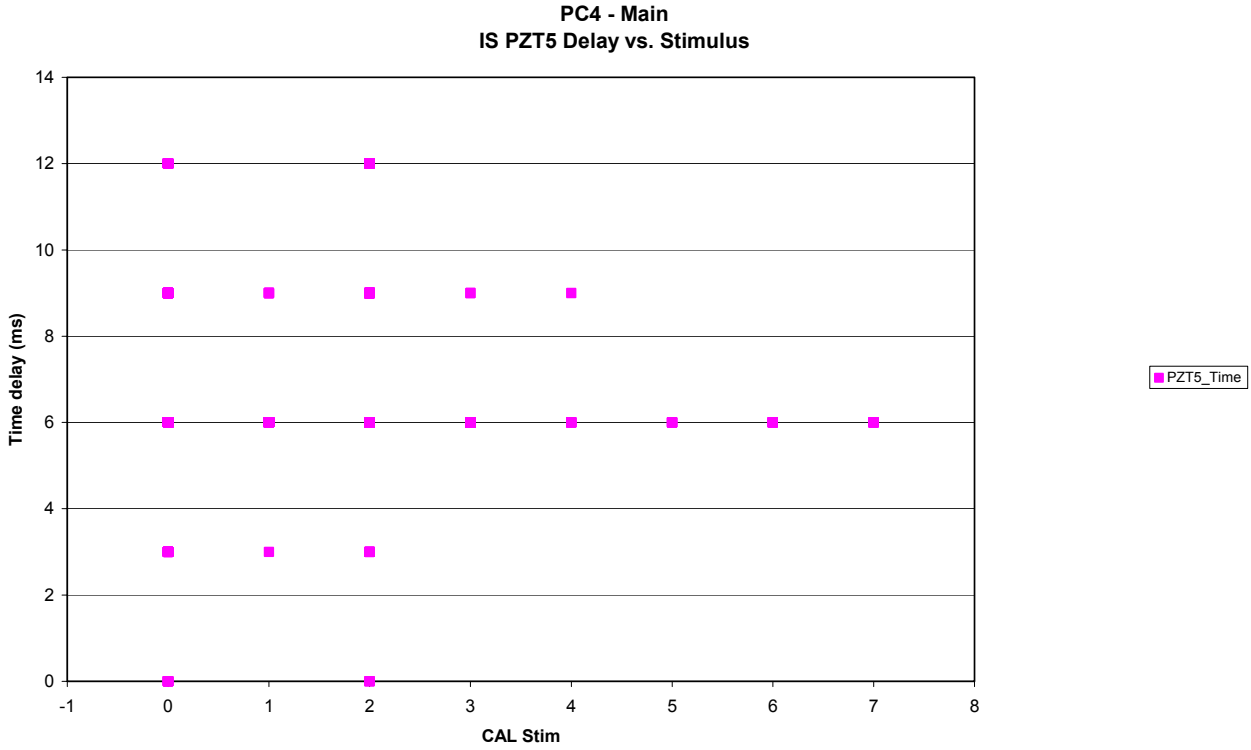


Figure 7.4-38. PZT 5 CAL Time delay vs. stimulus - Main



7.5 MICRO BALANCE SYSTEM (MBS)

7.5.1 MBS – Status

Figure 7.5-1. MBS Operation Status vs. time - Main

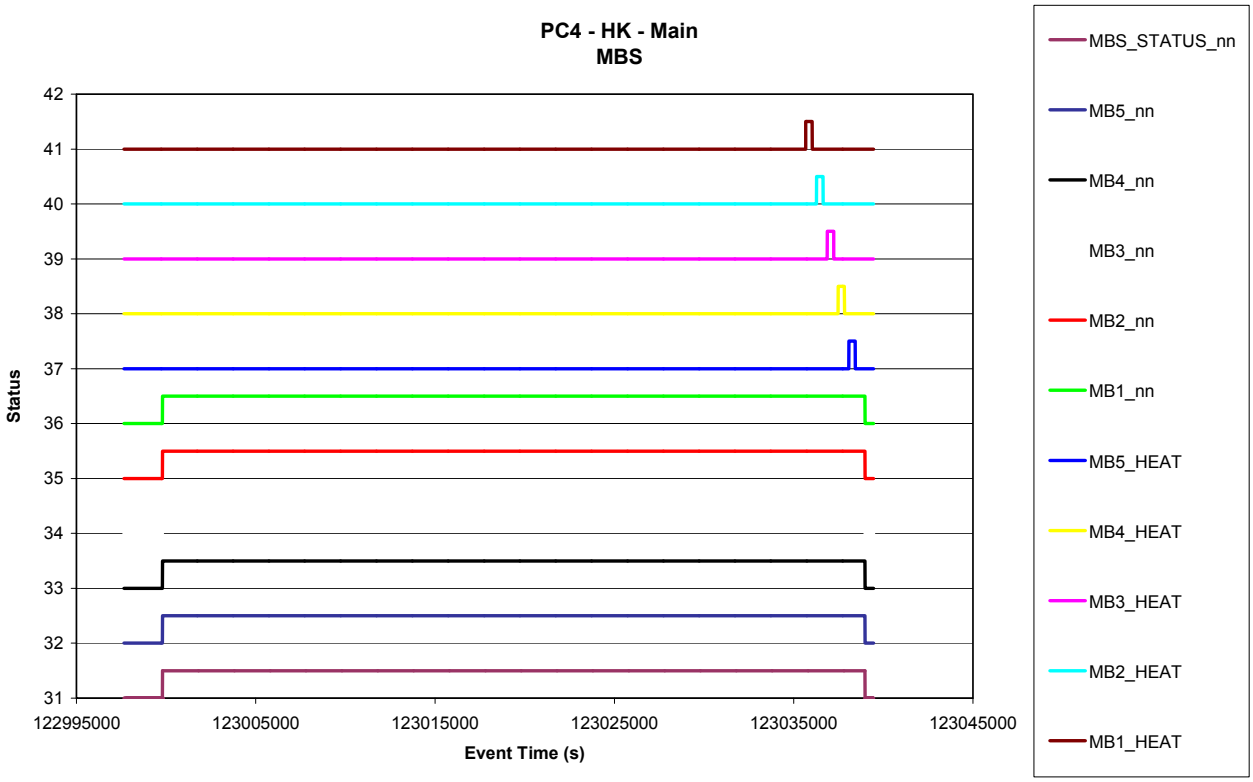


Figure 7.5-2. MBS 1 Temperature vs. time (HK, HK-SCI, SCI) – Main

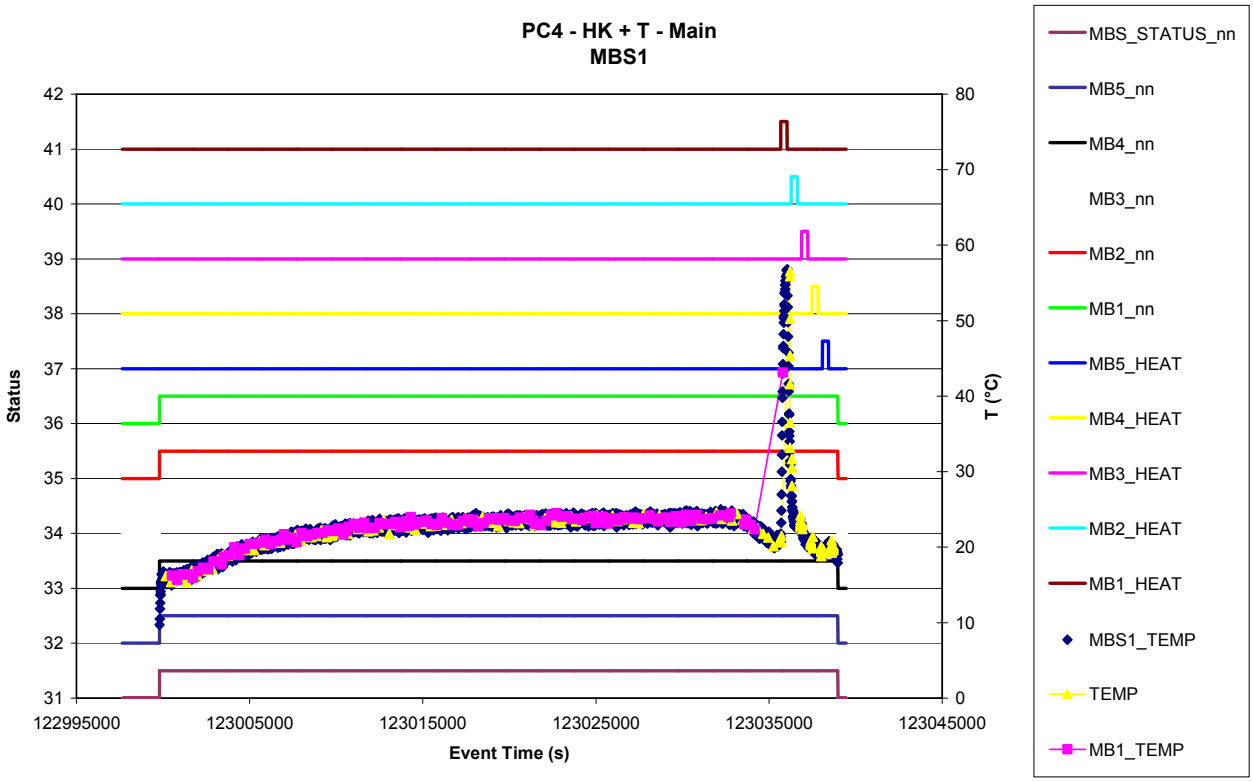


Figure 7.5-3. MBS 2 Temperature vs. time (HK, HK-SCI, SCI) - Main

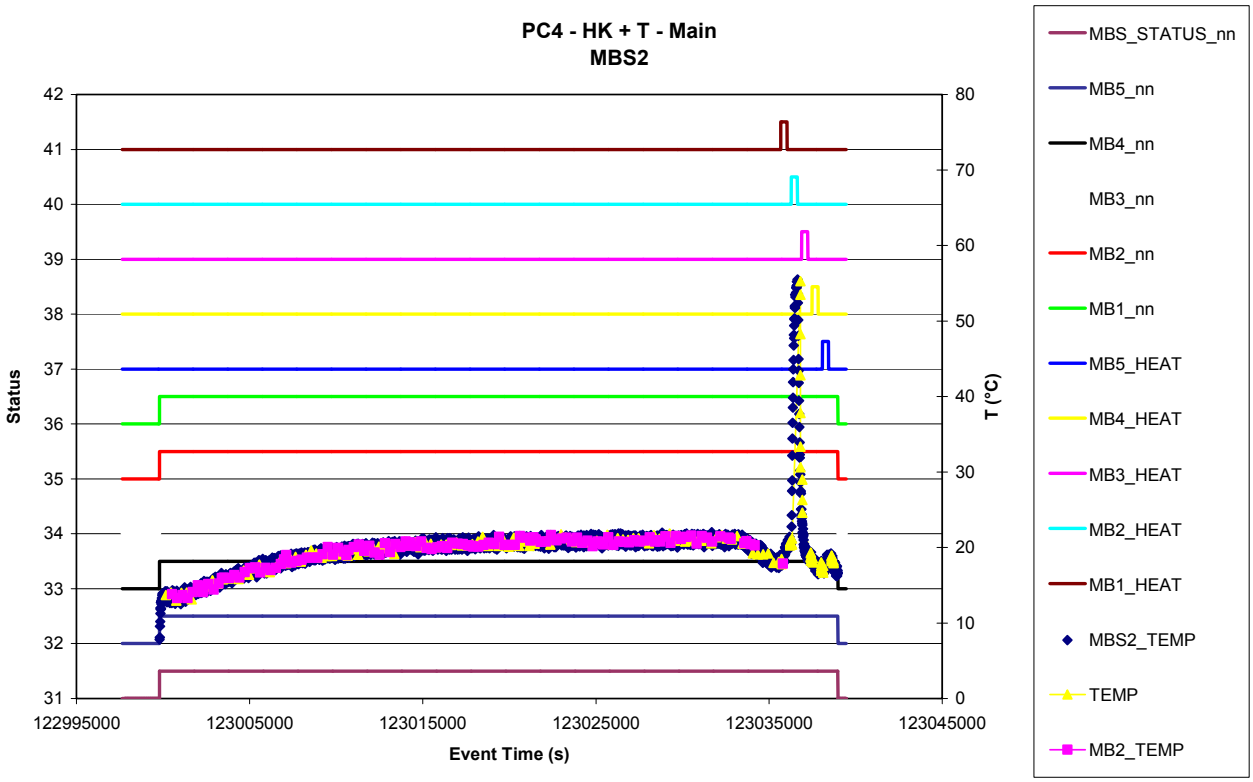


Figure 7.5-4. MBS 3 Temperature vs. time (HK, HK-SCI, SCI) - Main

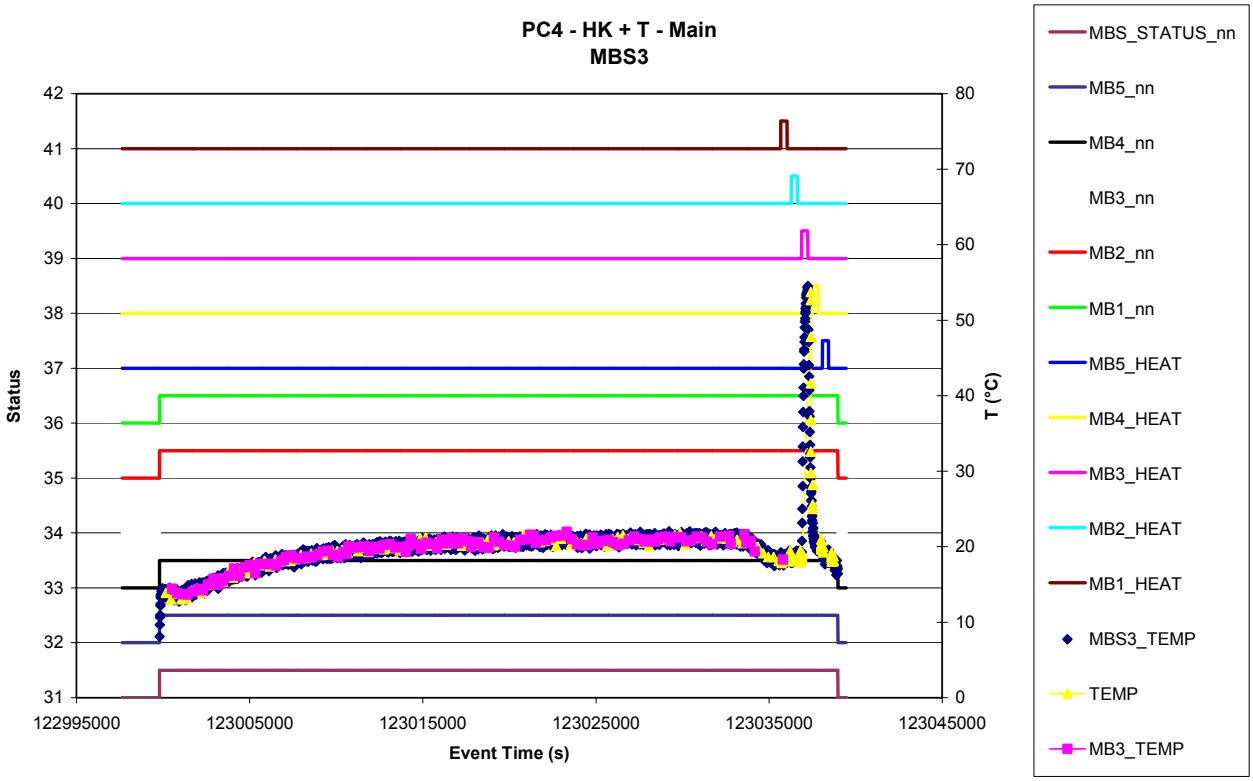


Figure 7.5-5. MBS 4 Temperature vs. time (HK, HK-SCI, SCI) - Main

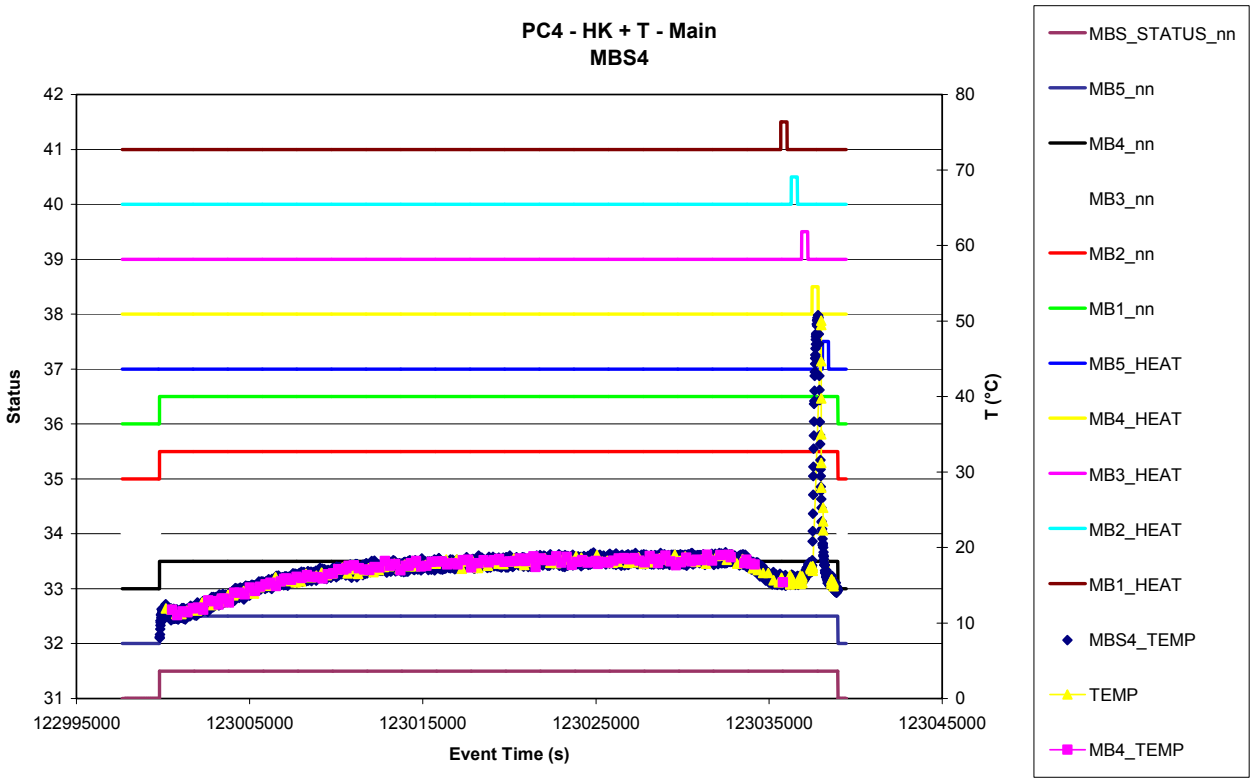
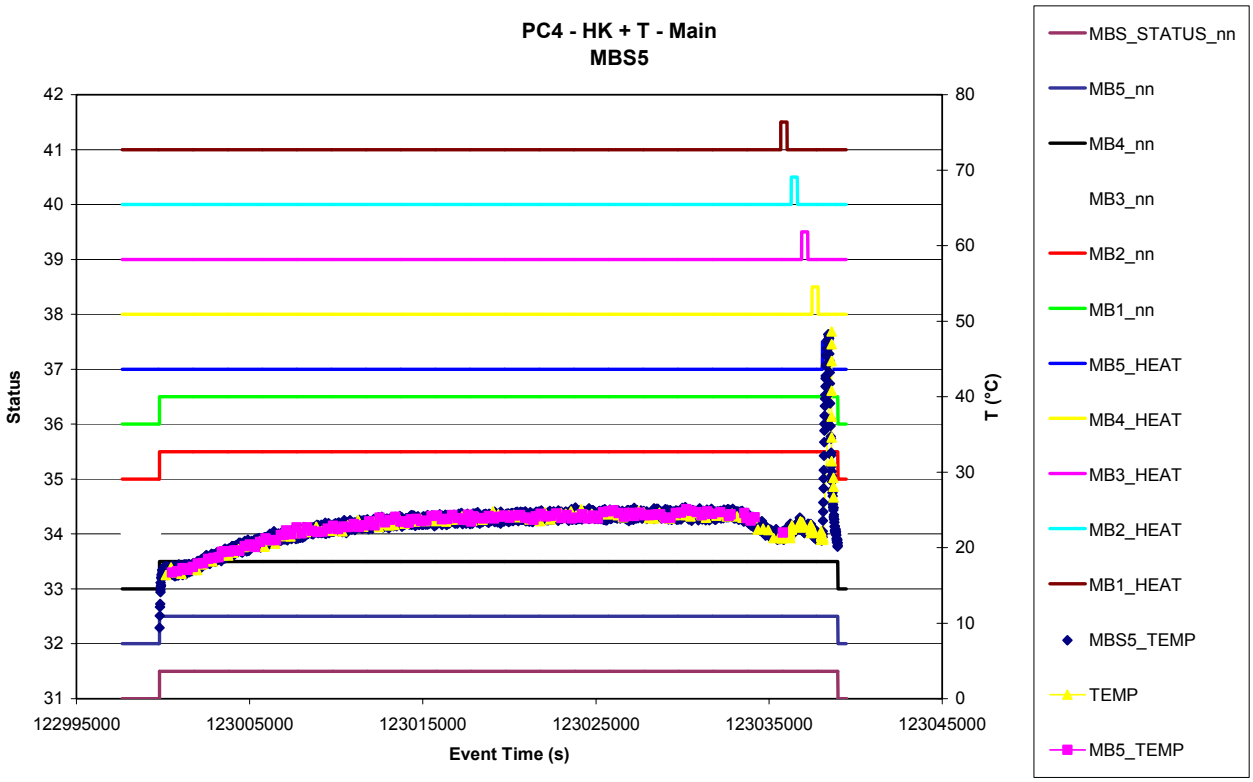


Figure 7.5-6. MBS 5 Temperature vs. time (HK, HK-SCI, SCI) - Main



7.5.2 MBS – Behaviour

7.5.2.1 Science Events (Normal + Heating)

Figure 7.5-7. MBS 1 Frequency and Temperature vs. time - Main

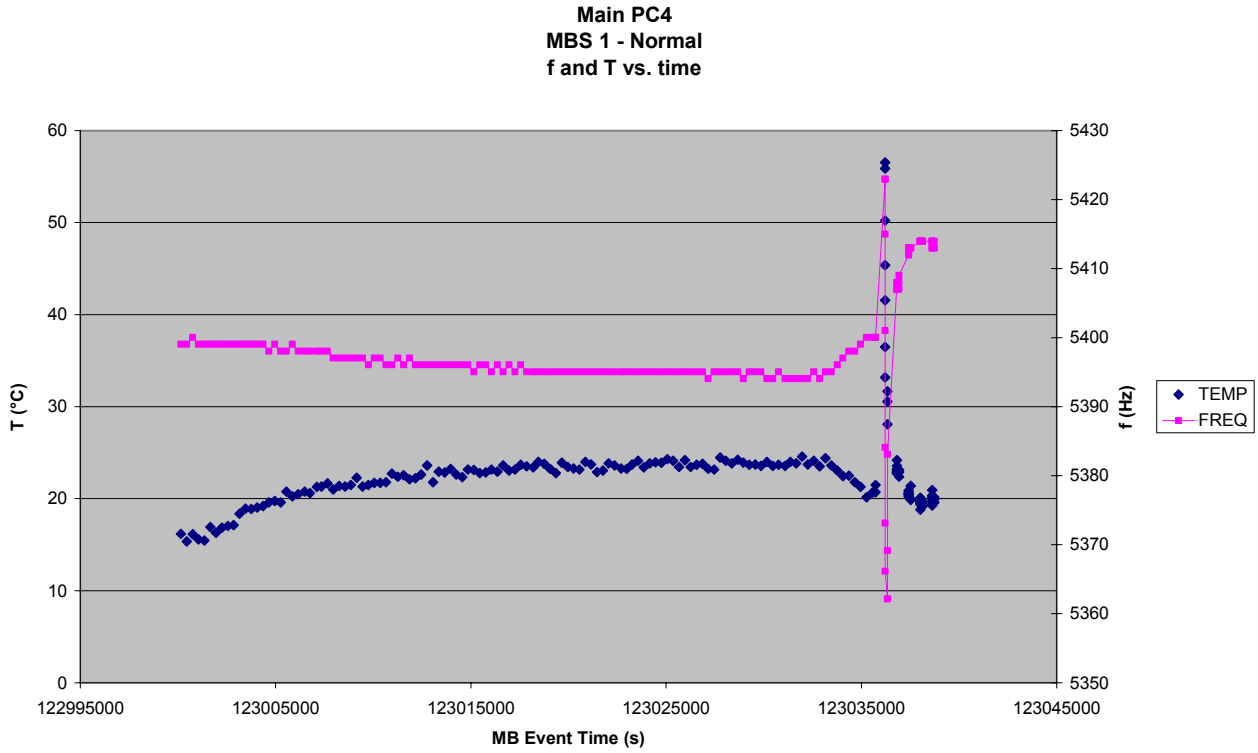


Figure 7.5-8. MBS 2 Frequency and Temperature vs. time - Main

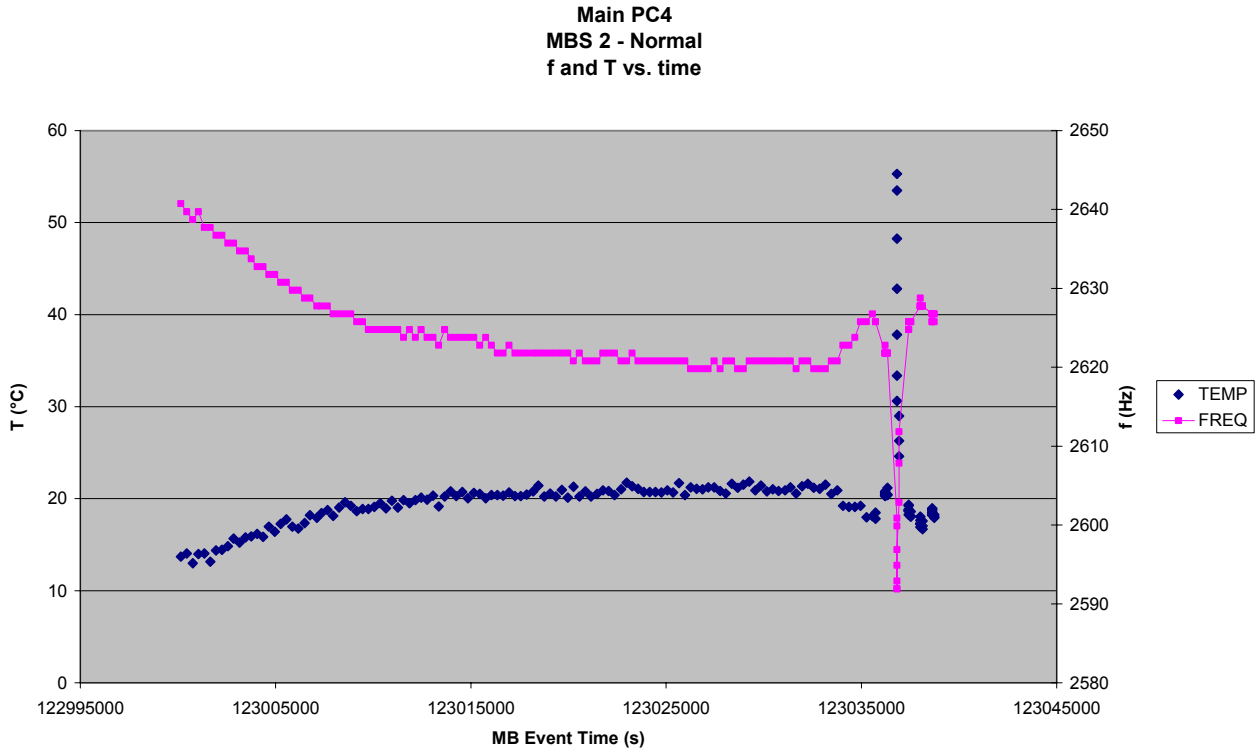


Figure 7.5-9. MBS 3 Frequency and Temperature vs. time - Main

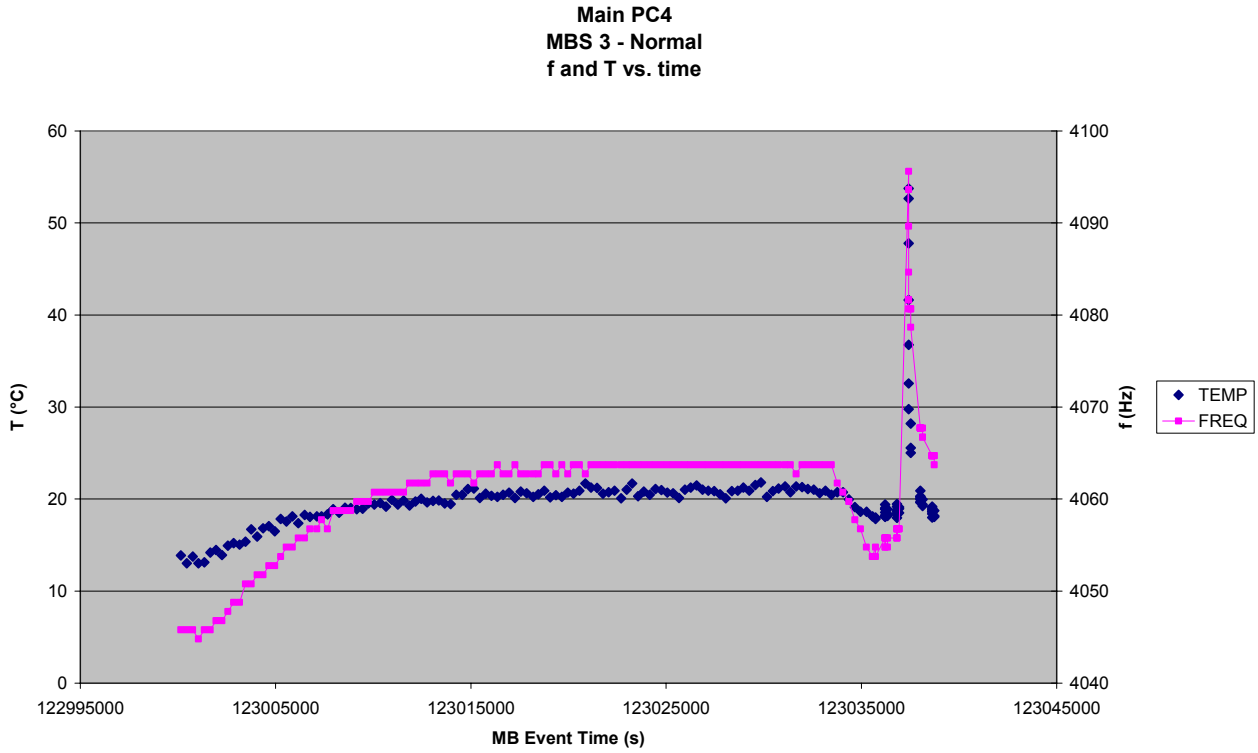


Figure 7.5-10. MBS 4 Frequency and Temperature vs. time - Main

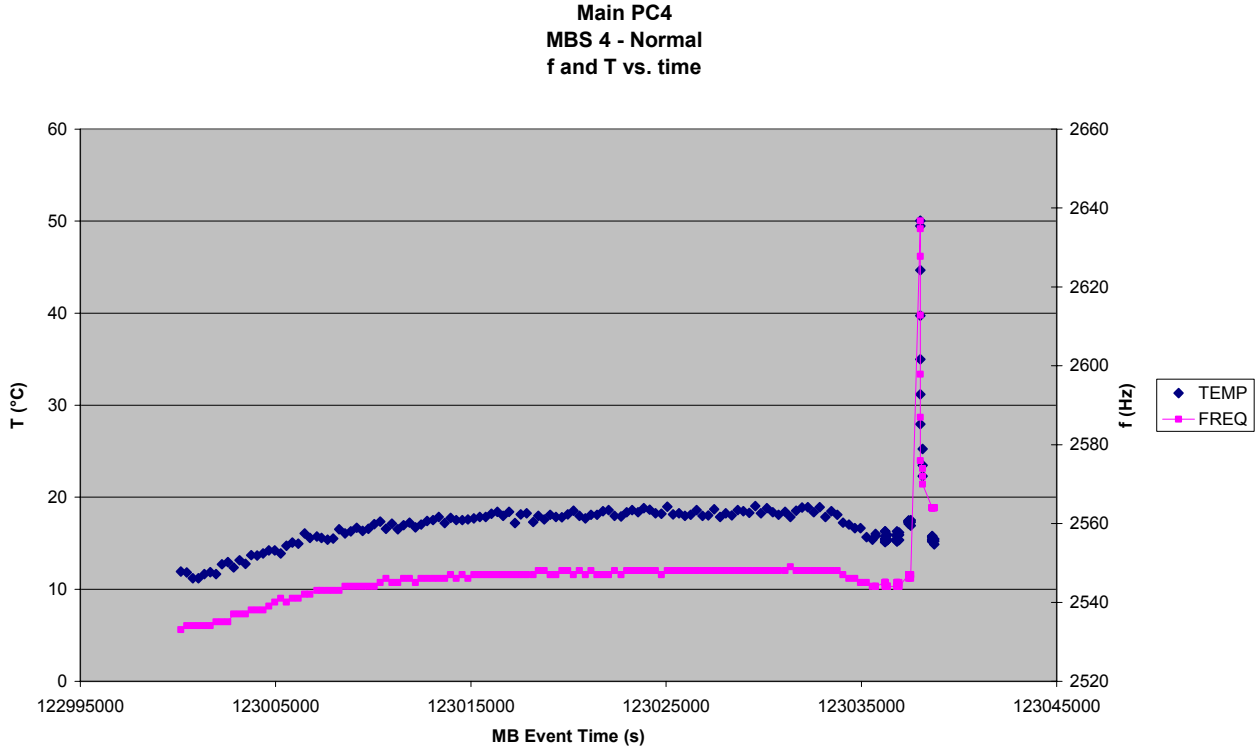


Figure 7.5-11. MBS 5 Frequency and Temperature vs. time - Main

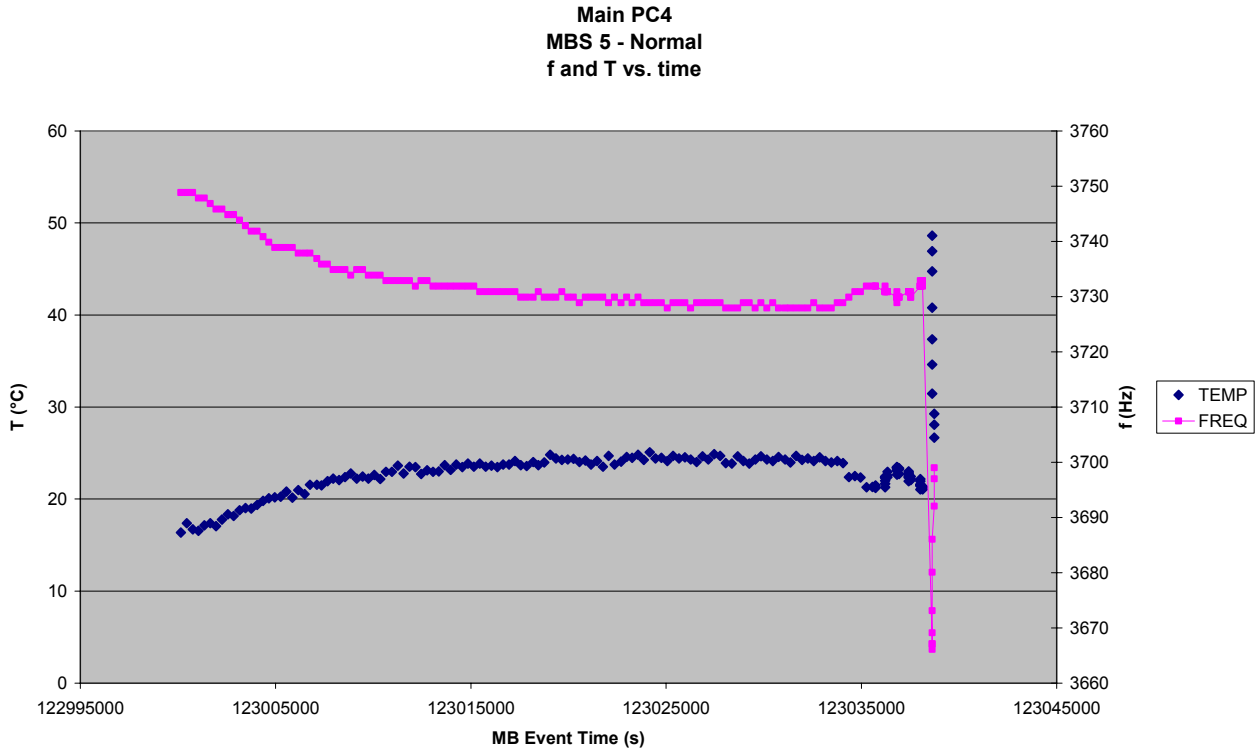


Figure 7.5-12. MBS 1 Frequency vs. Temperature - Main

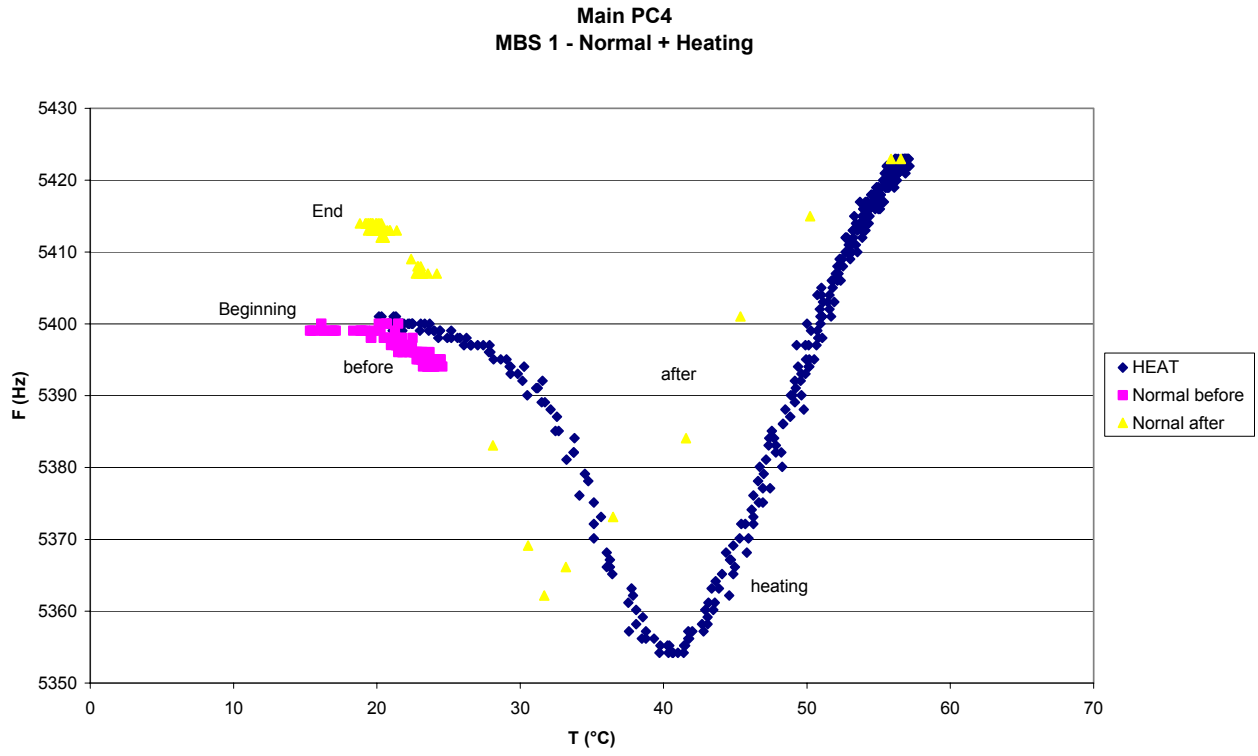


Figure 7.5-13. MBS 2 Frequency vs. Temperature - Main

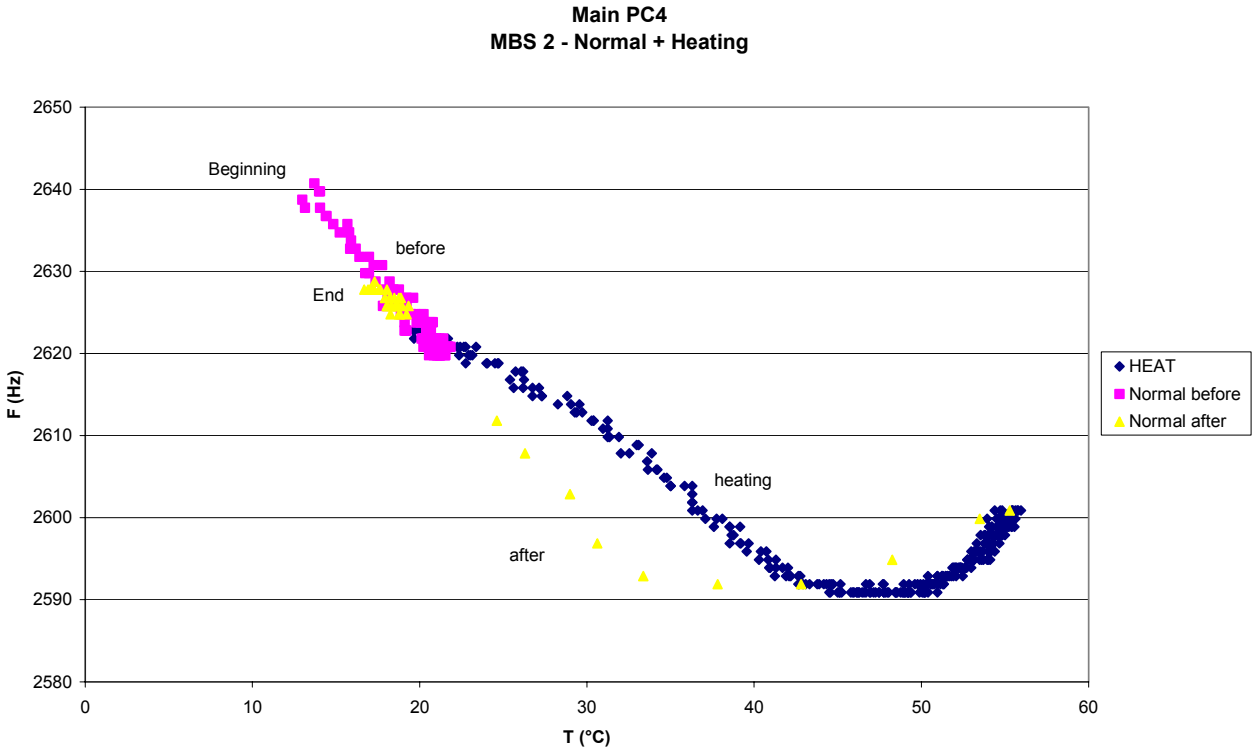


Figure 7.5-14. MBS 3 Frequency vs. Temperature - Main

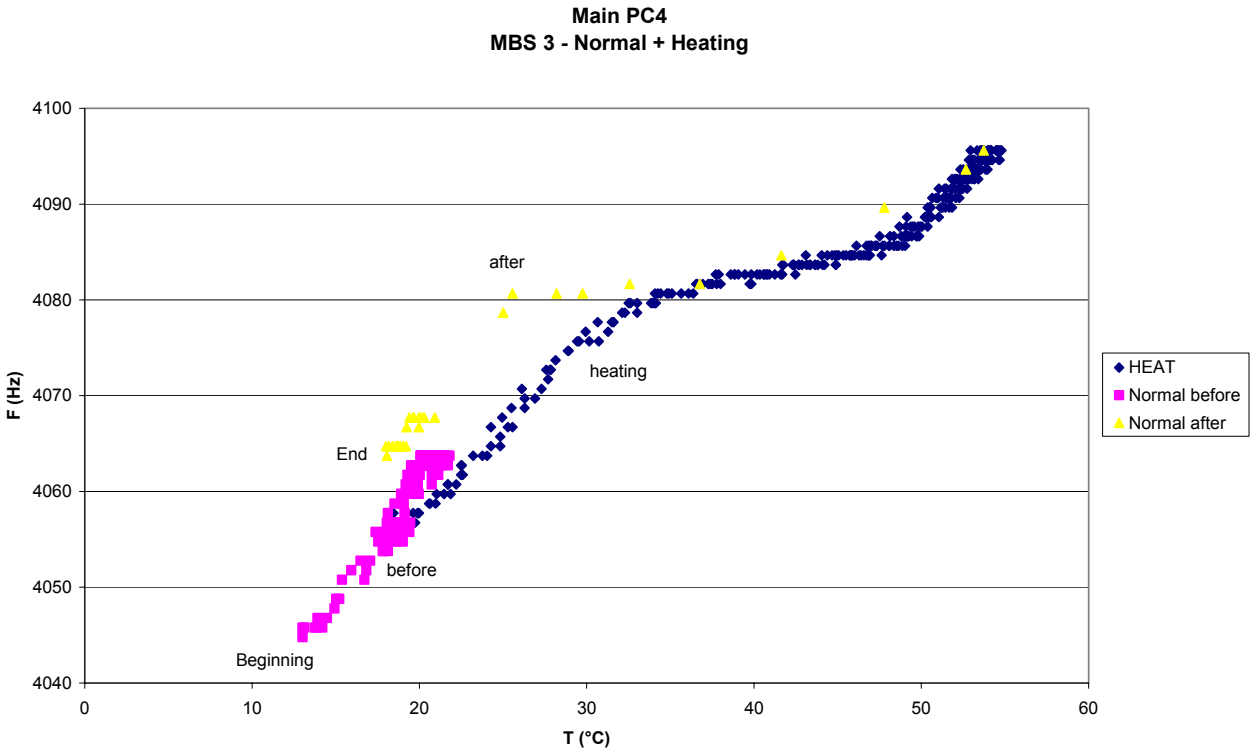


Figure 7.5-15. MBS 4 Frequency vs. Temperature - Main

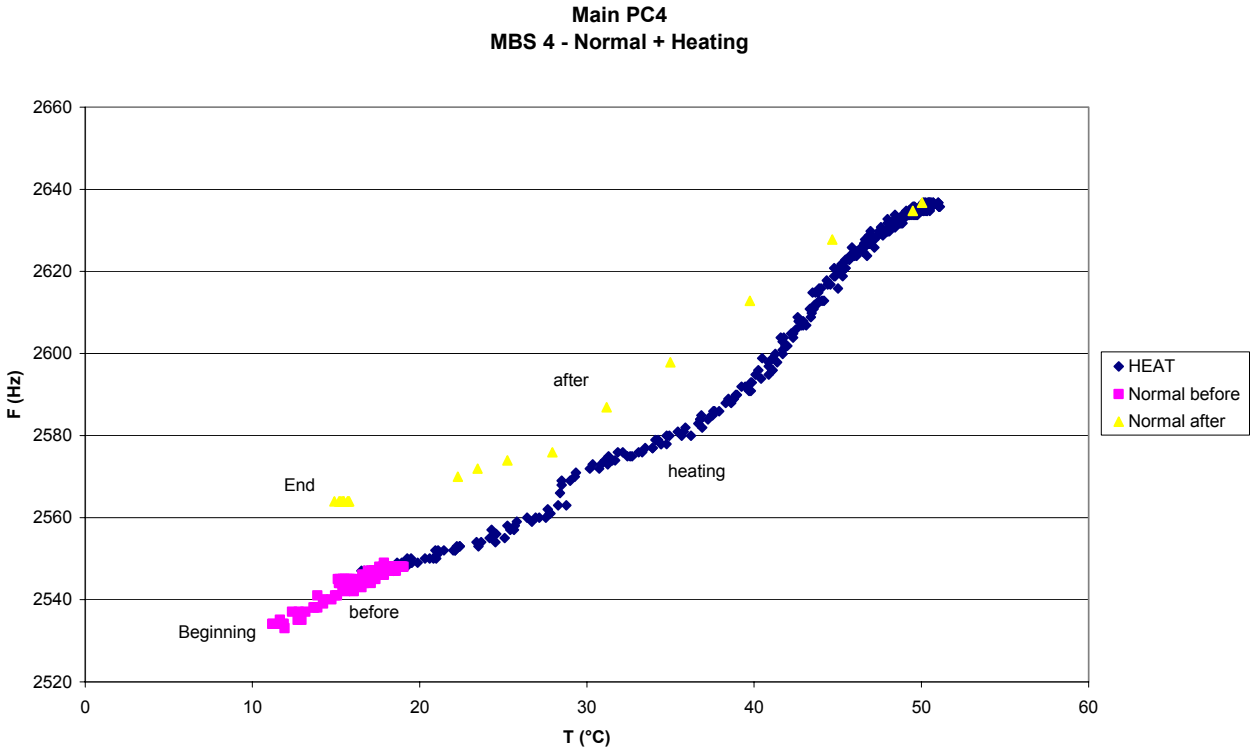
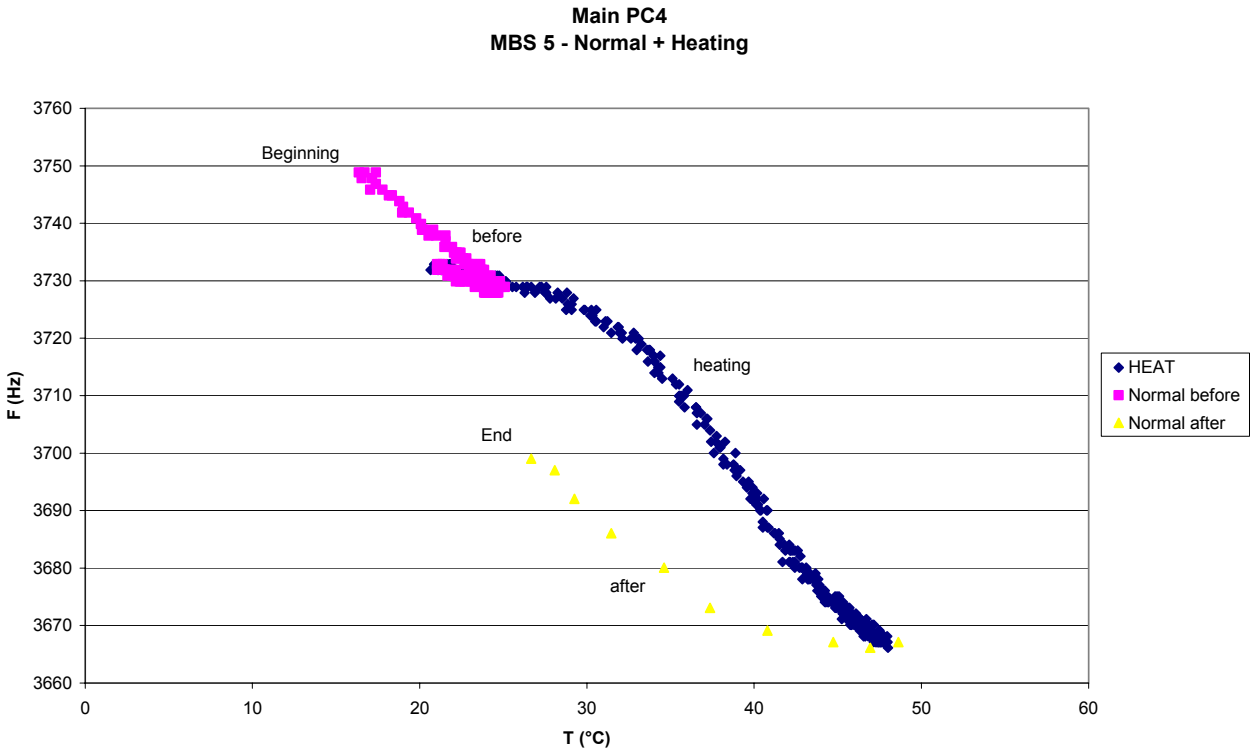


Figure 7.5-16. MBS 5 Frequency vs. Temperature - Main



8. PC4 DATA ANALYSIS – REDUNDANT INTERFACE (PASSIVE TEST)

8.1 GIADA STATUS

Figure 8.1-1. HK Status of GIADA and S/S vs. time - Red

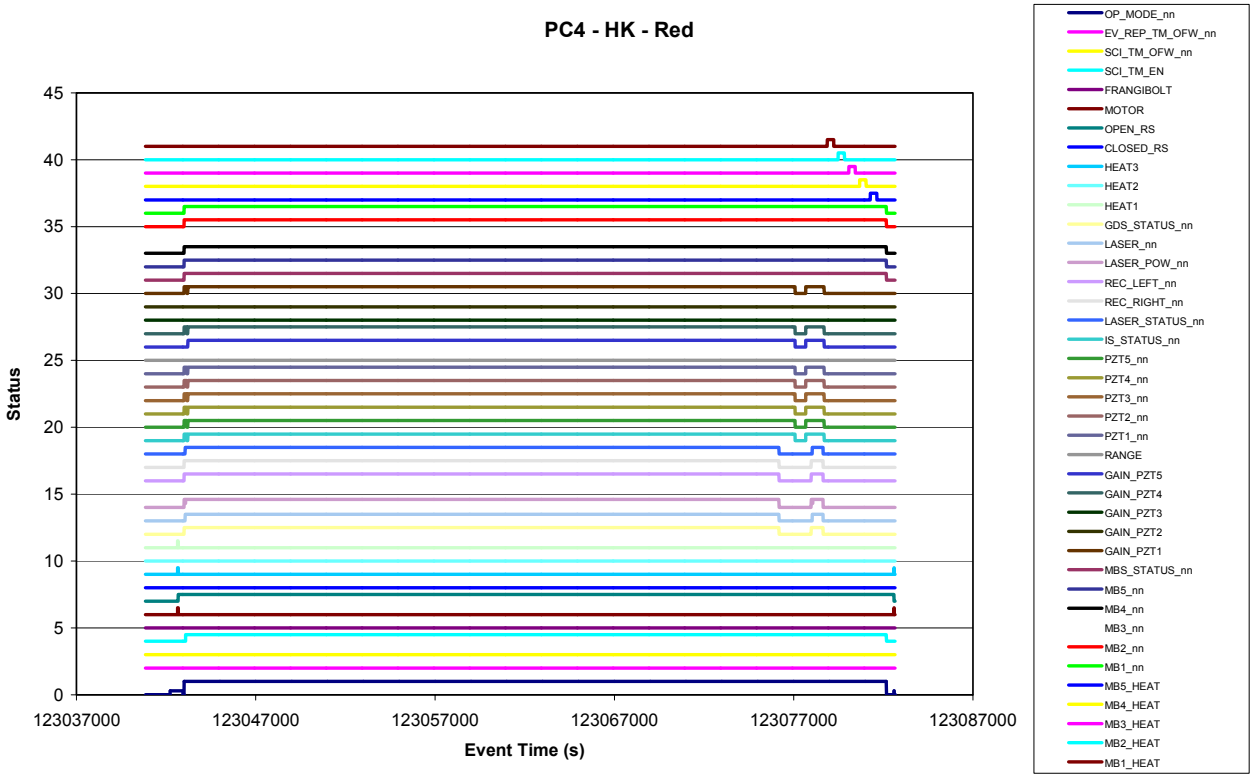


Figure 8.1-2. Evolution of all temperatures vs. time - HK, HK-SCI, SCI - Red

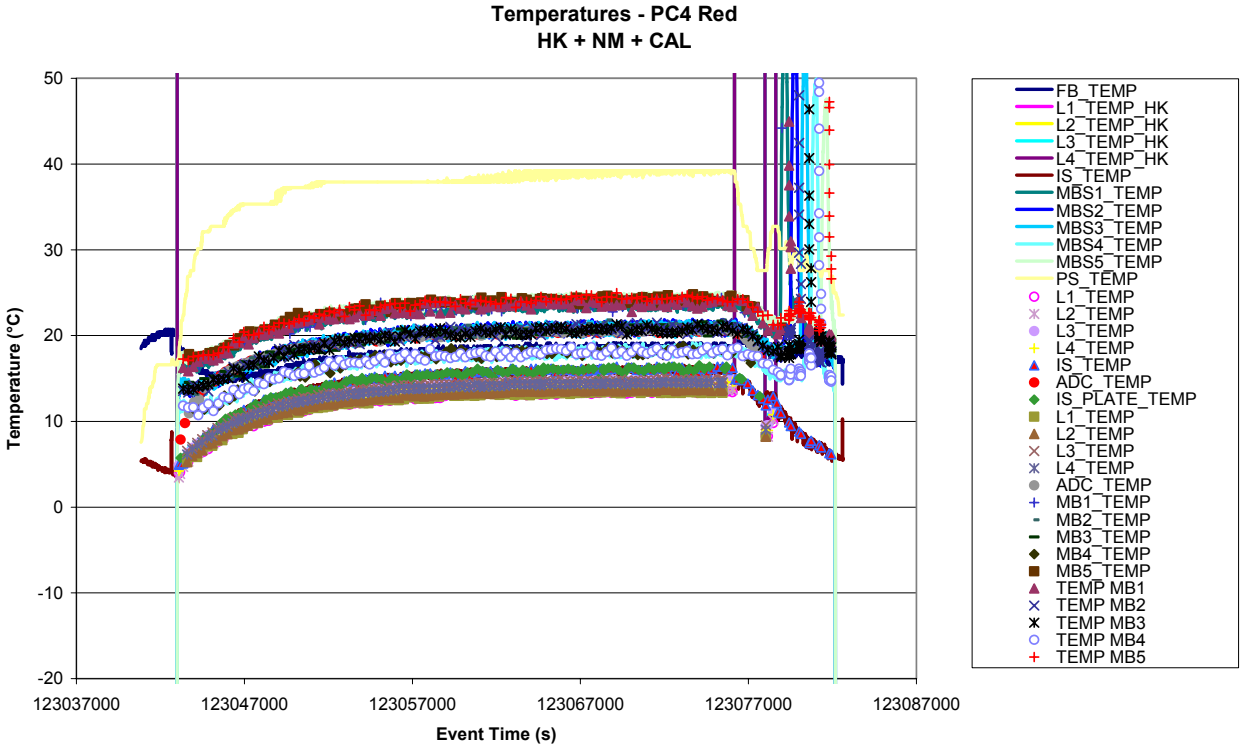


Figure 8.1-3. Evolution of temperatures of system elements vs. time - HK, HK-SCI, SCI - Red

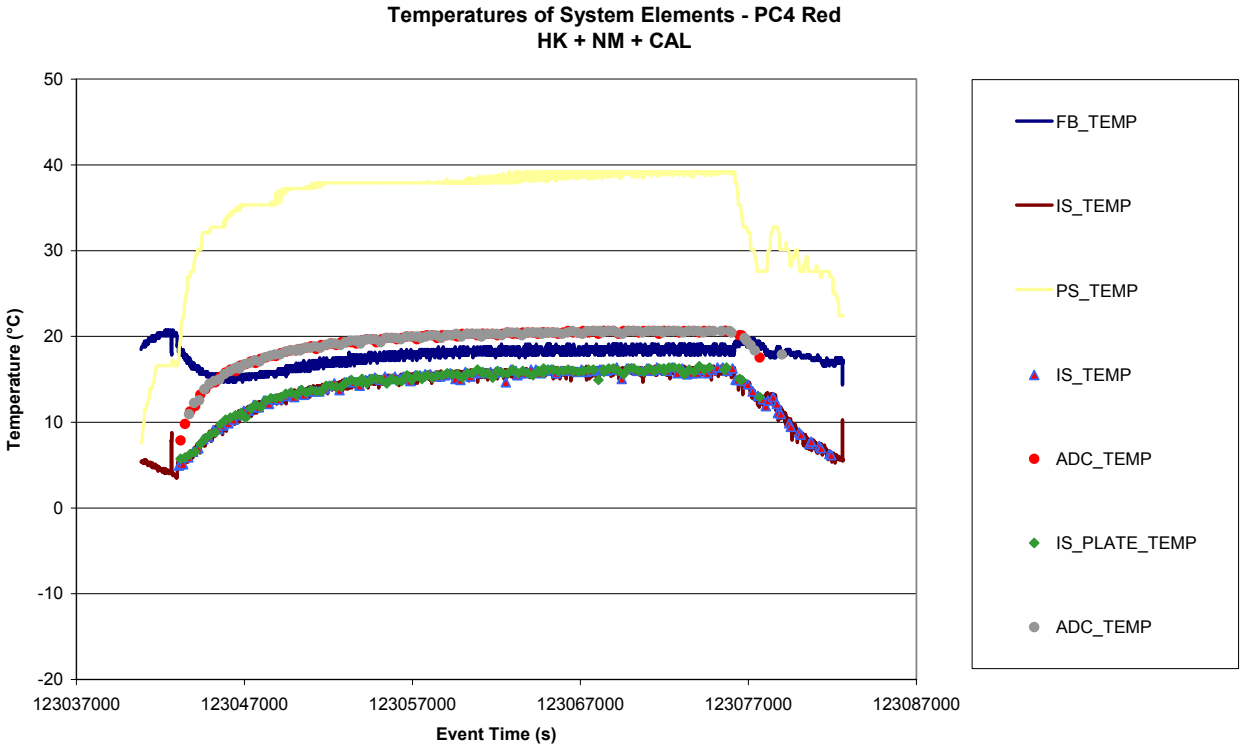


Figure 8.1-4. Evolution of temperatures of sub-systems vs. time - HK, HK-SCI, SCI - Red

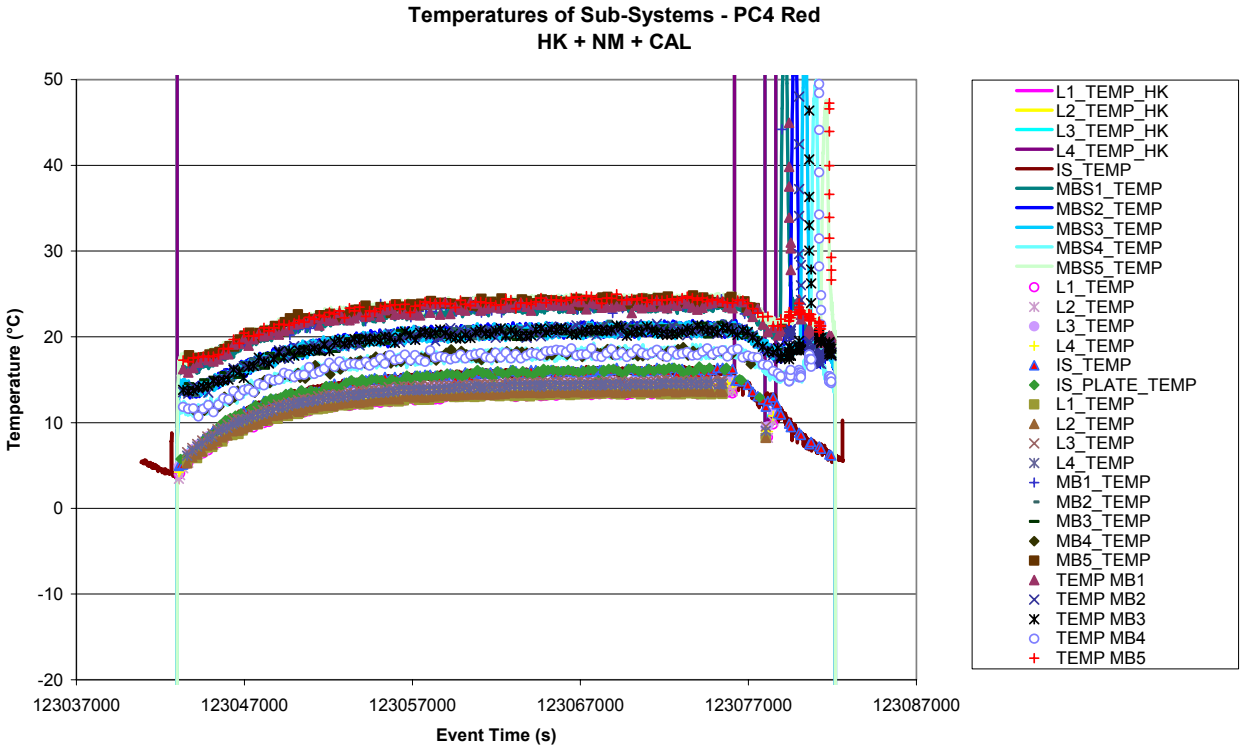


Figure 8.1-5. Operation Status vs. time - Red

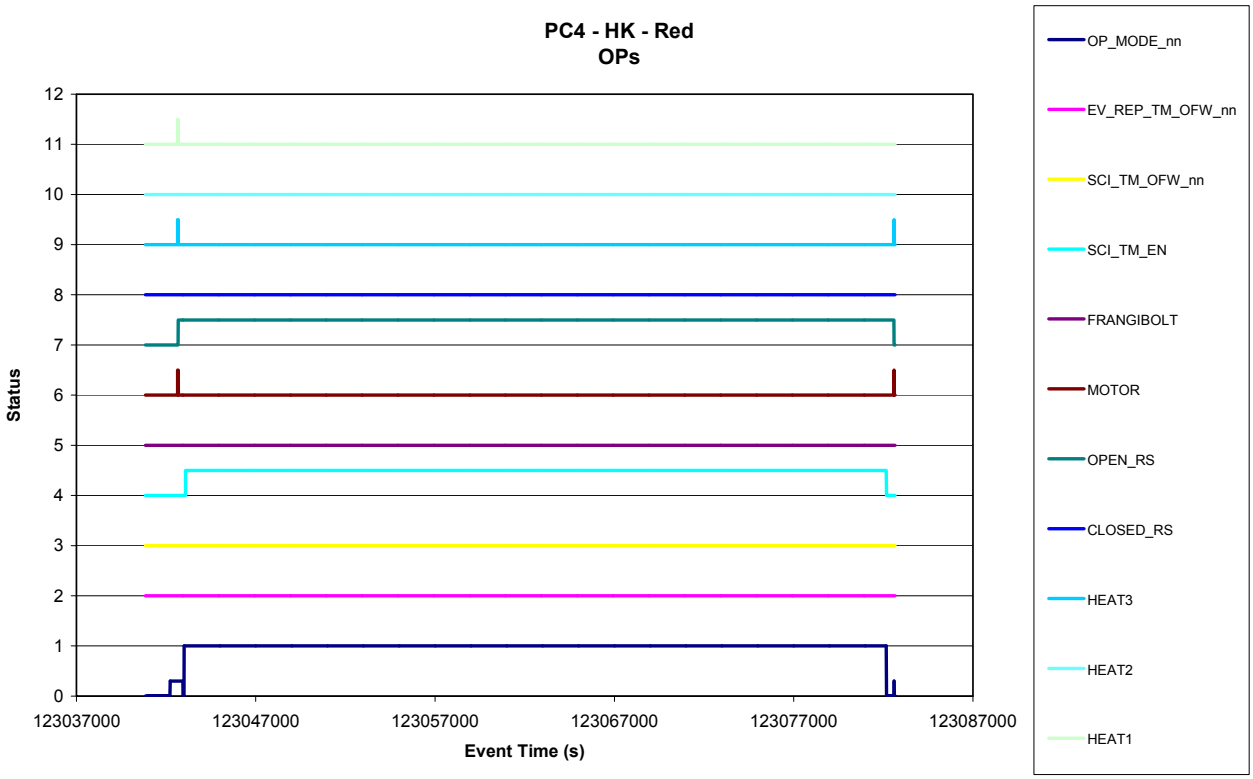


Figure 8.1-6. Power behaviour - Red

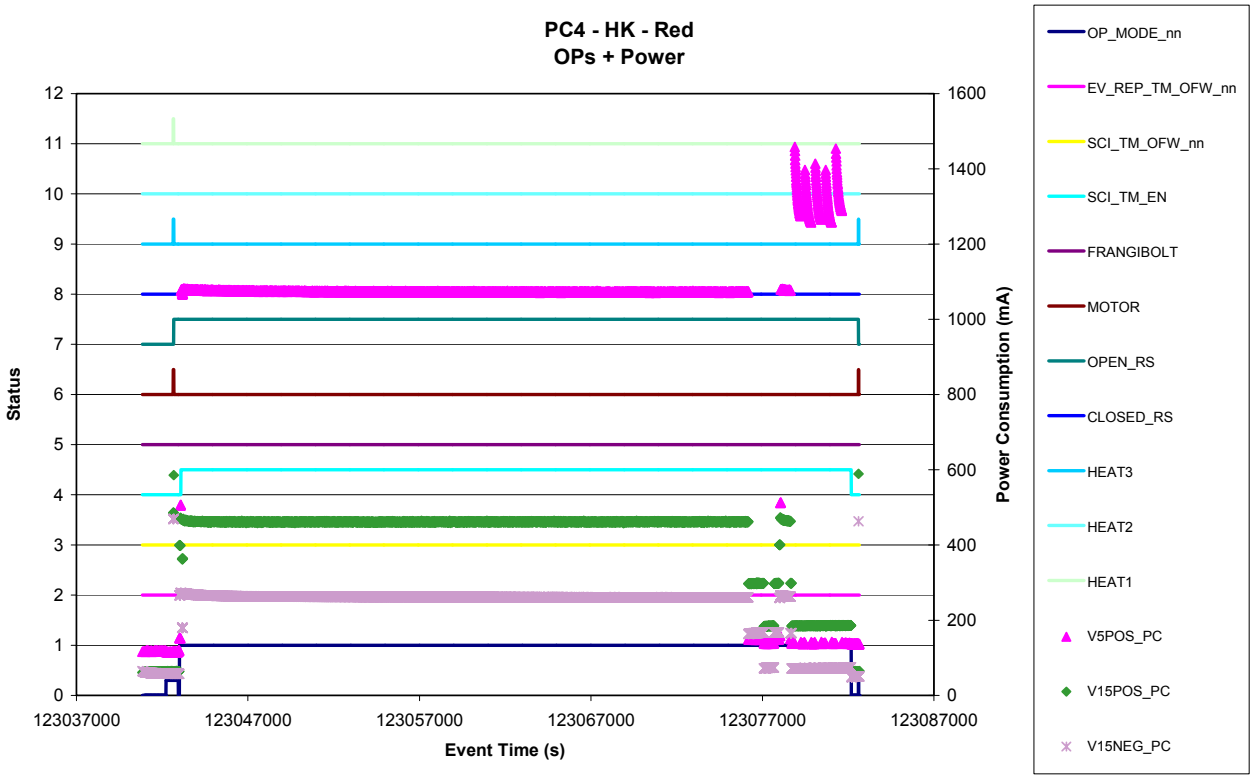


Figure 8.1-7. Power and PS temperature behaviour - Red

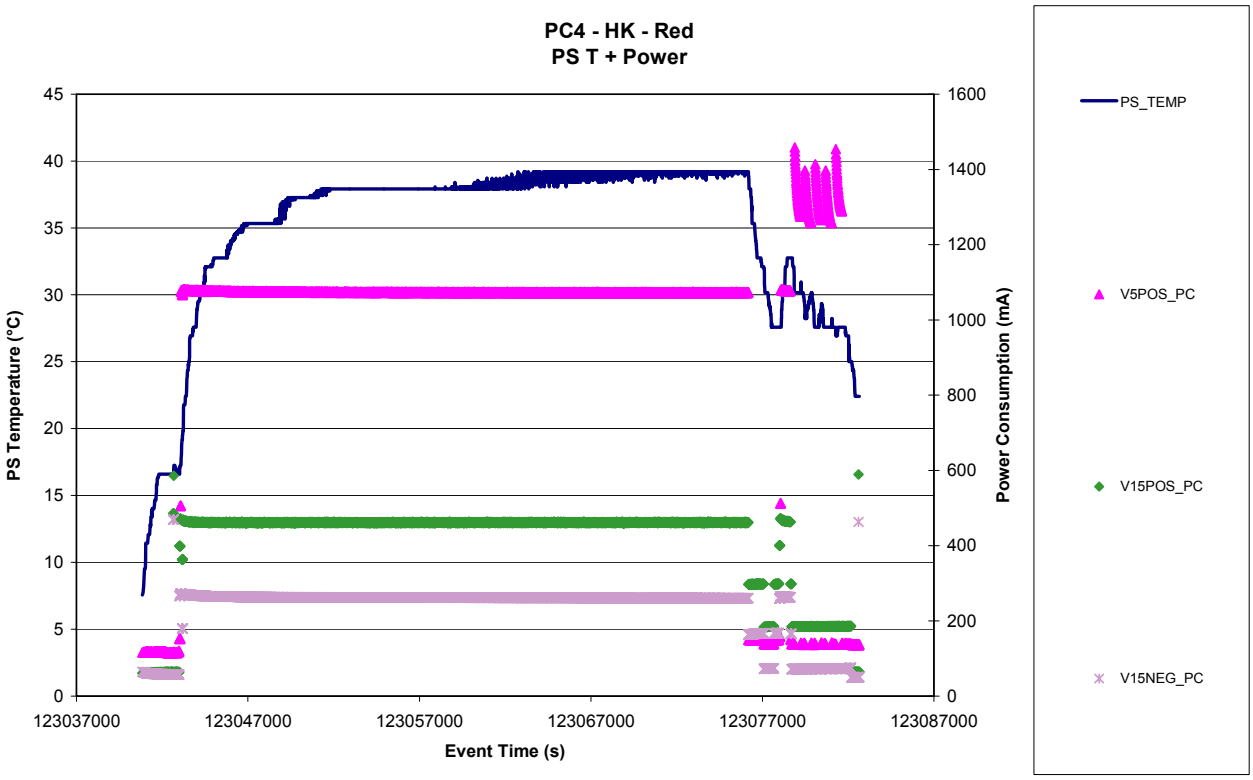


Figure 8.1-8. Source Sequence Count (SSC) of HK Telemetry vs. Time - Red

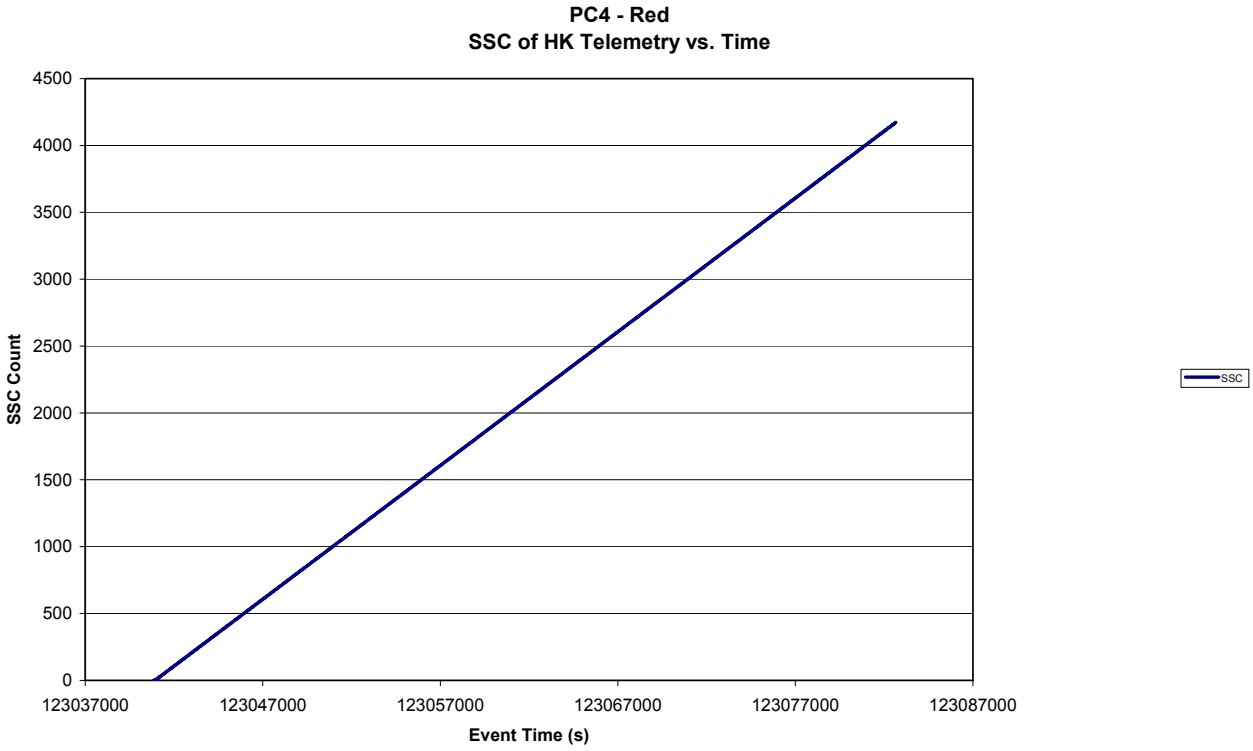


Figure 8.1-9. Source Sequence Count (SSC) of HK Telemetry vs. Number - Red

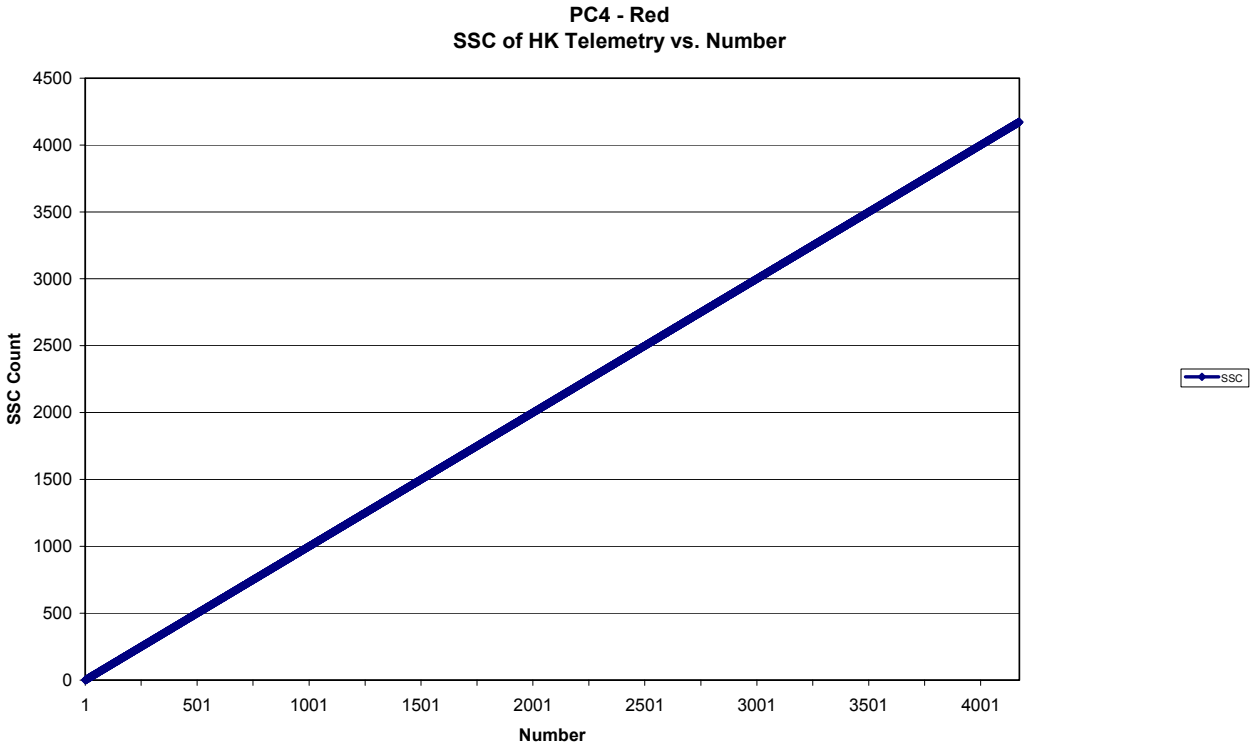


Figure 8.1-10. Source Sequence Count (SSC) of SCI Telemetry vs. Time - Red

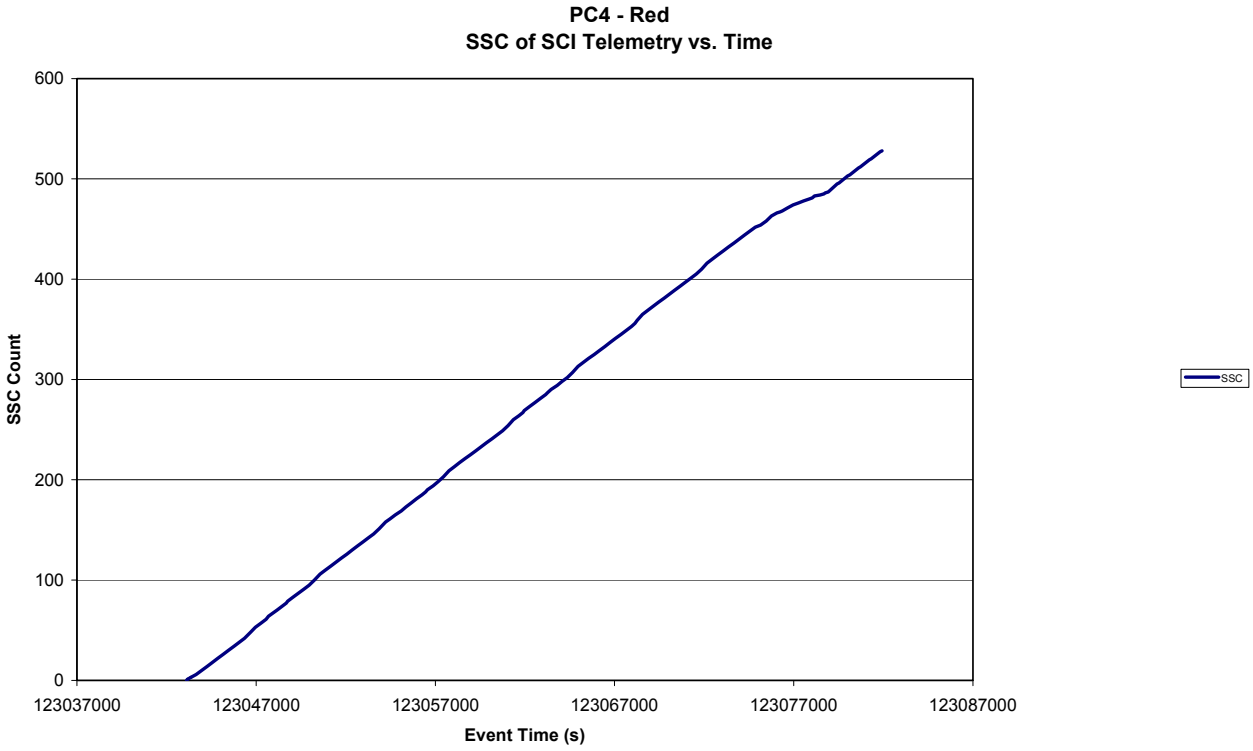
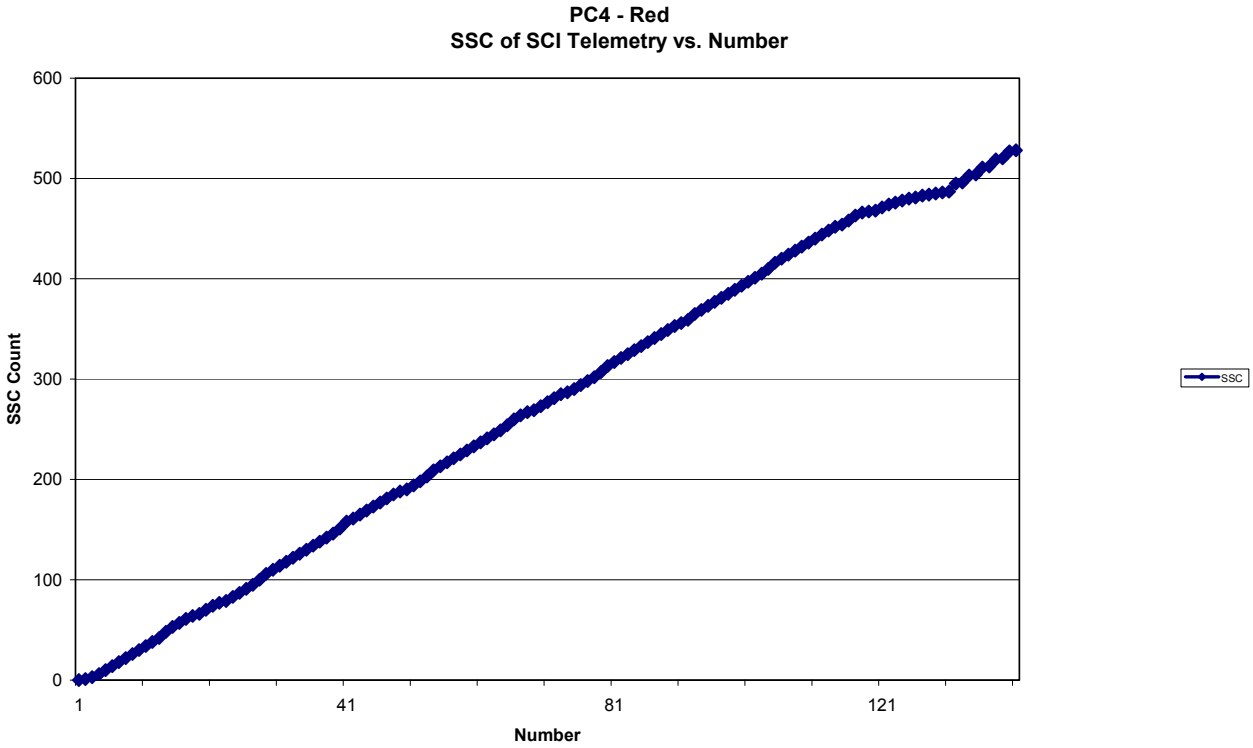


Figure 8.1-11. Source Sequence Count (SSC) of SCI Telemetry vs. Number - Red

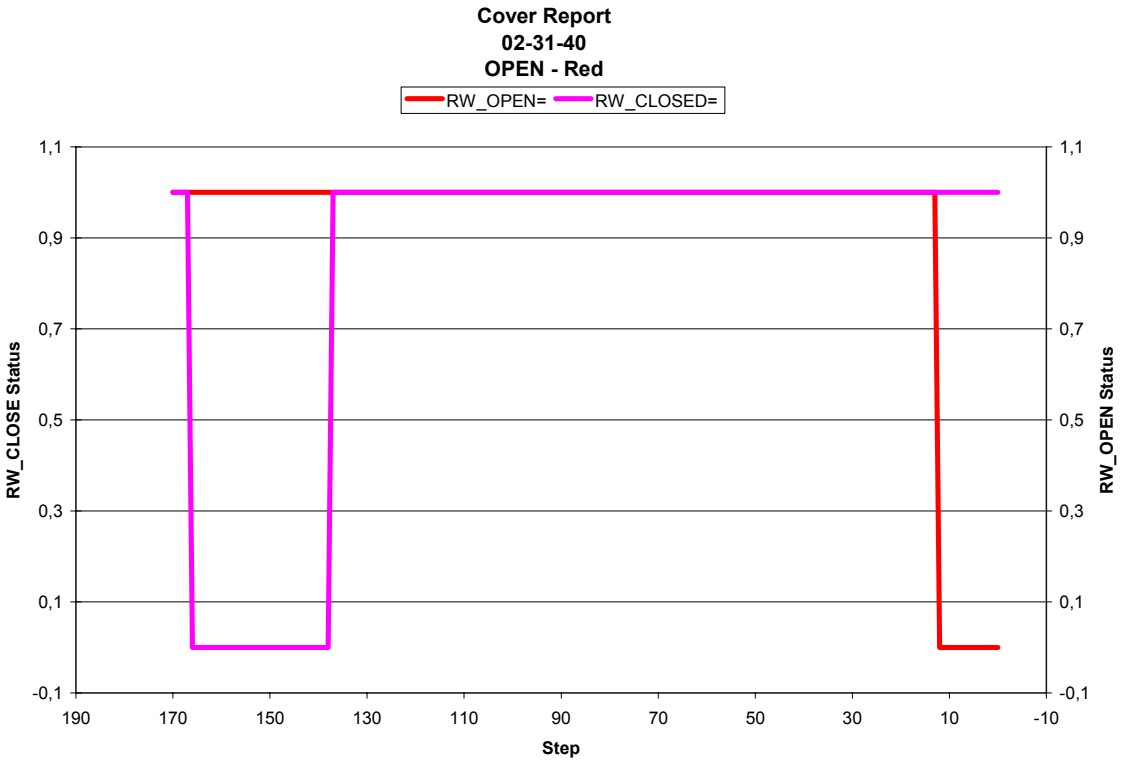


8.2 COVER REPORTS

8.2.1 Open Cover

```
HEADER_START
CREATION_TIME=2006-11-25T02:31:40Z
USER=AA0000
HEADER_END
//
// Generated by 'GIADA_EGSE_SW '
//
MOVEMENT DIRECTION: To open
BEGIN TIME OF OPERATION: 123042664.000000
END TIME OF OPERATION: 123042672.000000
```

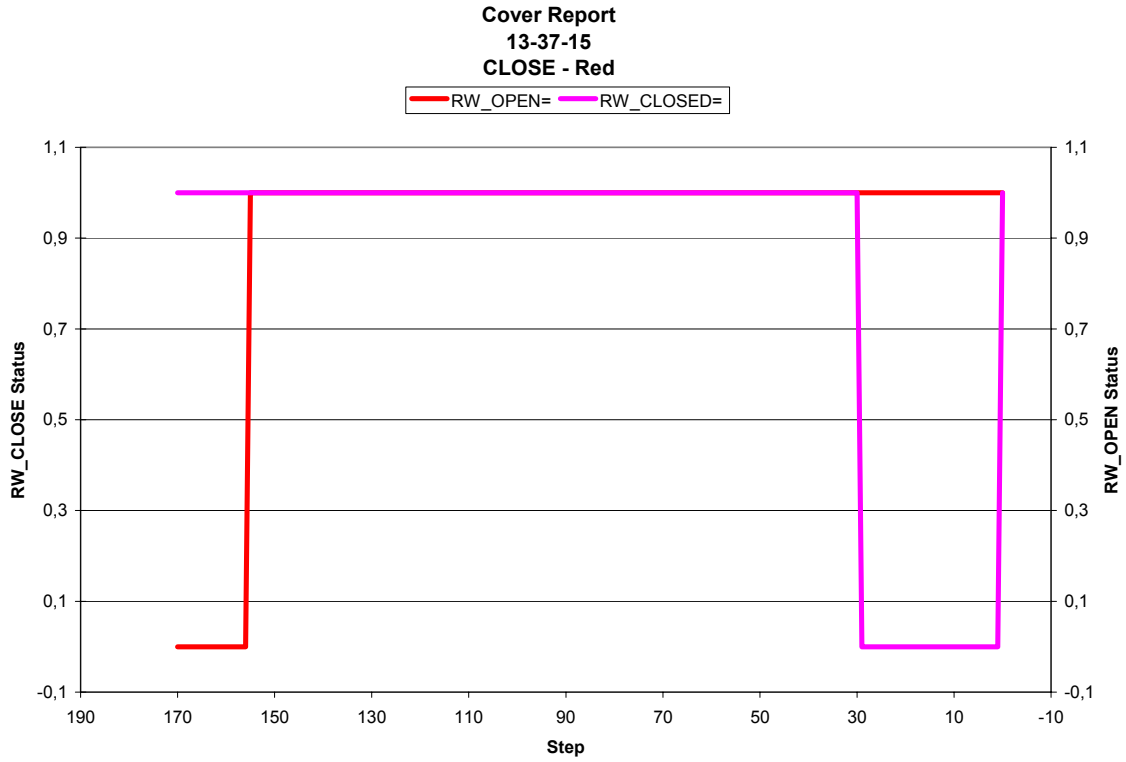
Figure 8.2-1 Cover Report – Open – Red



8.2.2 Close Cover

```
HEADER_START
CREATION_TIME=2006-11-25T13:37:15Z
USER=AA0000
HEADER_END
//
// Generated by 'GIADA_EGSE_SW '
//
MOVEMENT DIRECTION: To close
BEGIN TIME OF OPERATION: 123082600.000000
END TIME OF OPERATION: 123082608.000000
```

Figure 8.2-2 Cover Report – Close – Red



8.3 GRAIN DETECTION SYSTEM (GDS)

8.3.1 GDS – Status

Figure 8.3-1. GDS Operation Status vs. time - Red

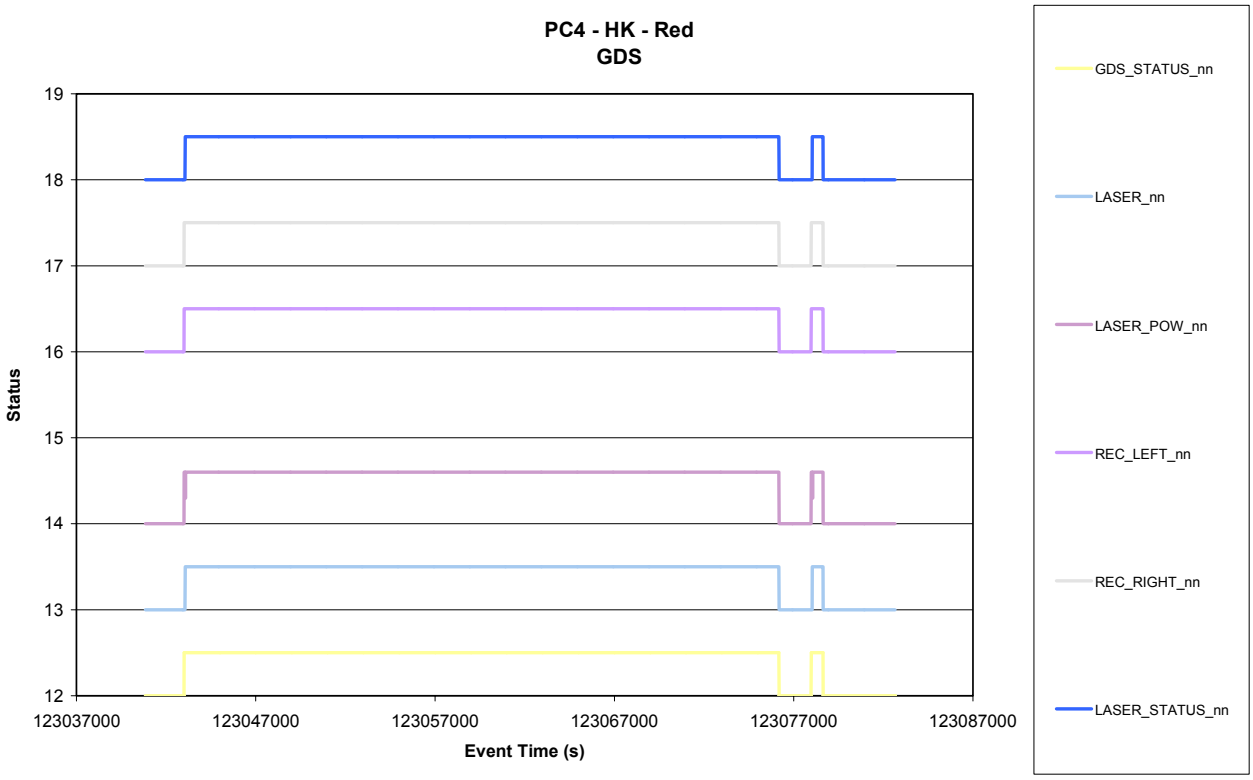


Figure 8.3-2. GDS Thresholds change vs. time - Red

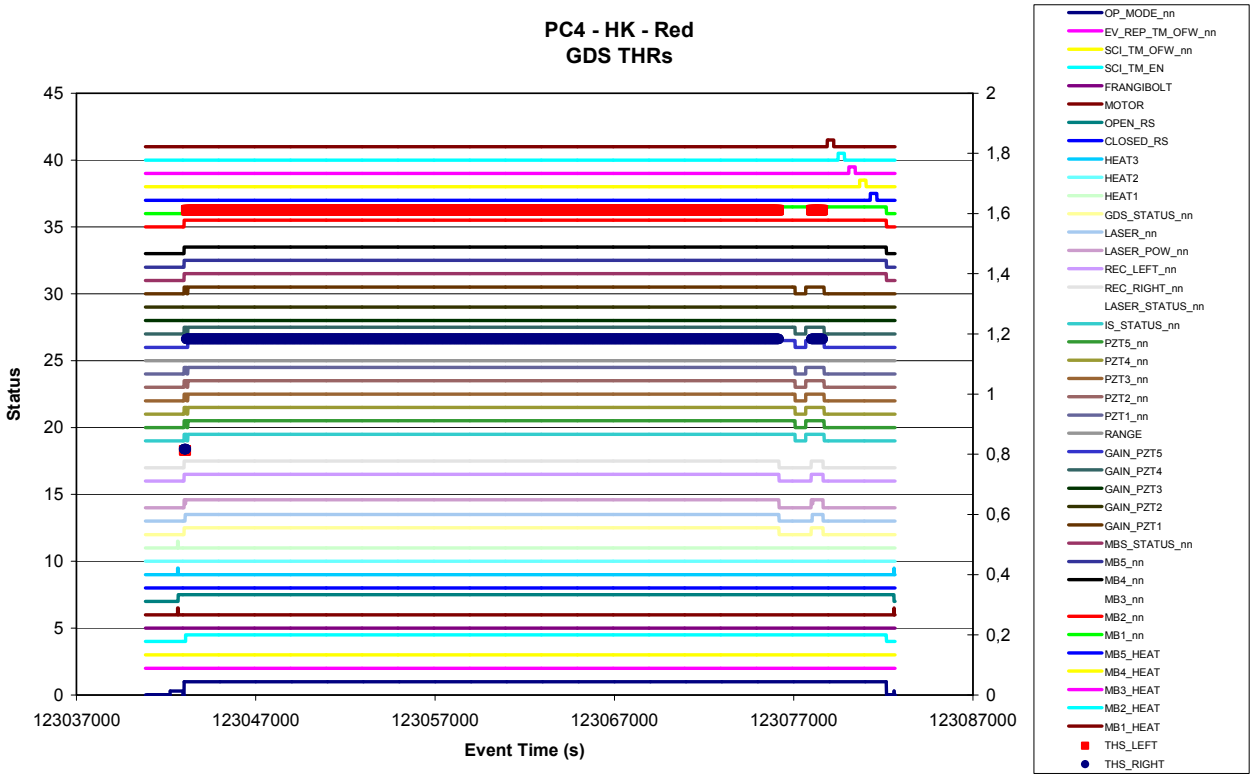


Figure 8.3-3. GDS Laser Temperatures vs. time (HK, HK-SCI, SCI) - Red

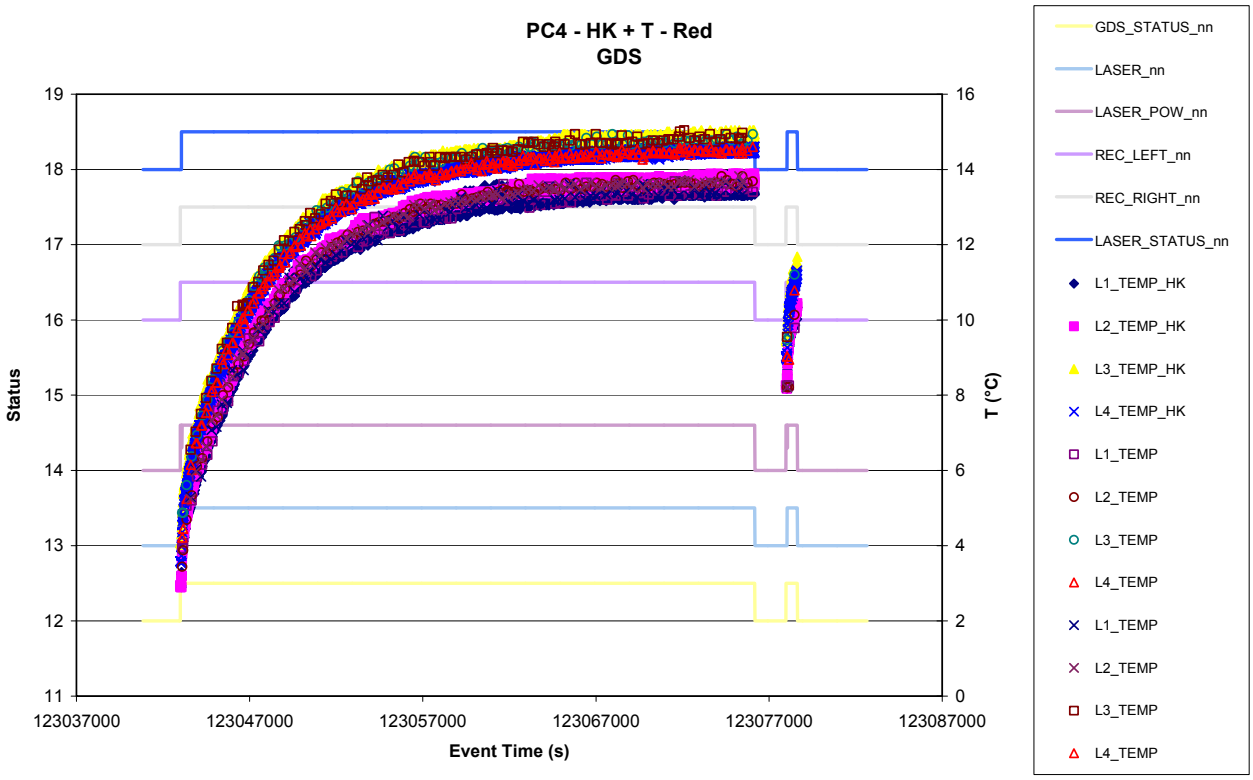


Figure 8.3-4. GDS Laser Monitor vs. time (HK, HK-SCI, SCI) - Red

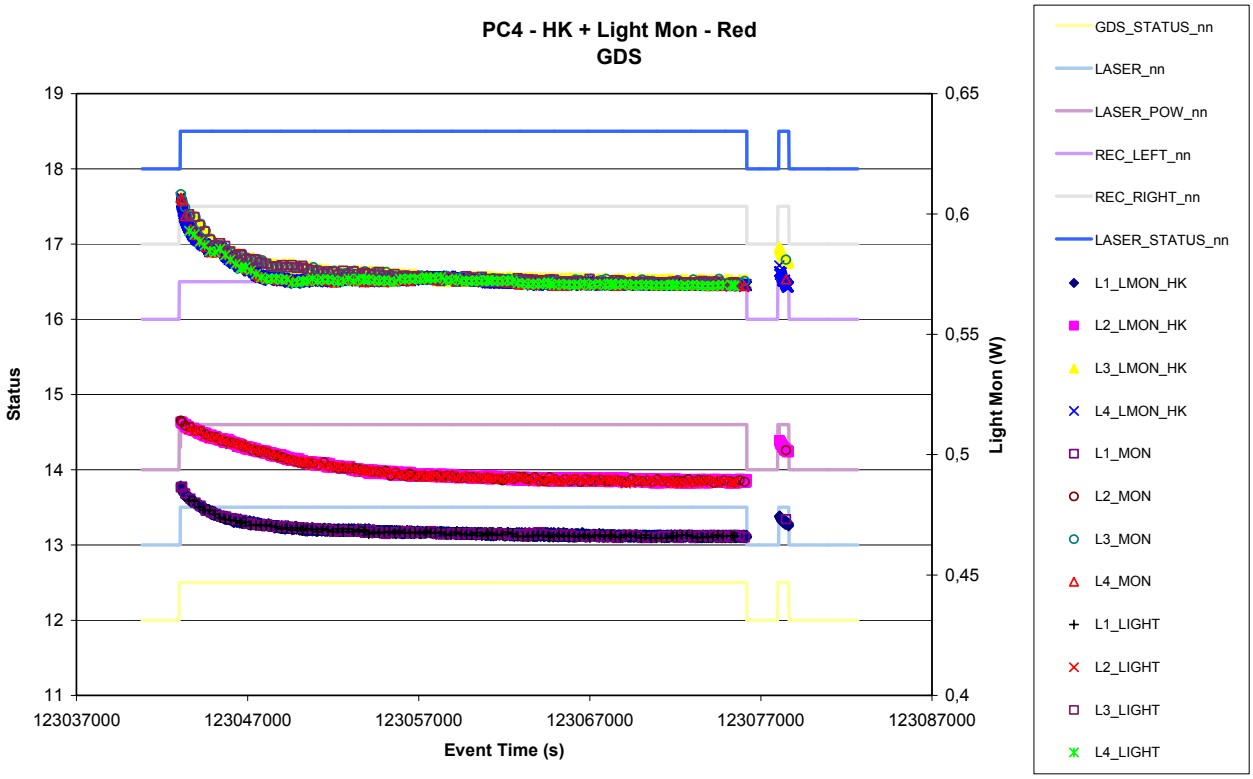


Figure 8.3-5. Laser 1 Light Monitor versus Temperature (HK, HK-SCI, SCI) - Red

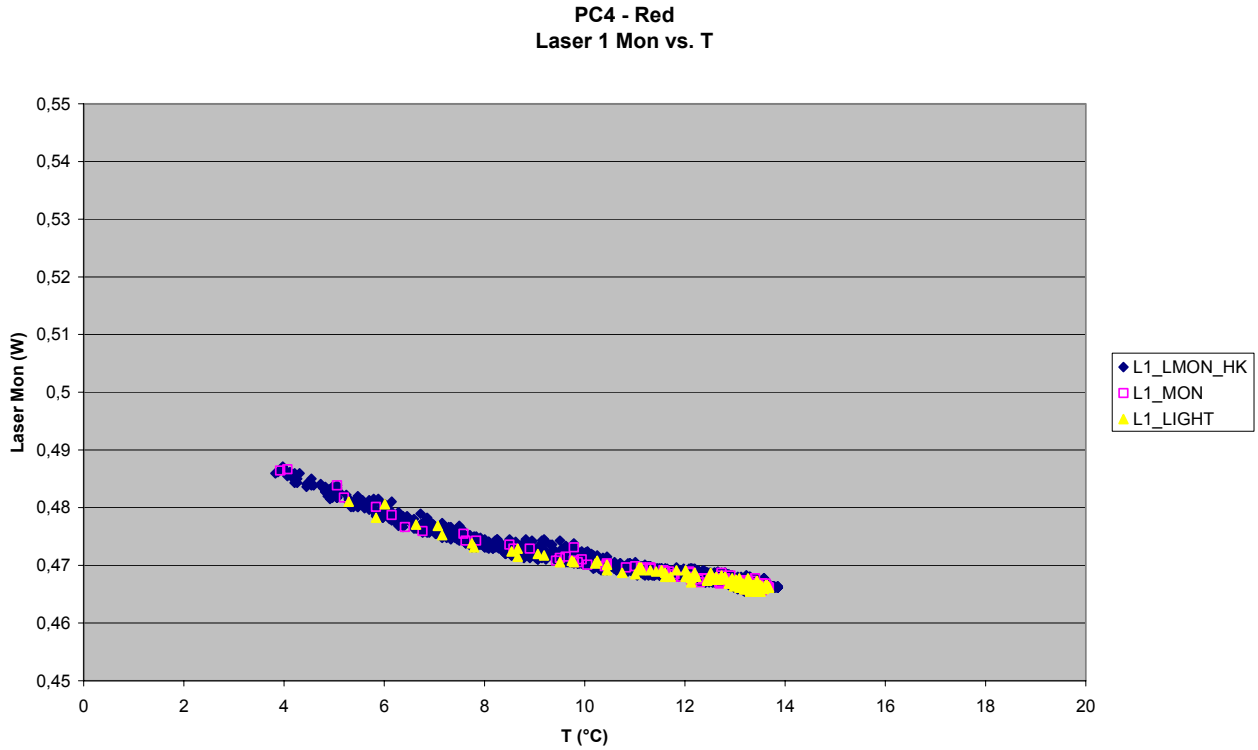


Figure 8.3-6. Laser 2 Light Monitor versus Temperature (HK, HK-SCI, SCI) - Red

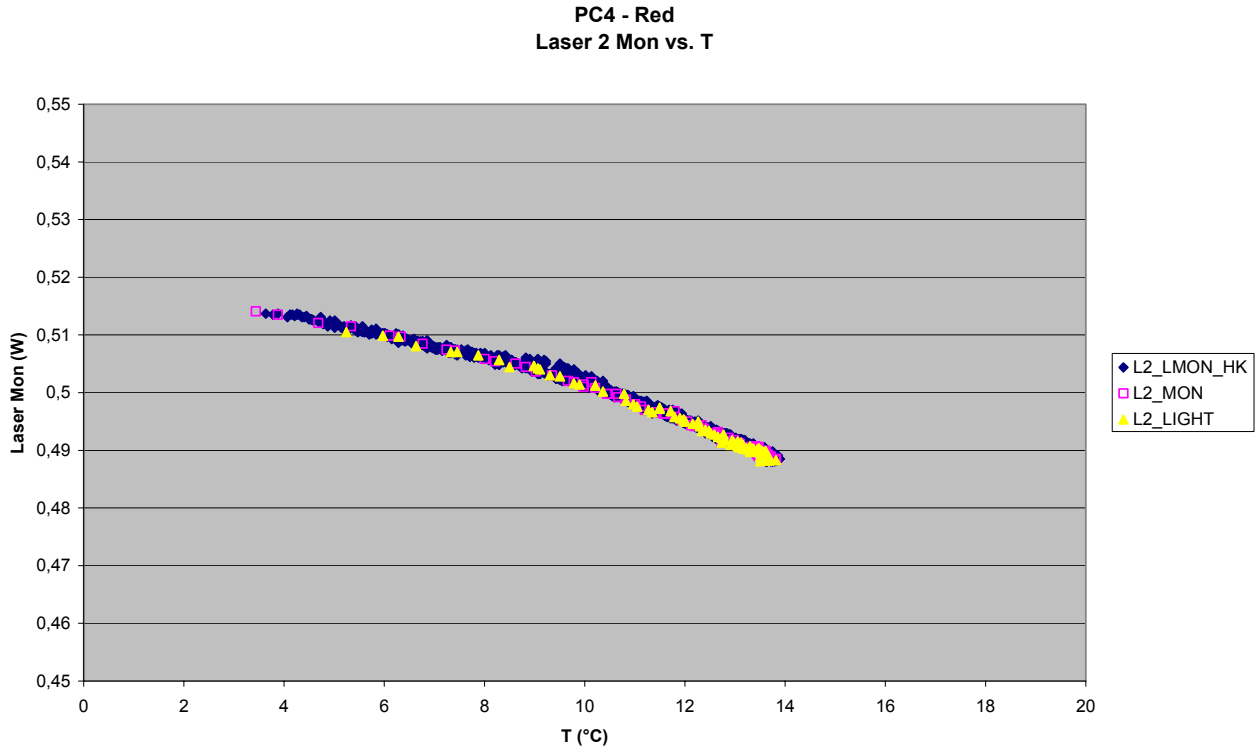


Figure 8.3-7. Laser 3 Light Monitor versus Temperature (HK, HK-SCI, SCI) - Red

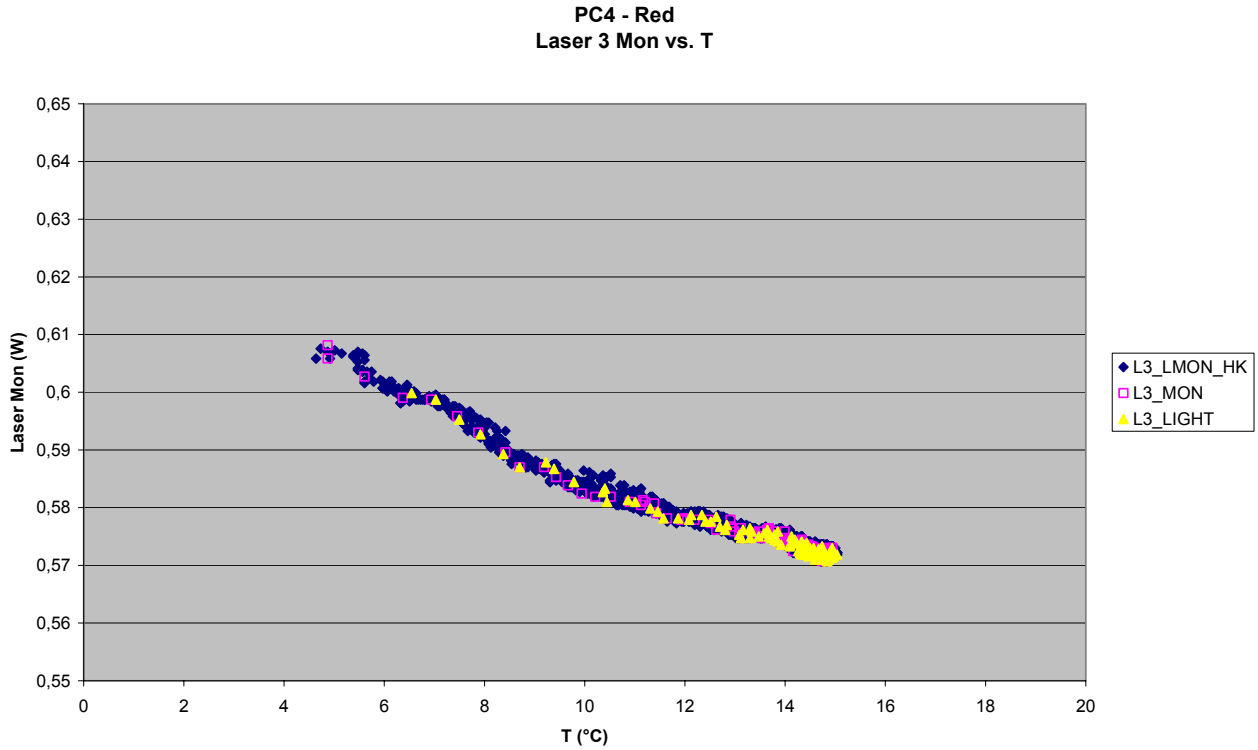
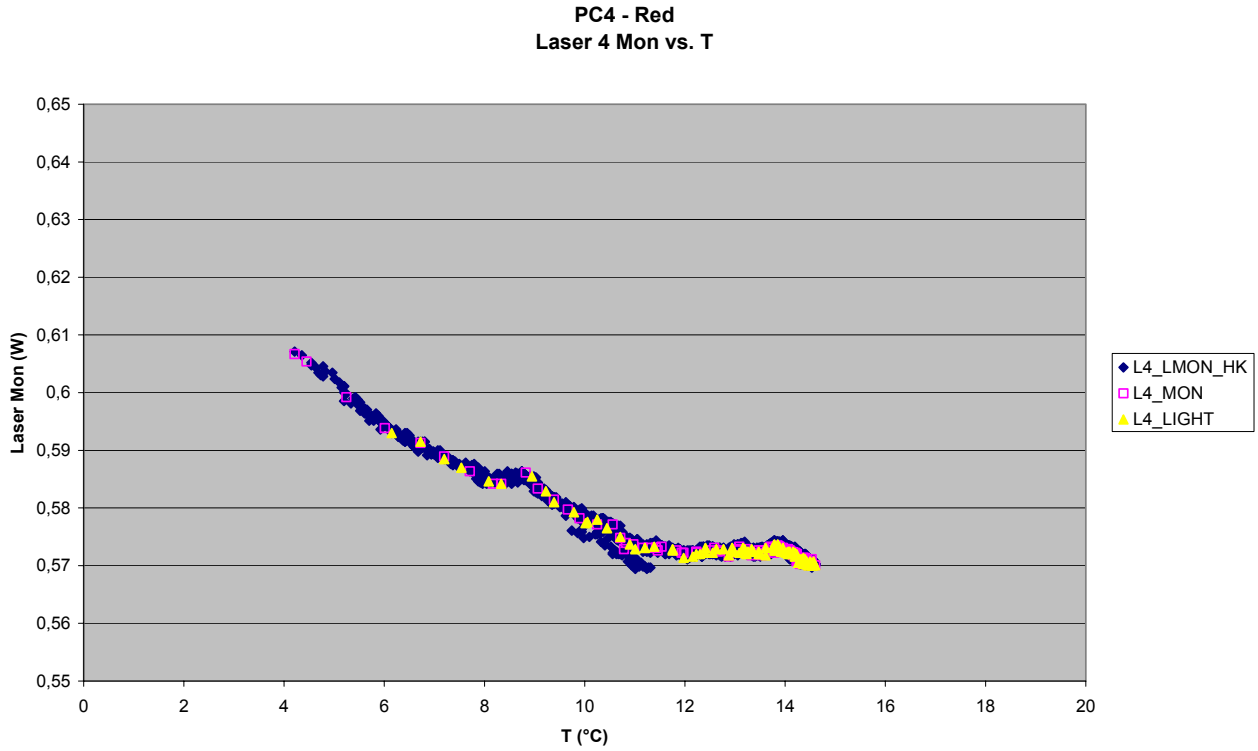


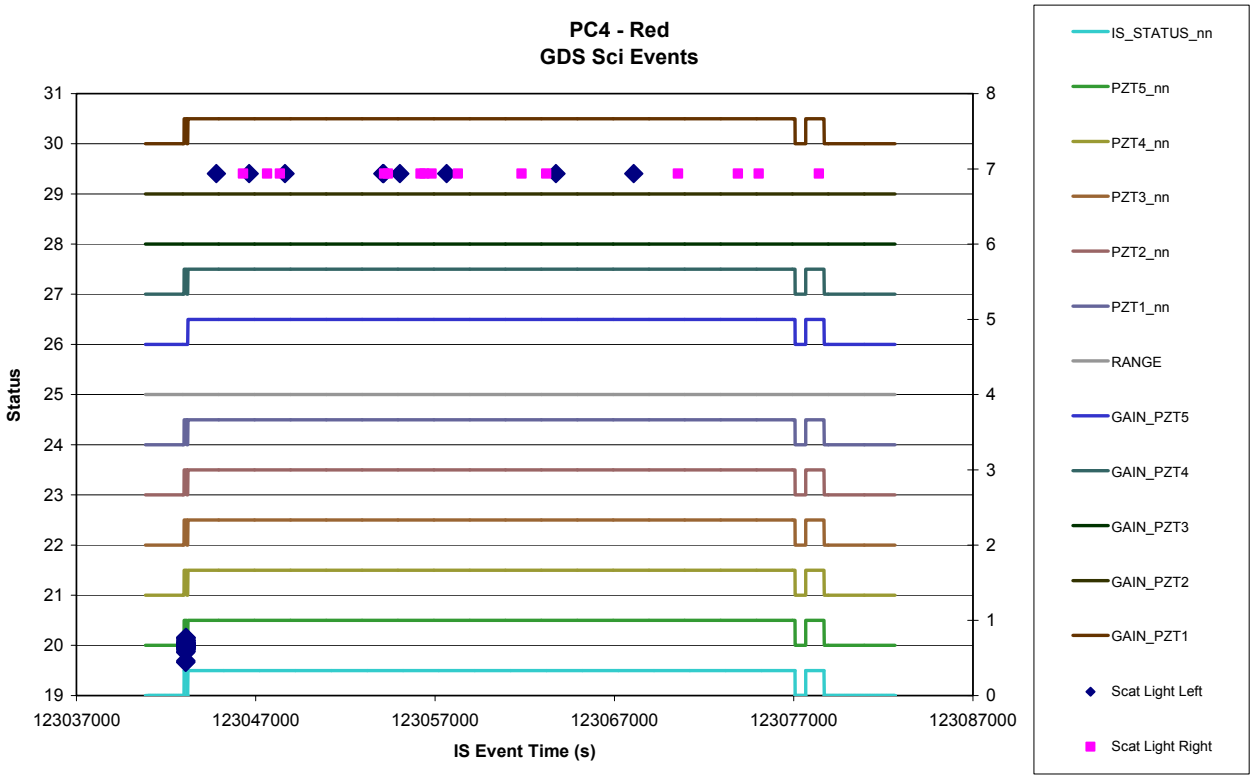
Figure 8.3-8. Laser 4 Light Monitor versus Temperature (HK, HK-SCI, SCI) - Red



8.3.2 GDS – Behaviour

8.3.2.1 Science Events

Figure 8.3-9. GDS Left and Right SCI events vs. time – Red

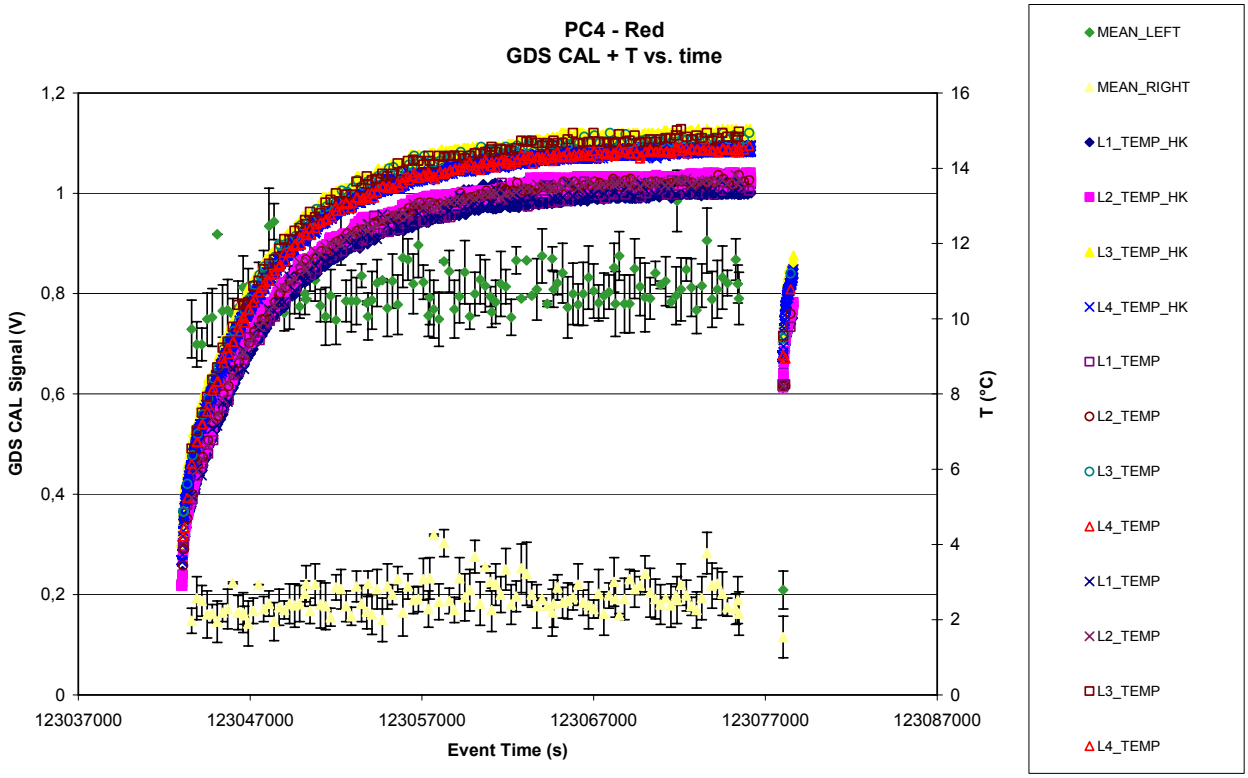


8.3.2.2 Event Rates

Not applicable

8.3.2.3 CAL

Figure 8.3-10. Evolution of GDS CAL Left and Right signals (and T) vs. time (Red)



8.4 IMPACT SENSOR (IS)

8.4.1 IS – Status

Figure 8.4-1. IS Operation Status vs. time - Red

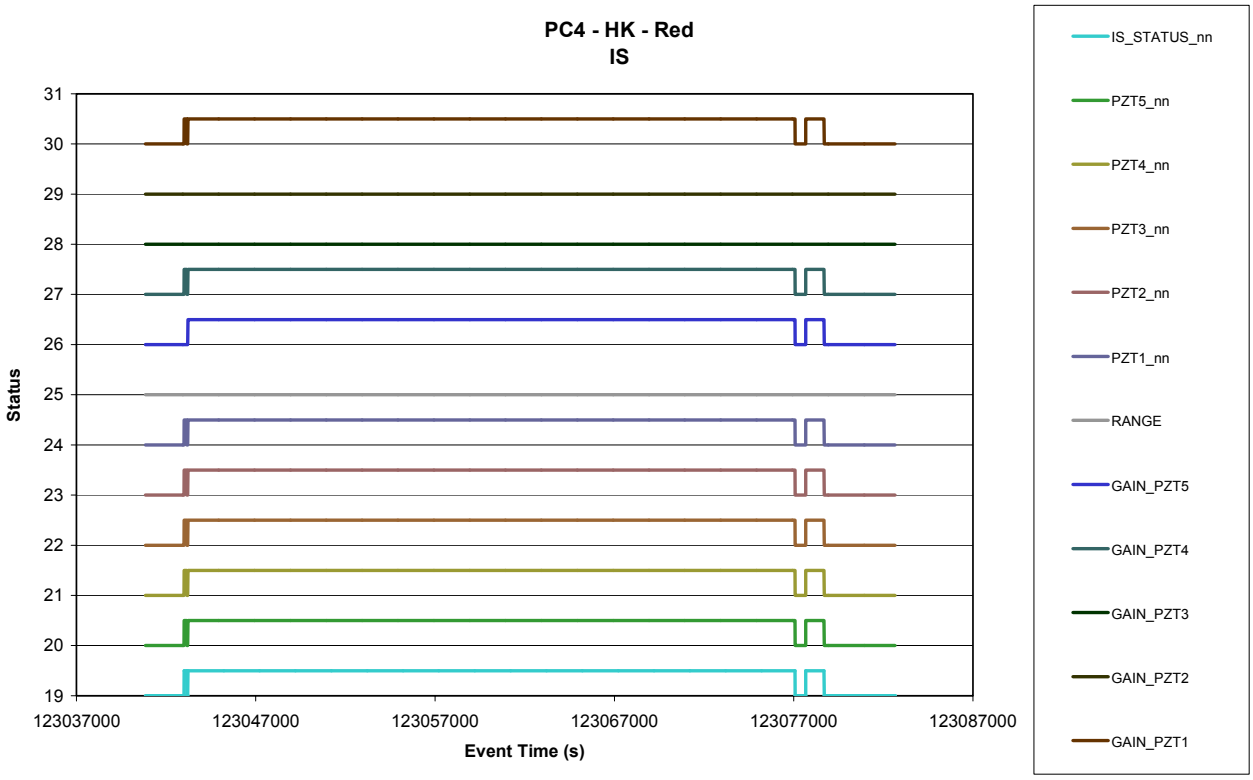


Figure 8.4-2. IS PZT 3 Thresholds change vs. time - Red

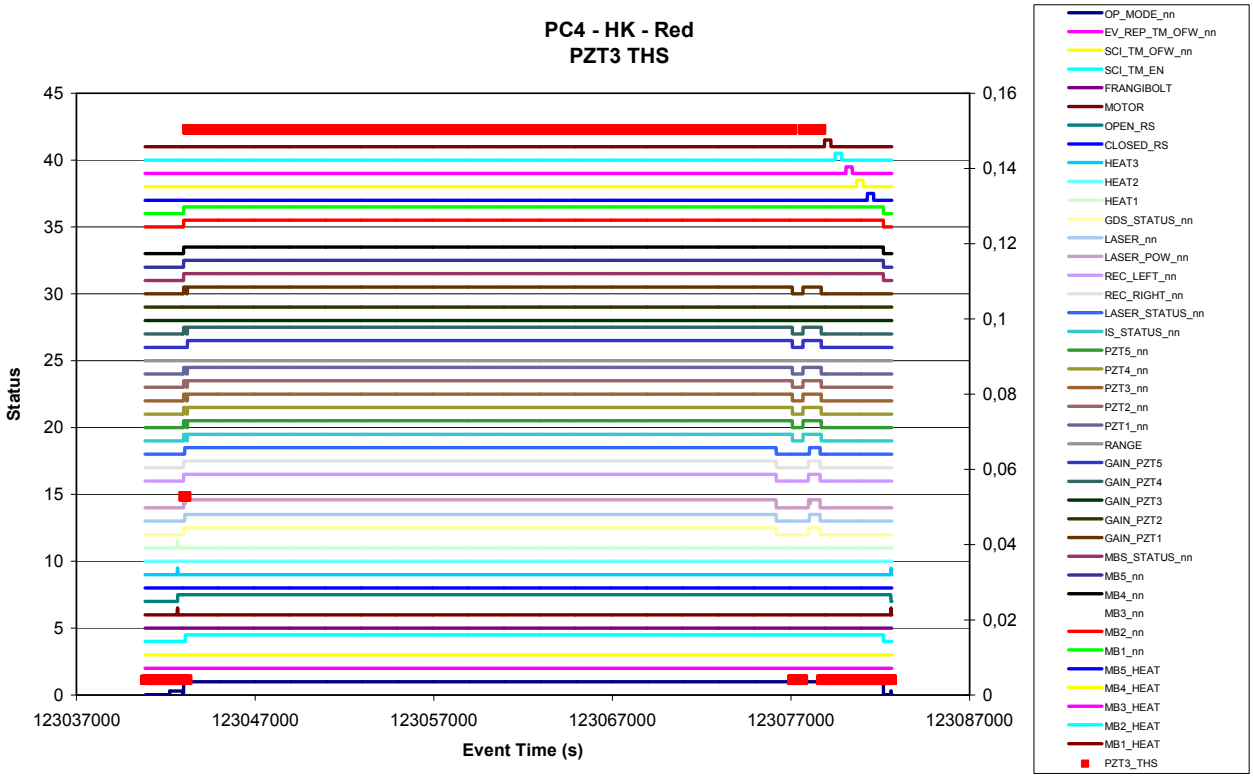


Figure 8.4-3. IS PZT 5 Thresholds change vs. time - Red

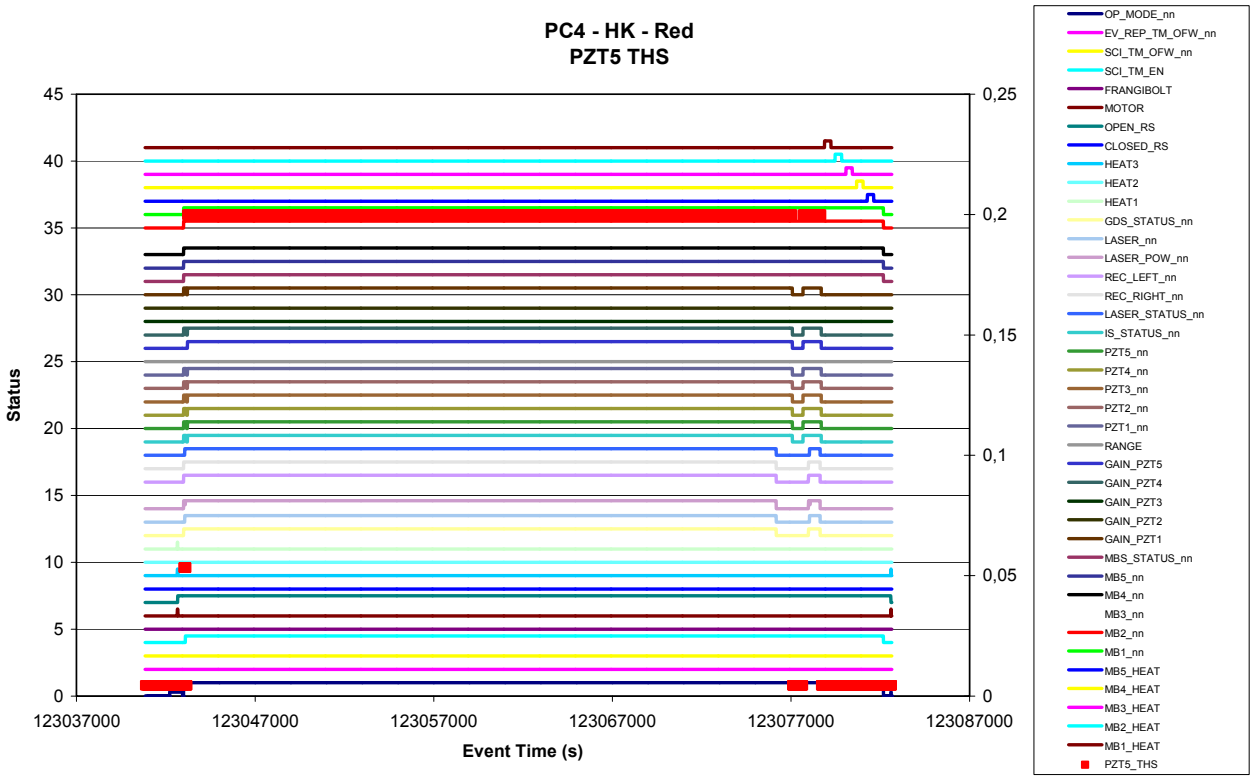
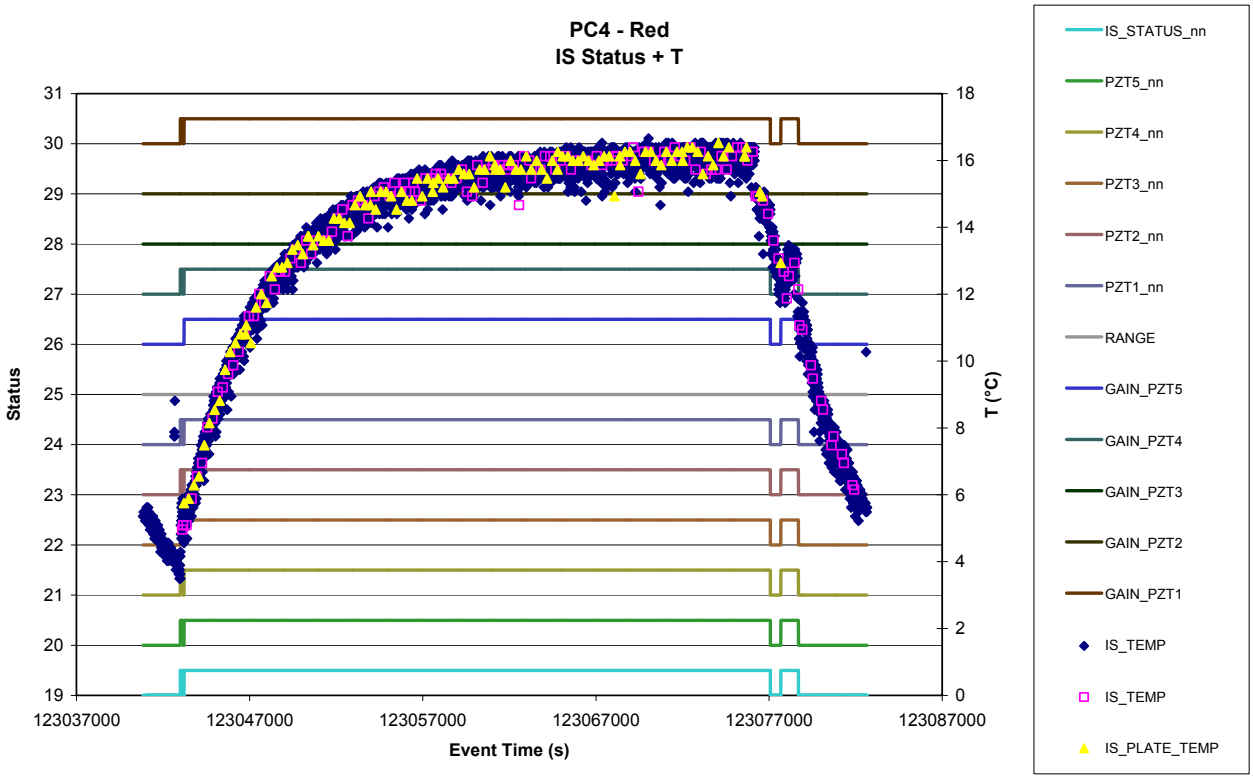


Figure 8.4-4. IS Temperature vs. time (HK, HK-SCI, SCI) - Red



8.4.2 IS – Behaviour

8.4.2.1 Science Events

Figure 8.4-5. All PZT (det. and non-det.) events vs. time - Red

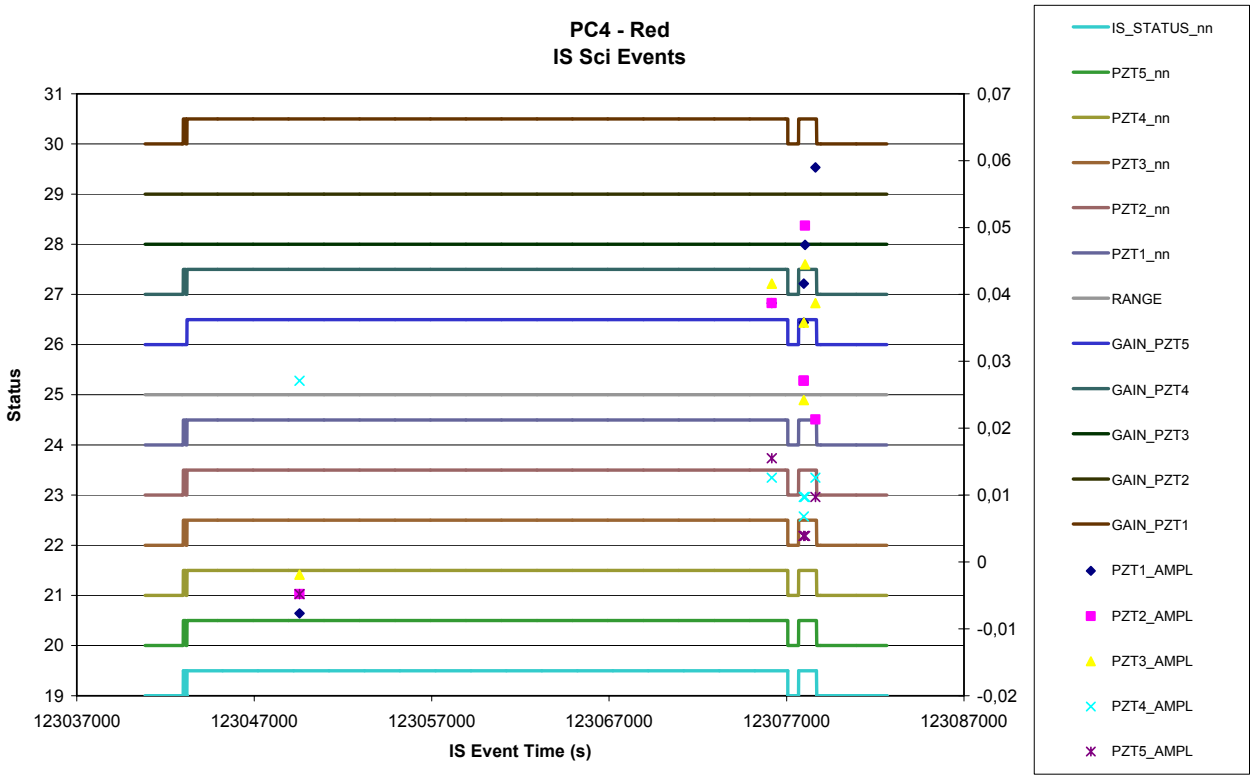


Figure 8.4-6. PZT 1-2-3-4-5 Detected Events vs. time - Red

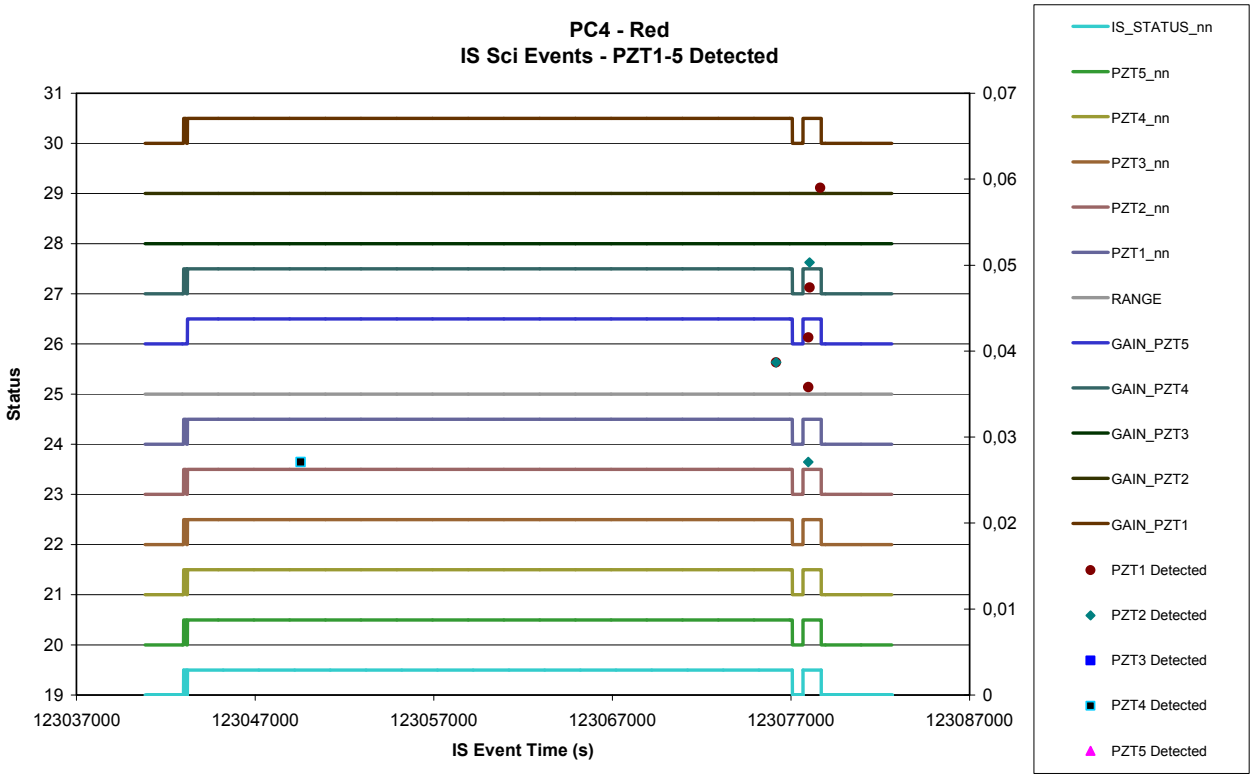


Figure 8.4-7. PZT 1 Detected Events vs. time - Red

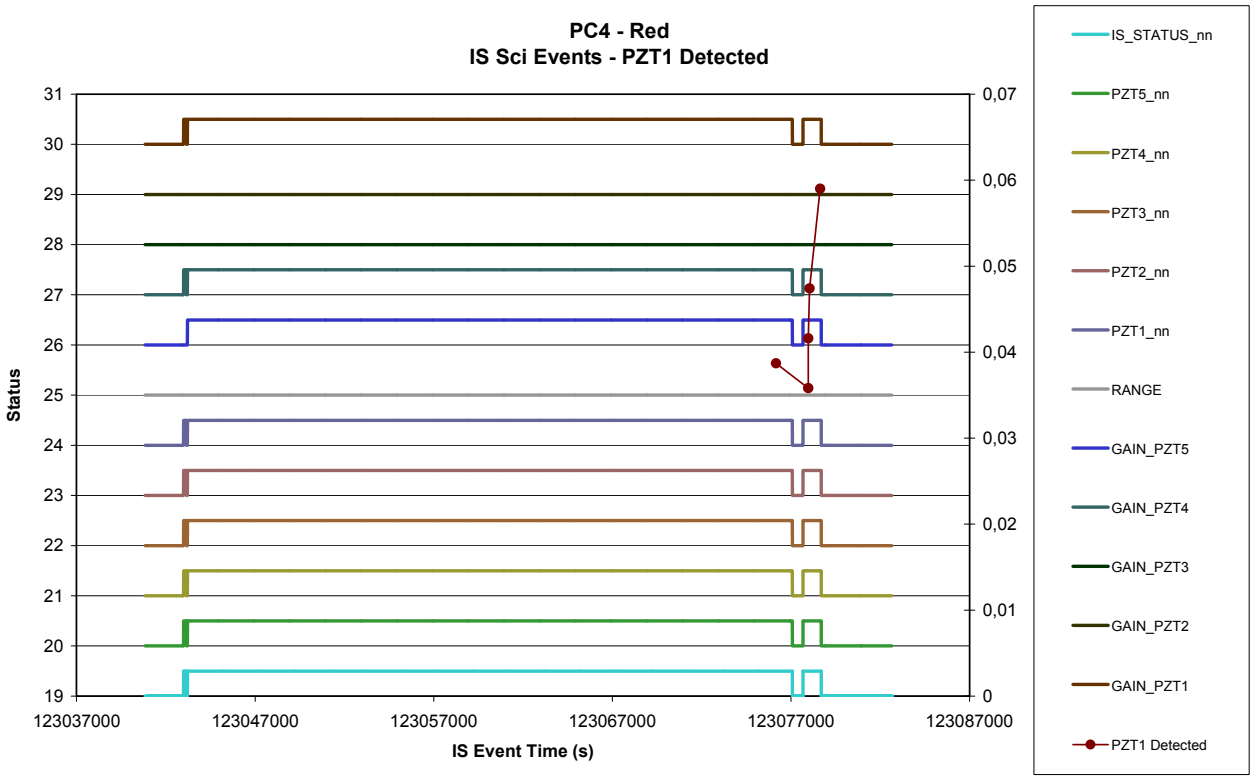


Figure 8.4-8. PZT 2 Detected Events vs. time - Red

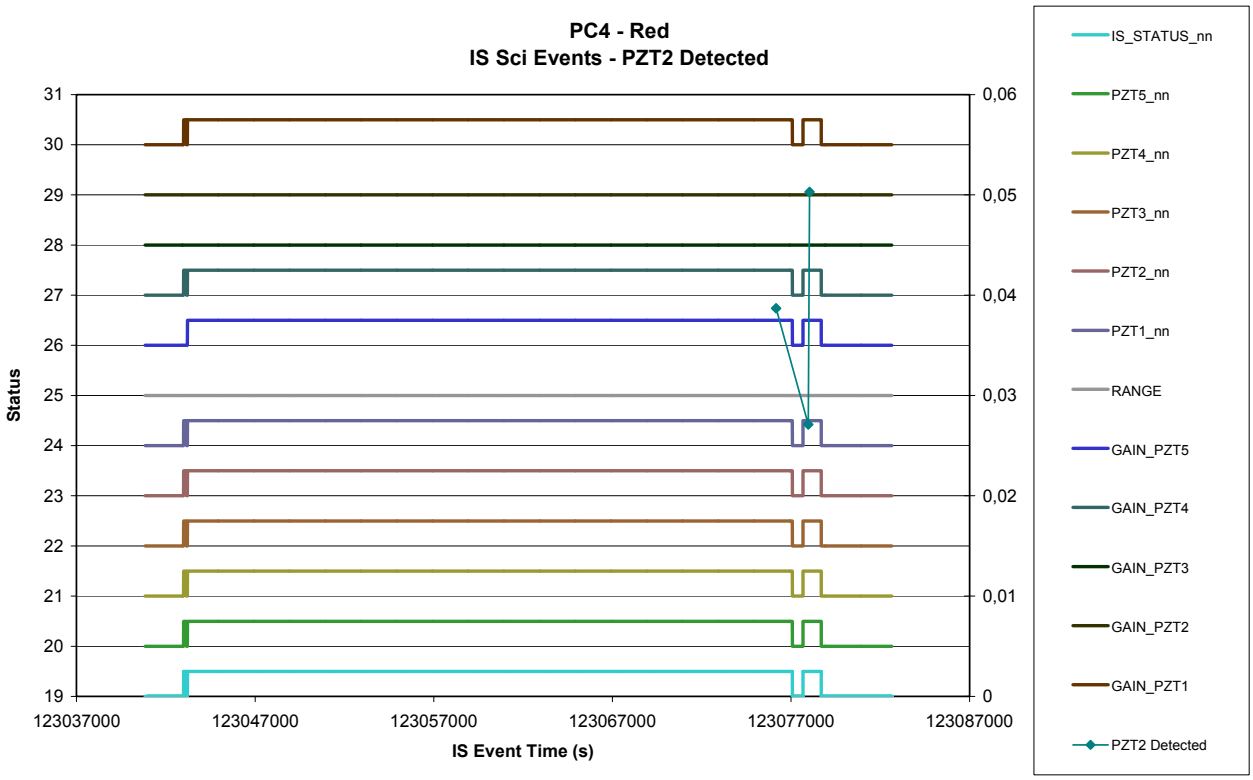


Figure 8.4-9. PZT 3 Detected Events vs. time - Red

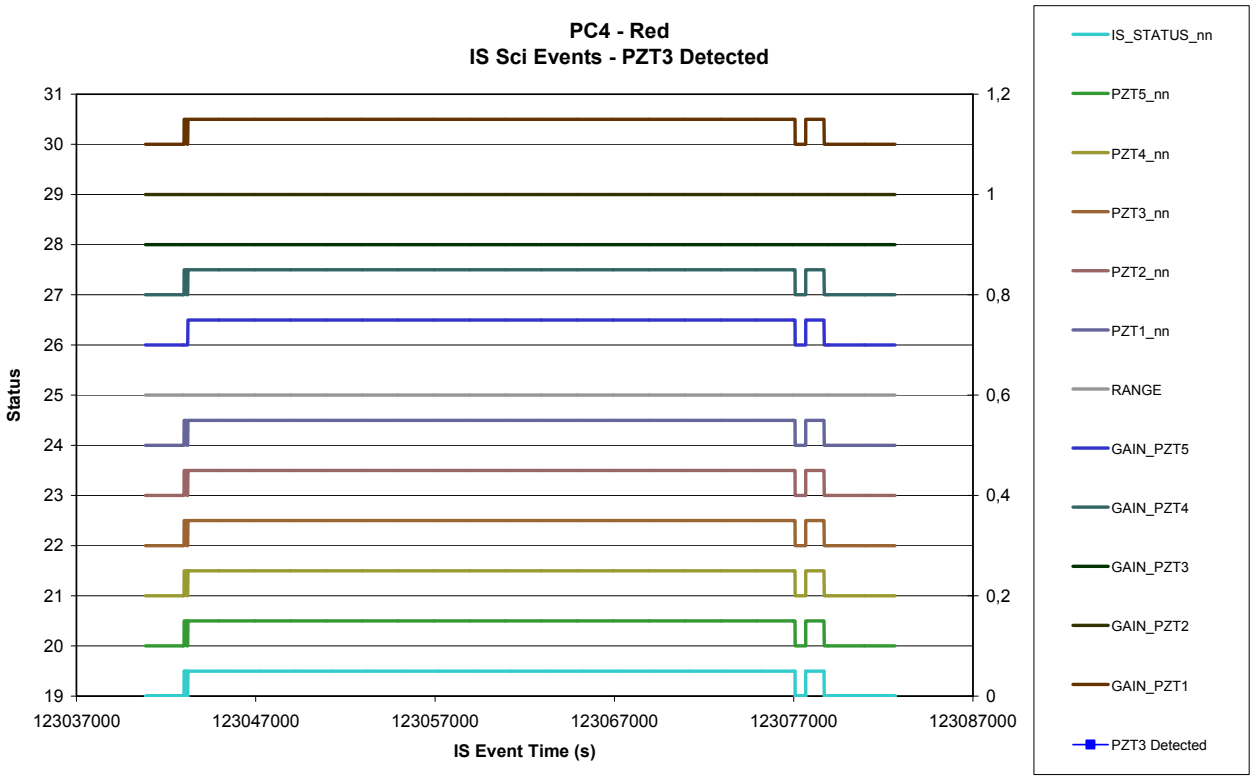


Figure 8.4-10. PZT 4 Detected Events vs. time - Red

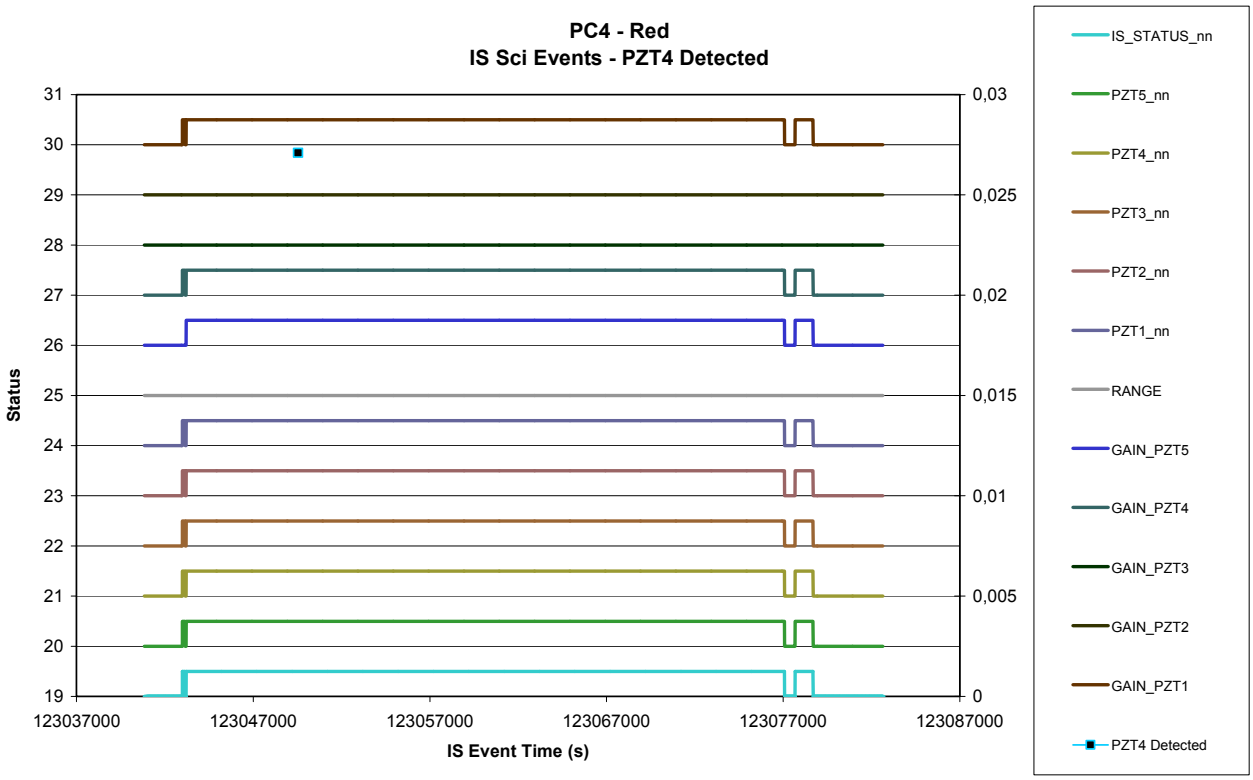


Figure 8.4-11. PZT 5 Detected Events vs. time - Red

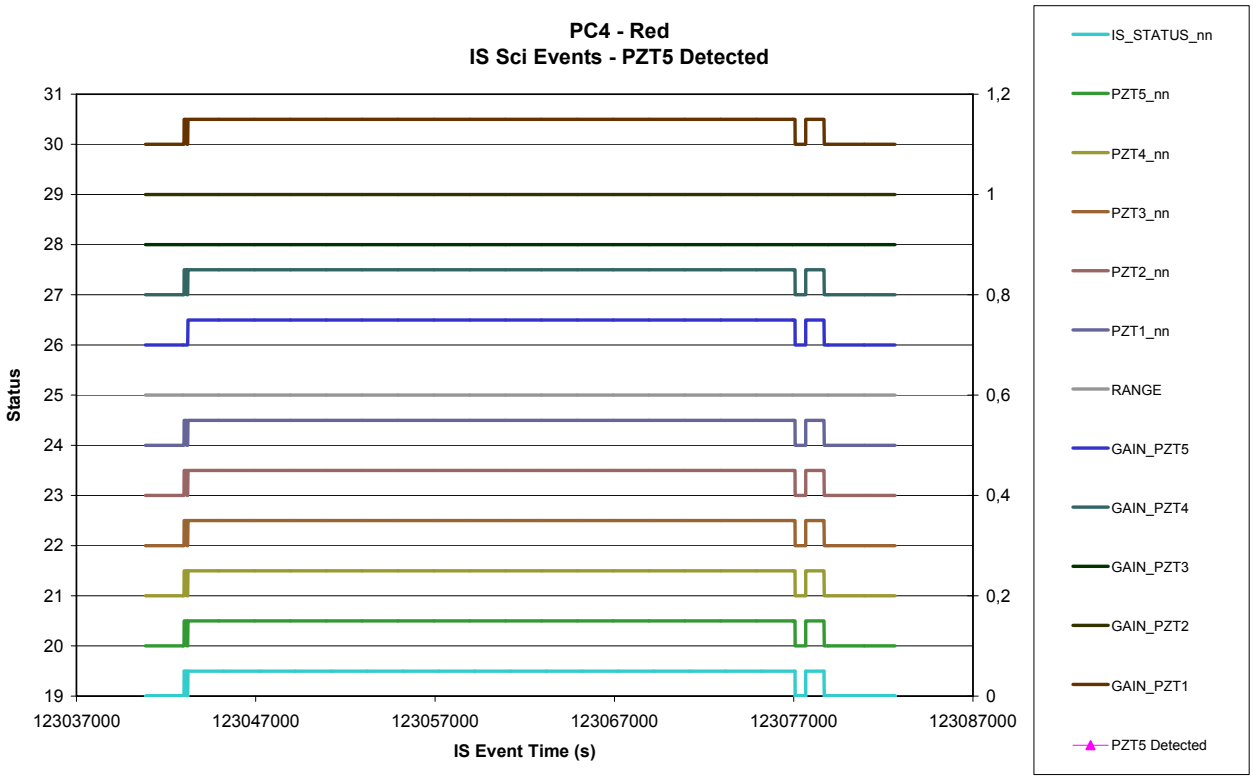
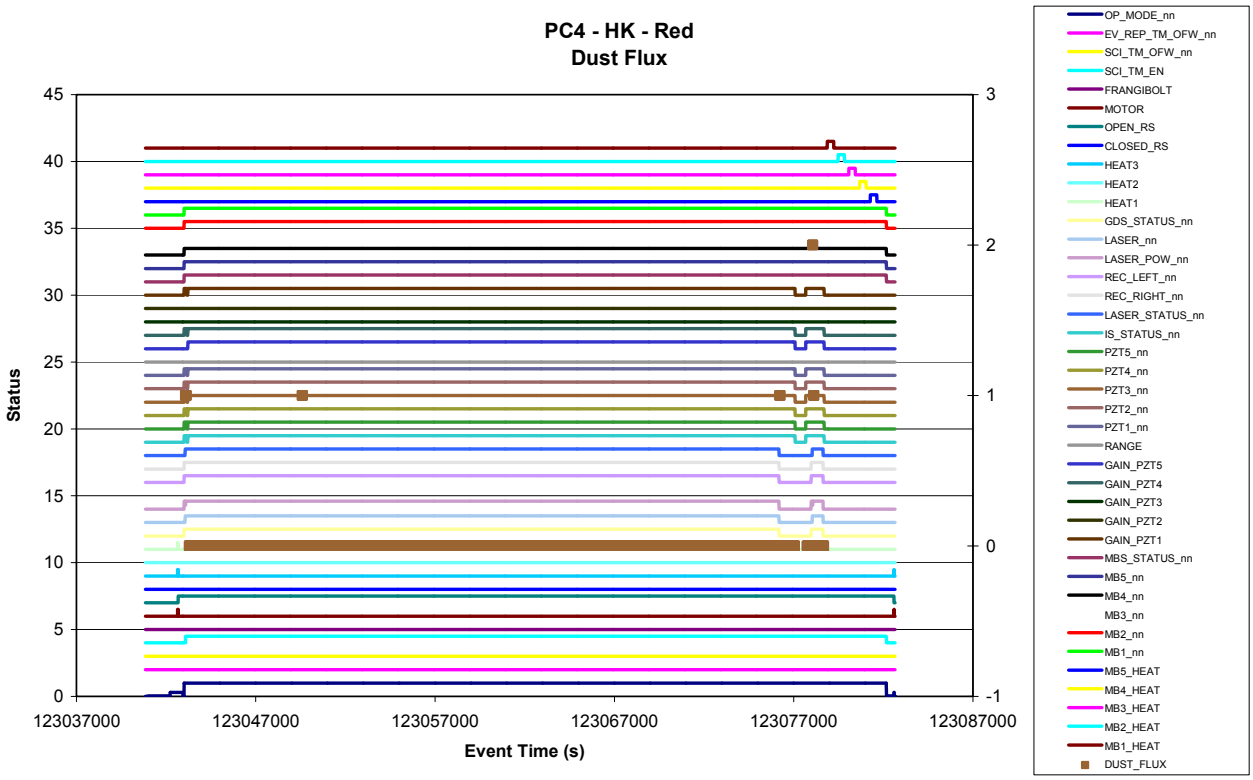


Figure 8.4-12. Dust Flux vs. time - Red



8.4.2.2 Event Rates

Not applicable

8.4.2.3 CAL

Figure 8.4-13. PZT 1 Mean and St Dev. CAL vs. time - Red

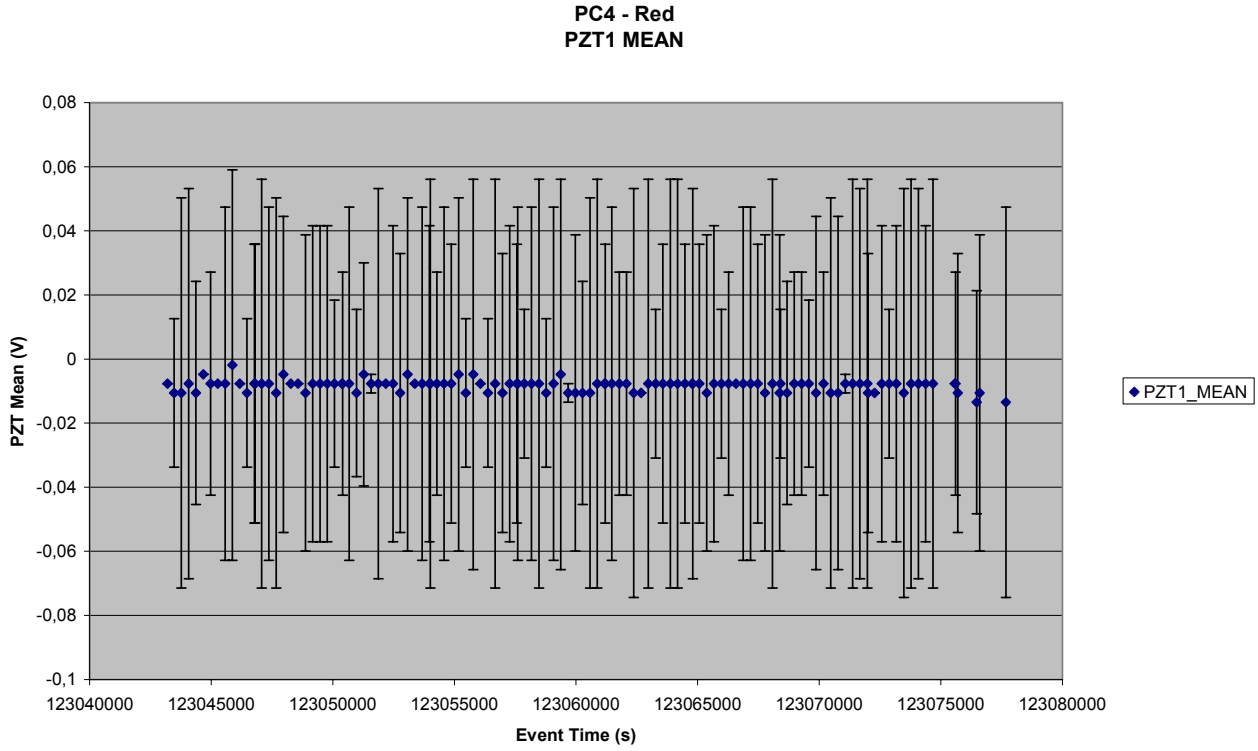


Figure 8.4-14. PZT 2 Mean and St Dev. CAL vs. time - Red

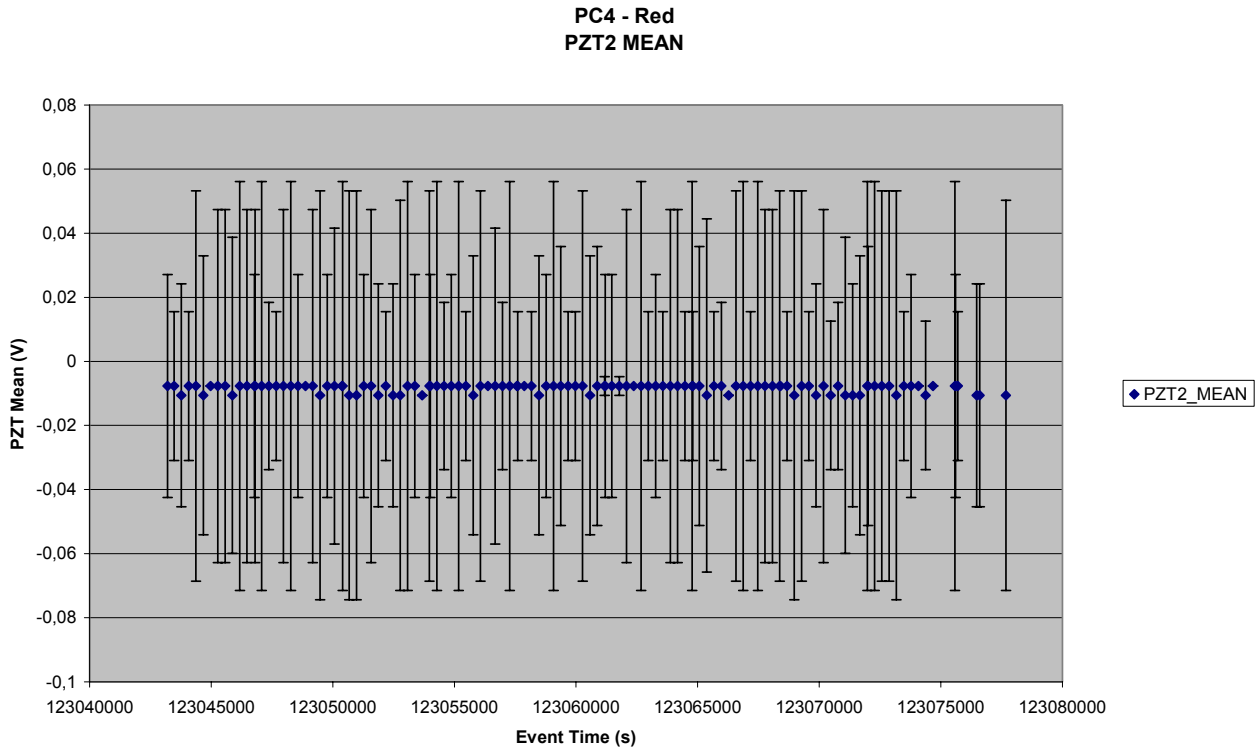


Figure 8.4-15. PZT 3 Mean and St Dev. CAL vs. time - Red

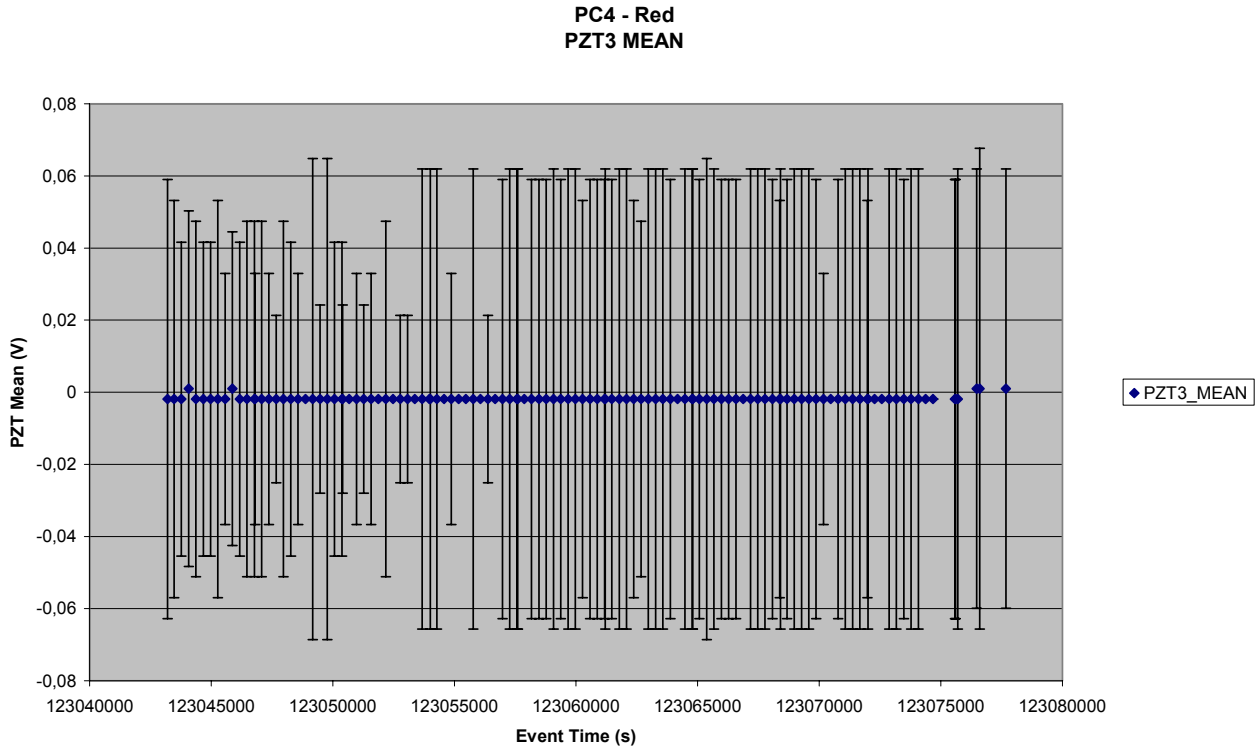


Figure 8.4-16. PZT 4 Mean and St Dev. CAL vs. time - Red

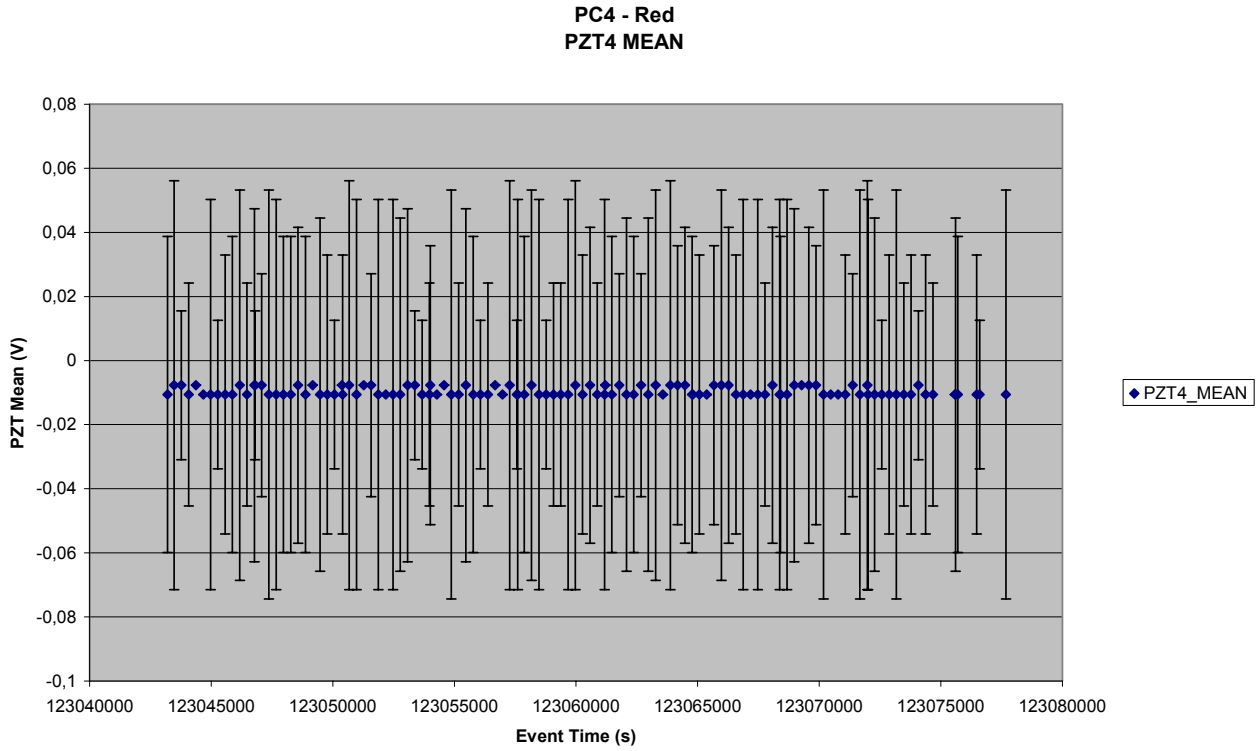


Figure 8.4-17. PZT 5 Mean and St Dev. CAL vs. time - Red

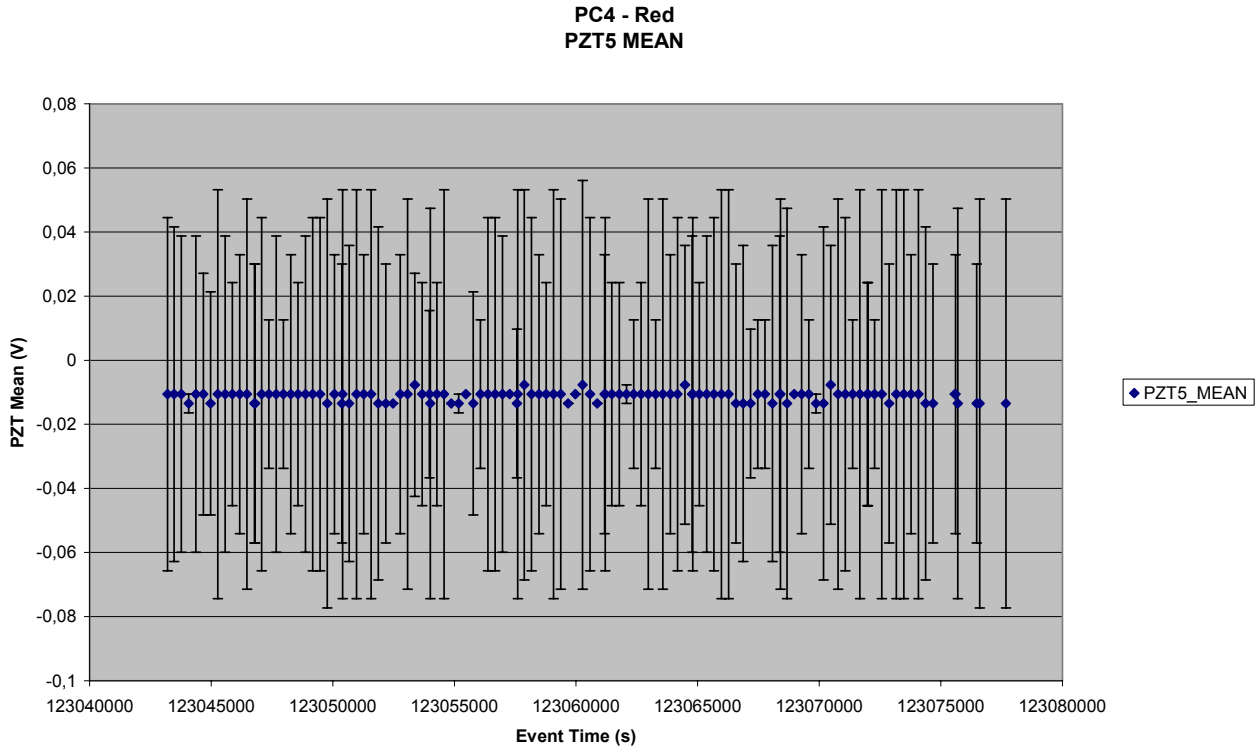


Figure 8.4-18. Reference Voltages for IS calibration vs. time - Red

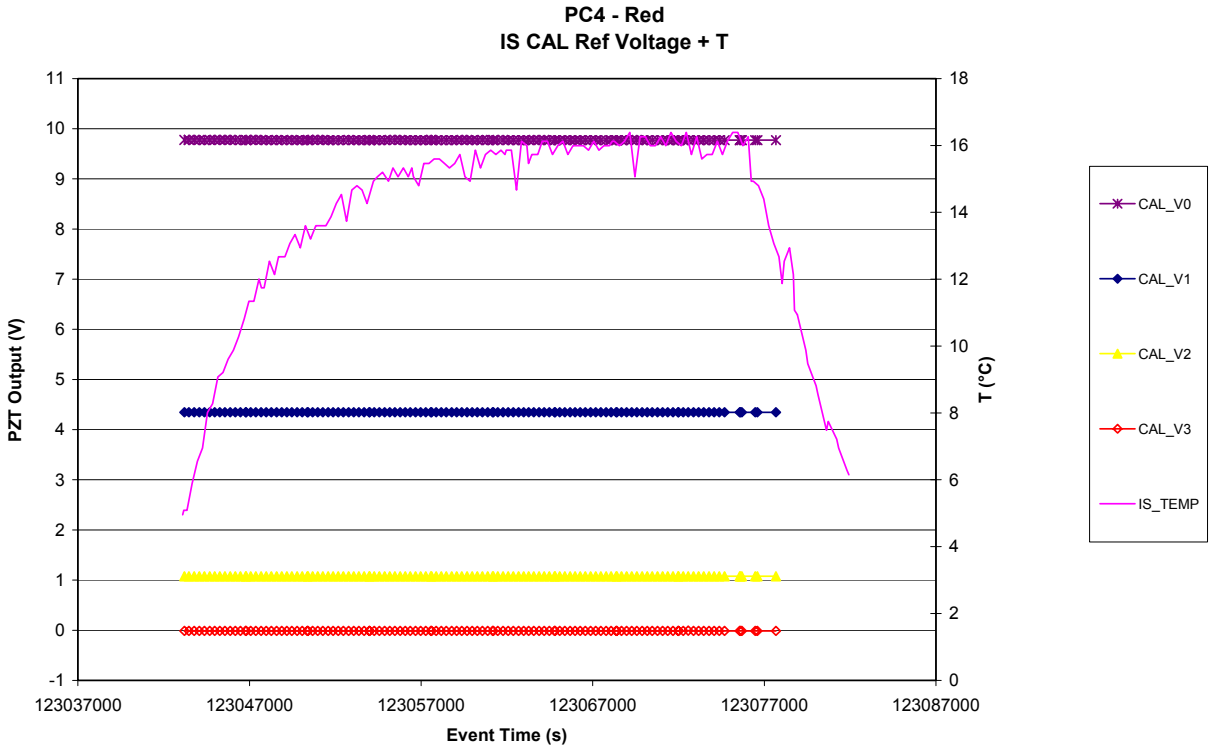


Figure 8.4-19. PZT 1 CAL Signal vs. time - Red

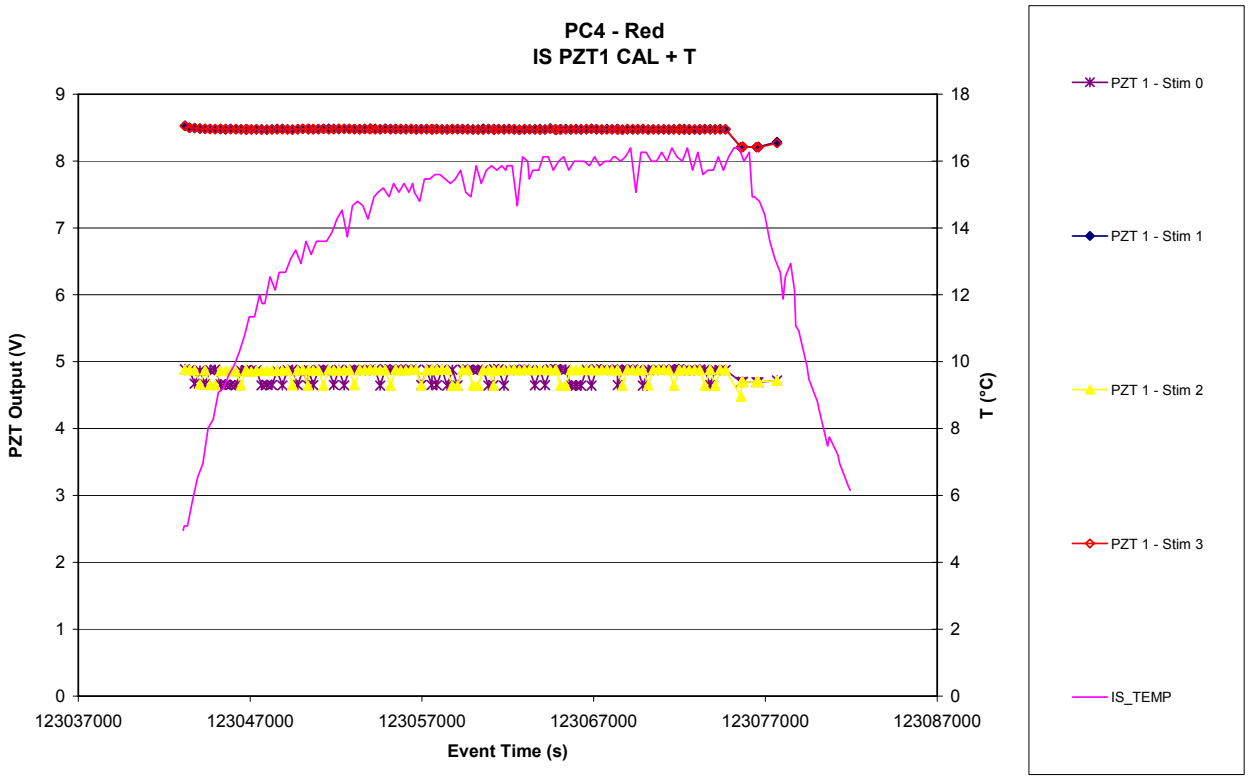


Figure 8.4-20. PZT 2 CAL Signal vs. time - Red

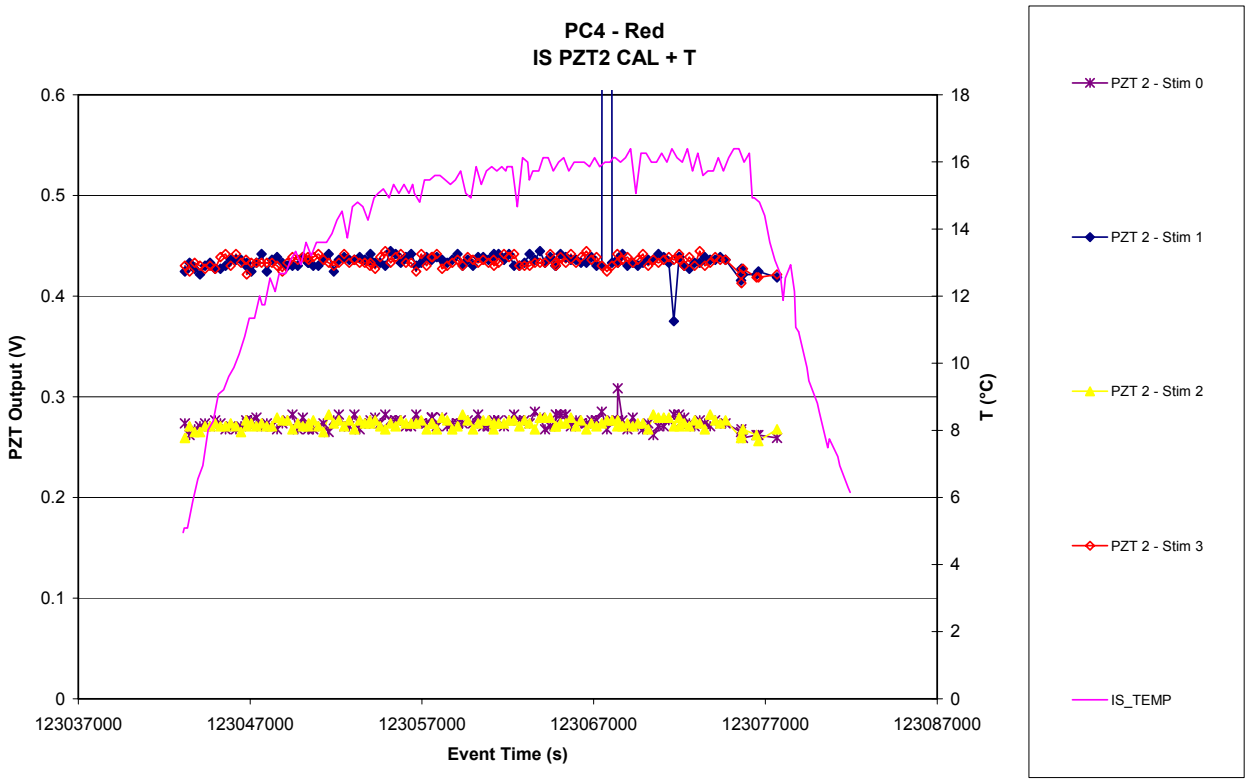


Figure 8.4-21. PZT 3 CAL Signal vs. time - Red

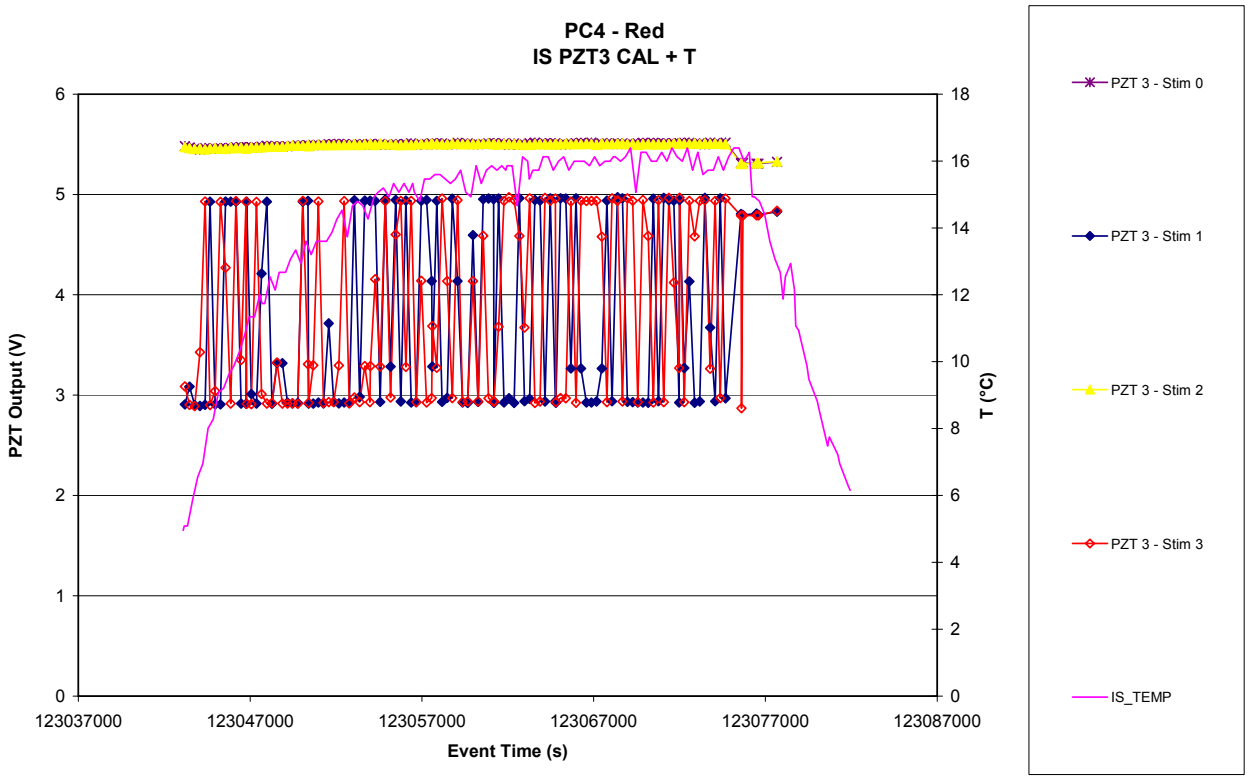


Figure 8.4-22. PZT 4 CAL Signal vs. time - Red

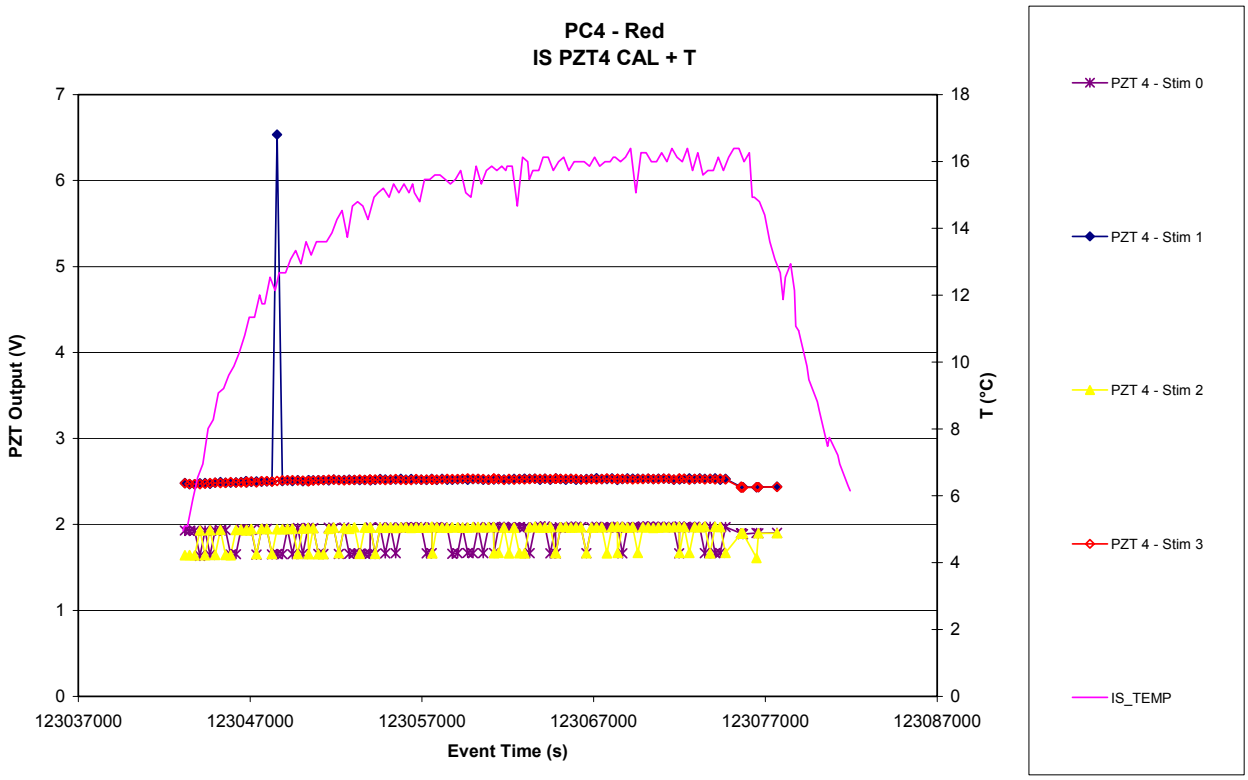


Figure 8.4-23. PZT 5 CAL Signal vs. time - Red

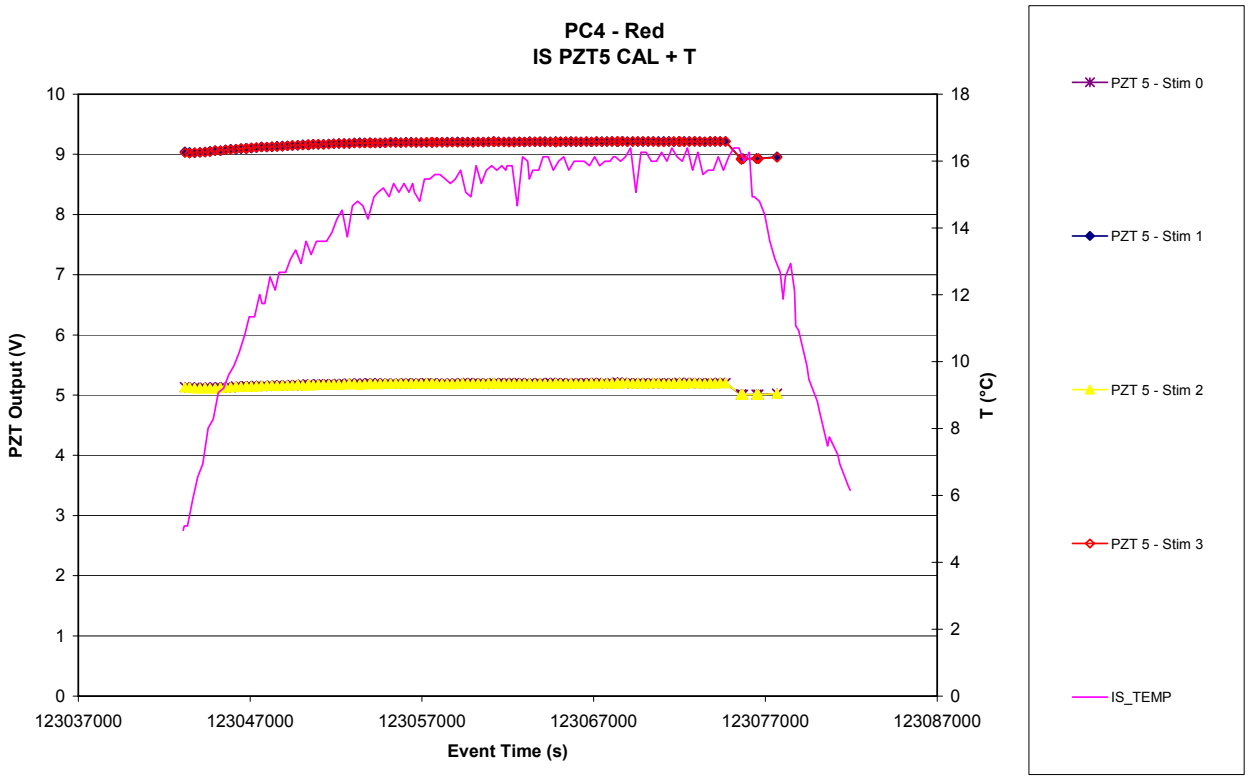


Figure 8.4-24. PZT 1 CAL Time delay vs. time - Red

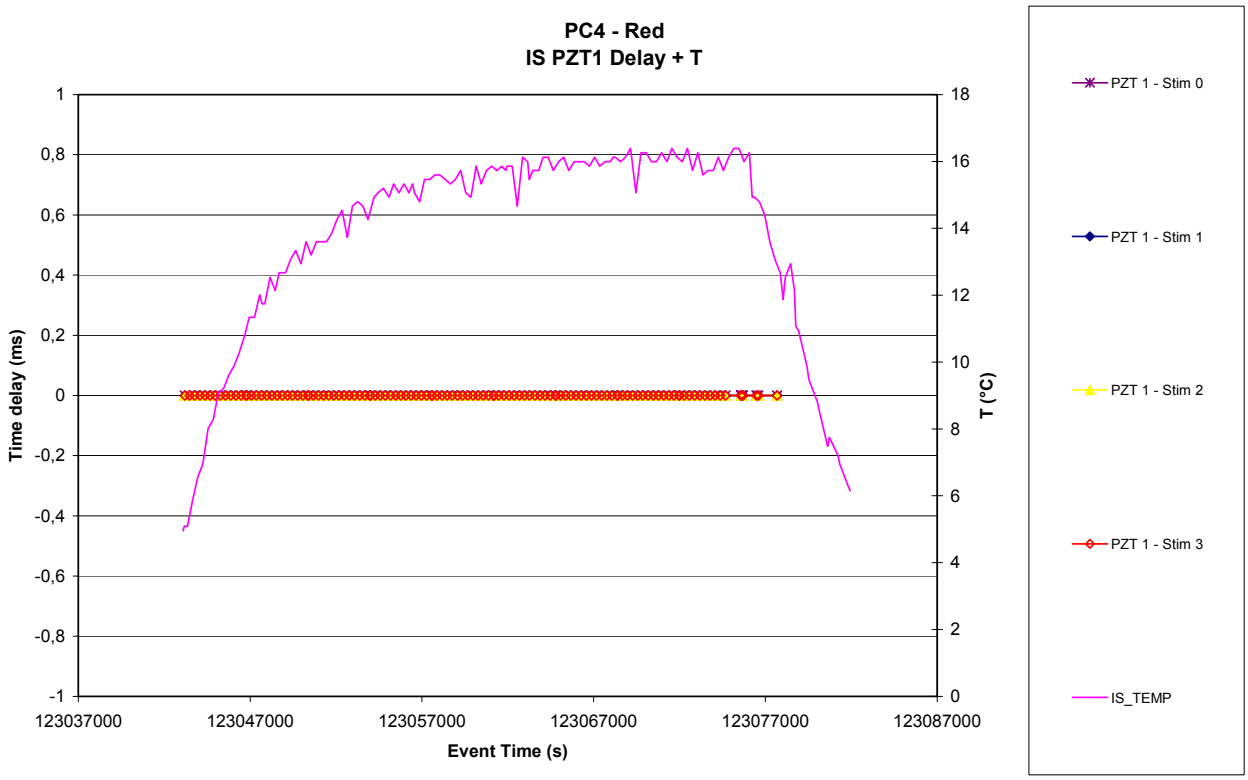


Figure 8.4-25. PZT 2 CAL Time delay vs. time - Red

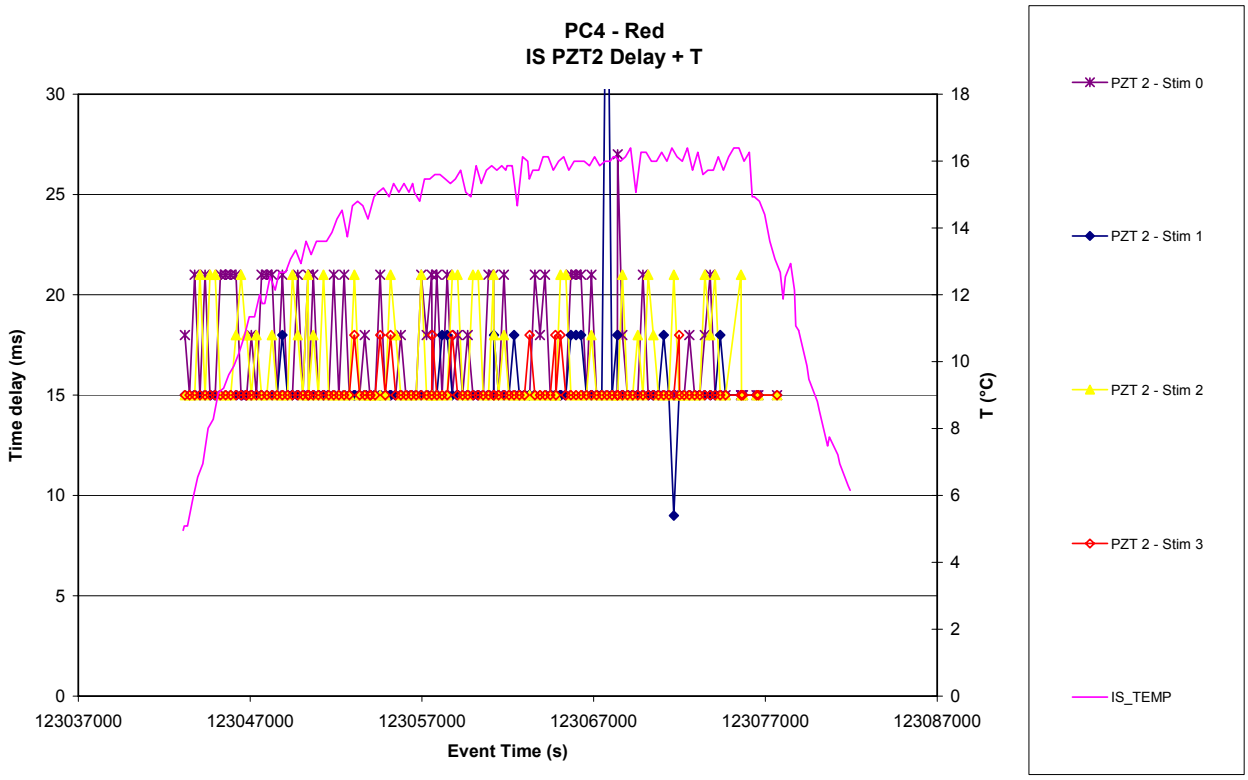


Figure 8.4-26. PZT 3 CAL Time delay vs. time - Red

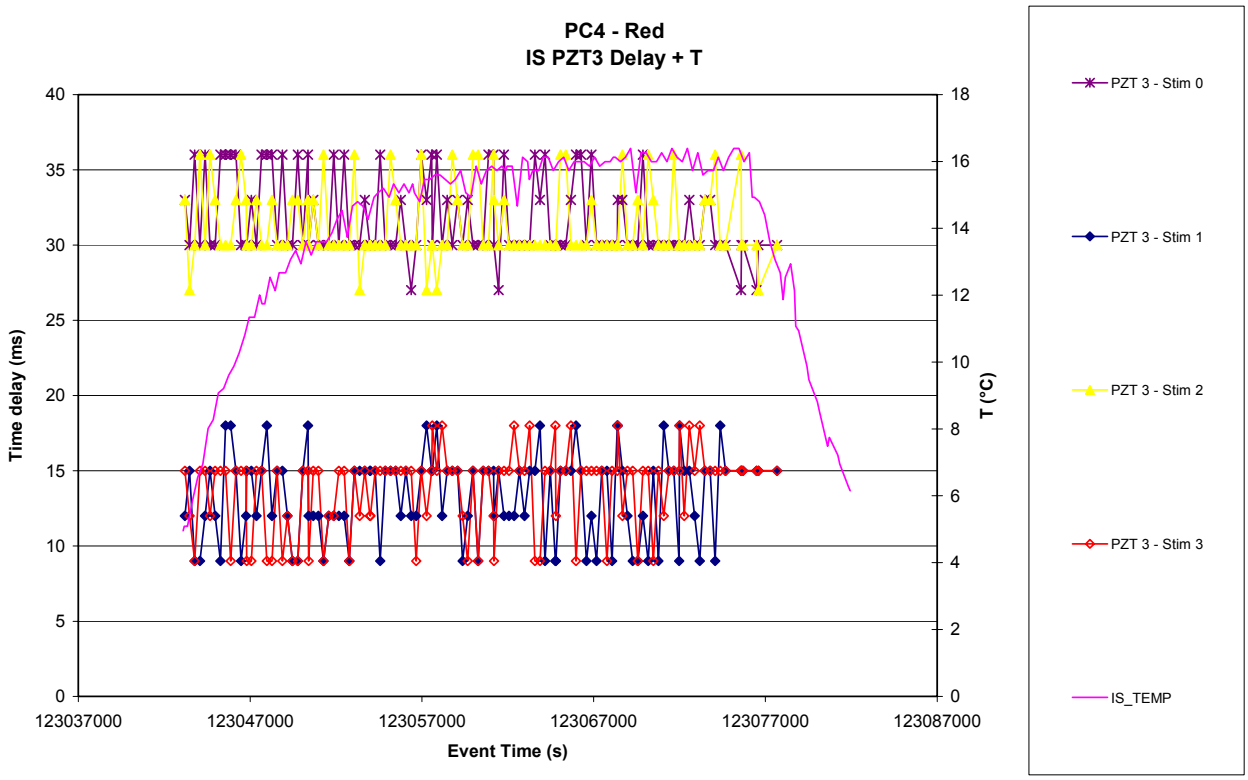


Figure 8.4-27. PZT 4 CAL Time delay vs. time - Red

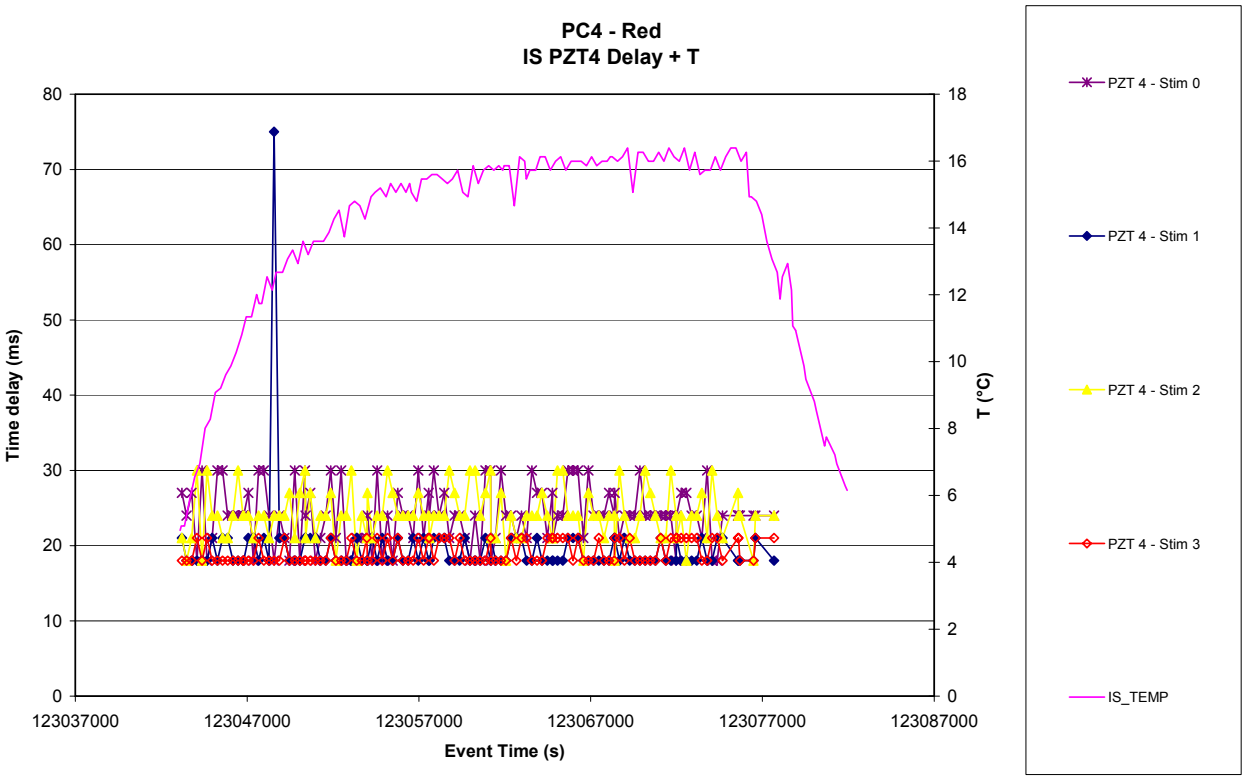


Figure 8.4-28. PZT 5 CAL Time delay vs. time - Red

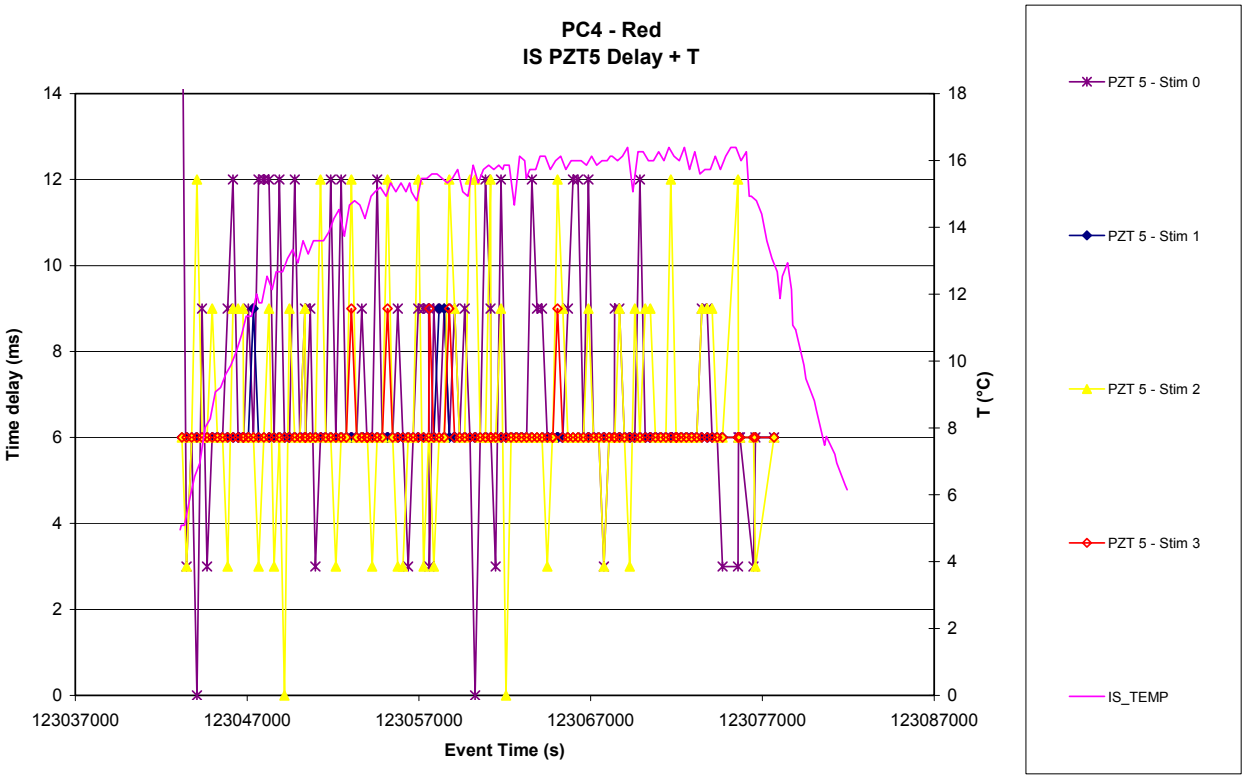


Figure 8.4-29. PZT 1 CAL Signal vs. stimulus – Red

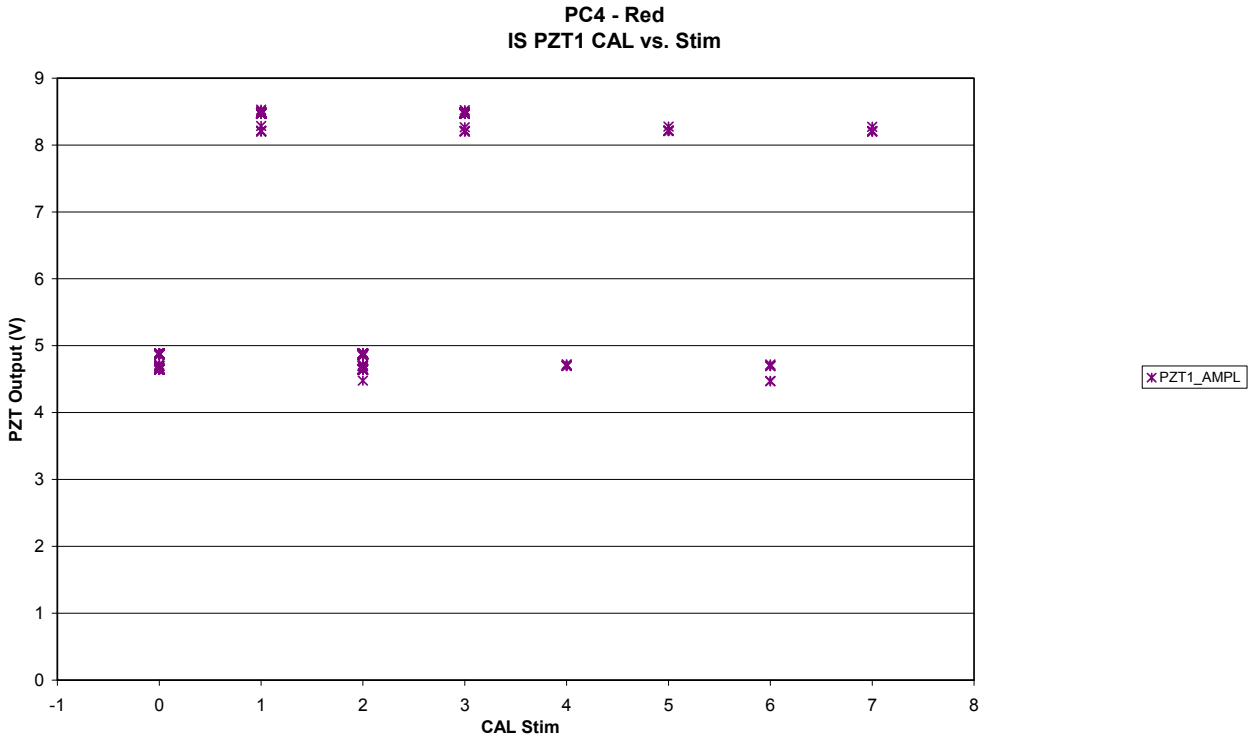


Figure 8.4-30. PZT 2 CAL Signal vs. stimulus – Red

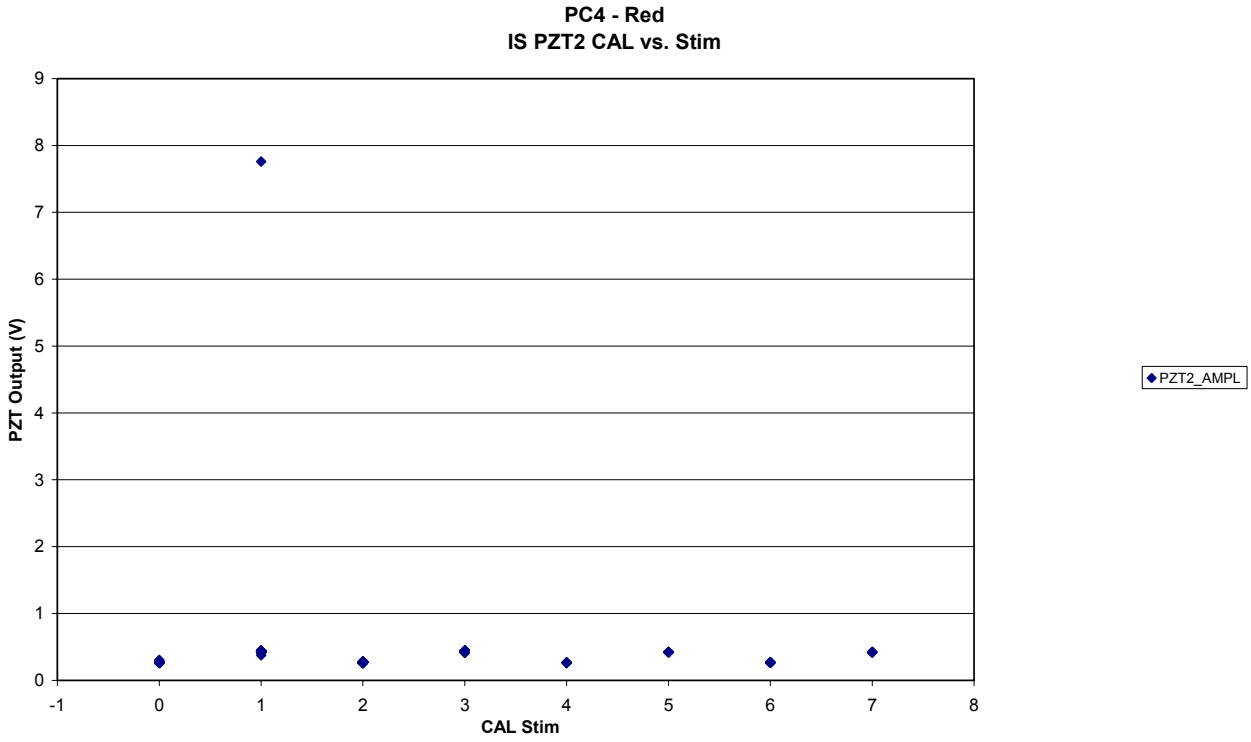


Figure 8.4-31. PZT 3 CAL Signal vs. stimulus – Red

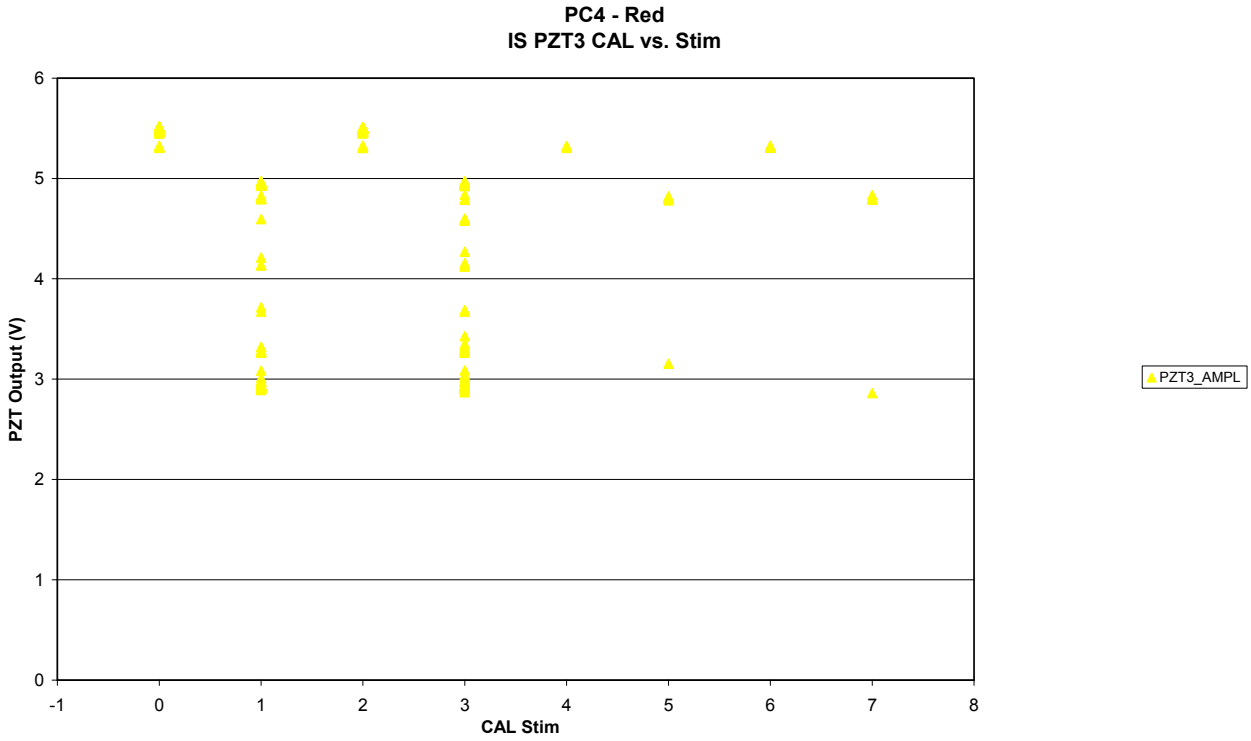


Figure 8.4-32. PZT 4 CAL Signal vs. stimulus – Red

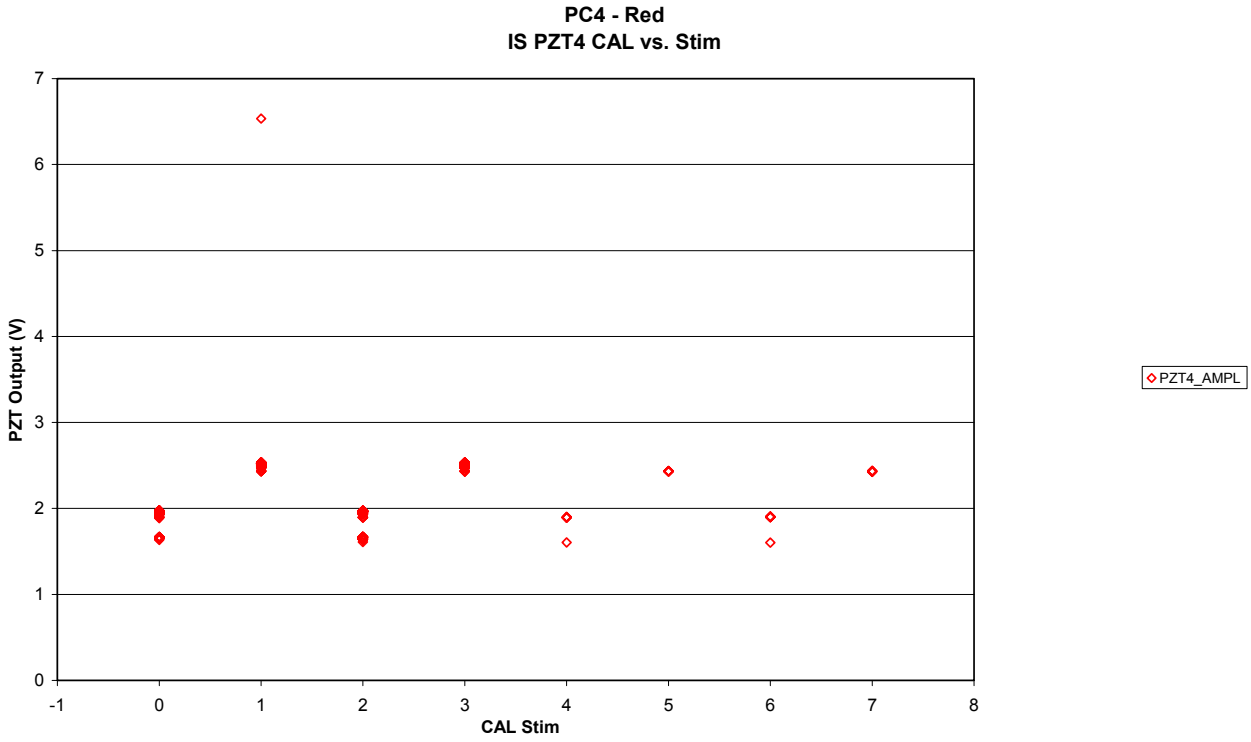


Figure 8.4-33. PZT 5 CAL Signal vs. stimulus – Red

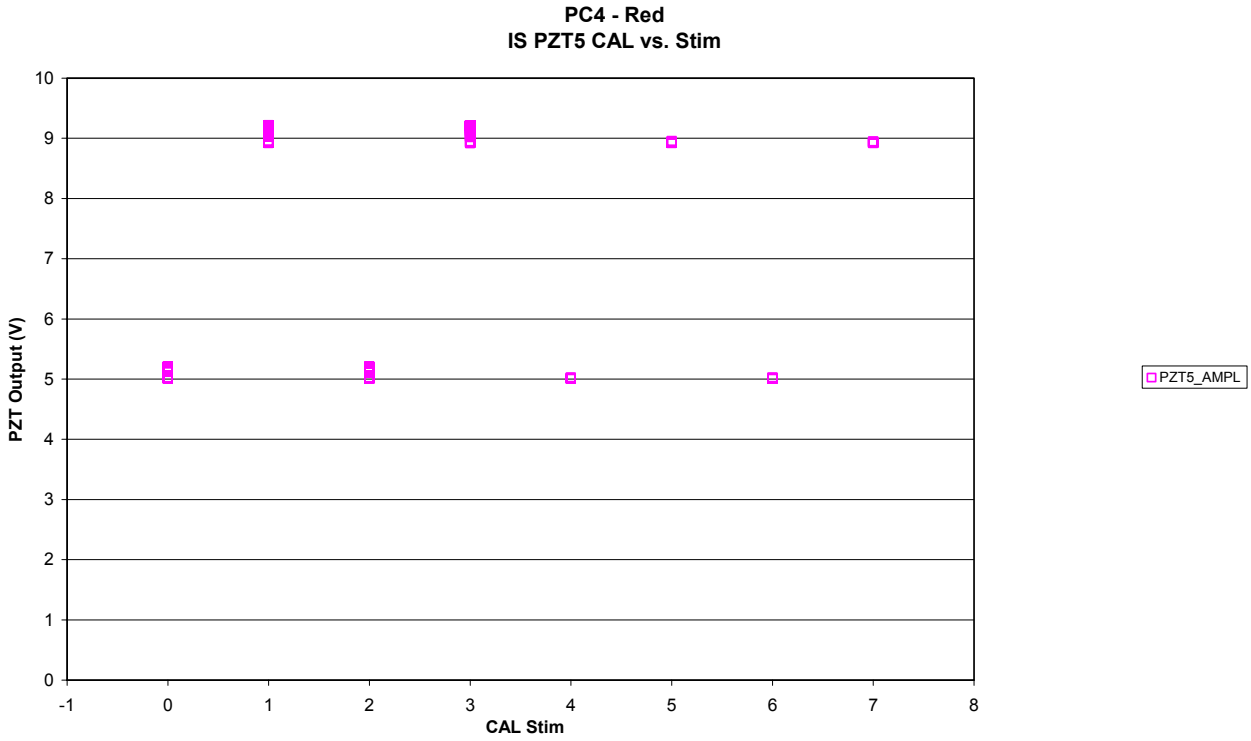


Figure 8.4-34. PZT 1 CAL Time delay vs. stimulus – Red

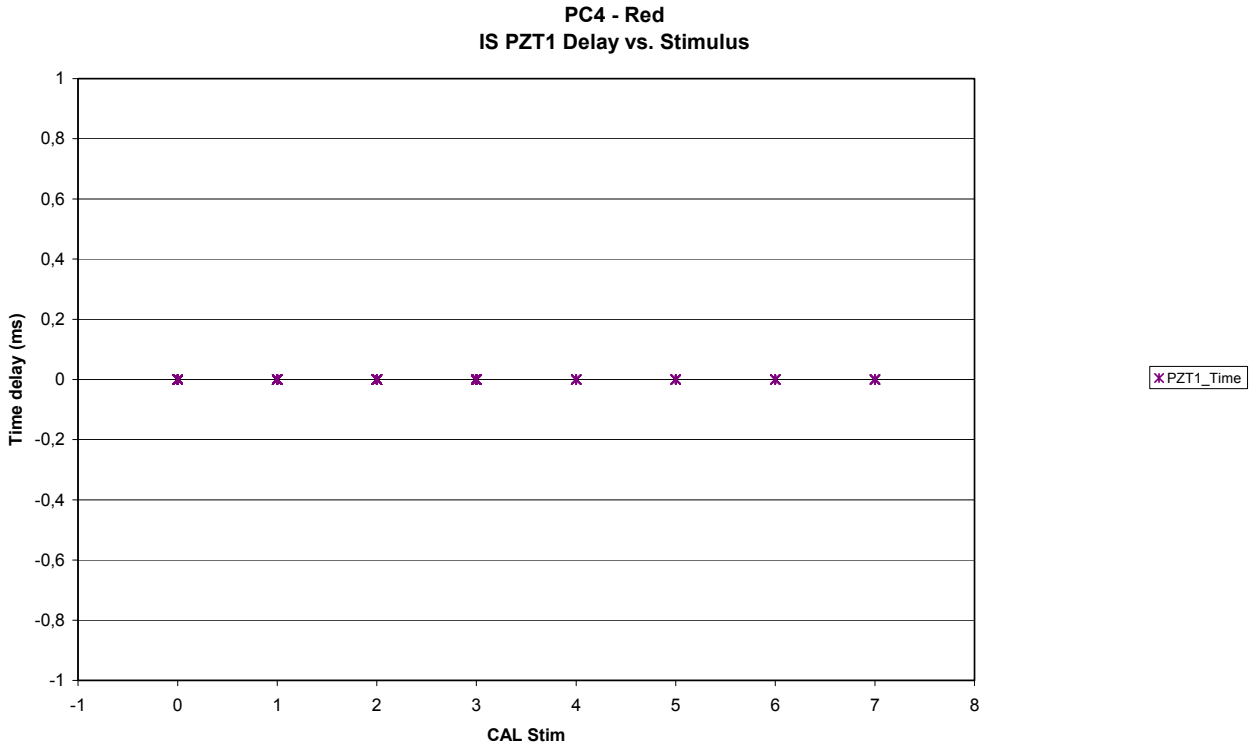


Figure 8.4-35. PZT 2 CAL Time delay vs. stimulus - Red

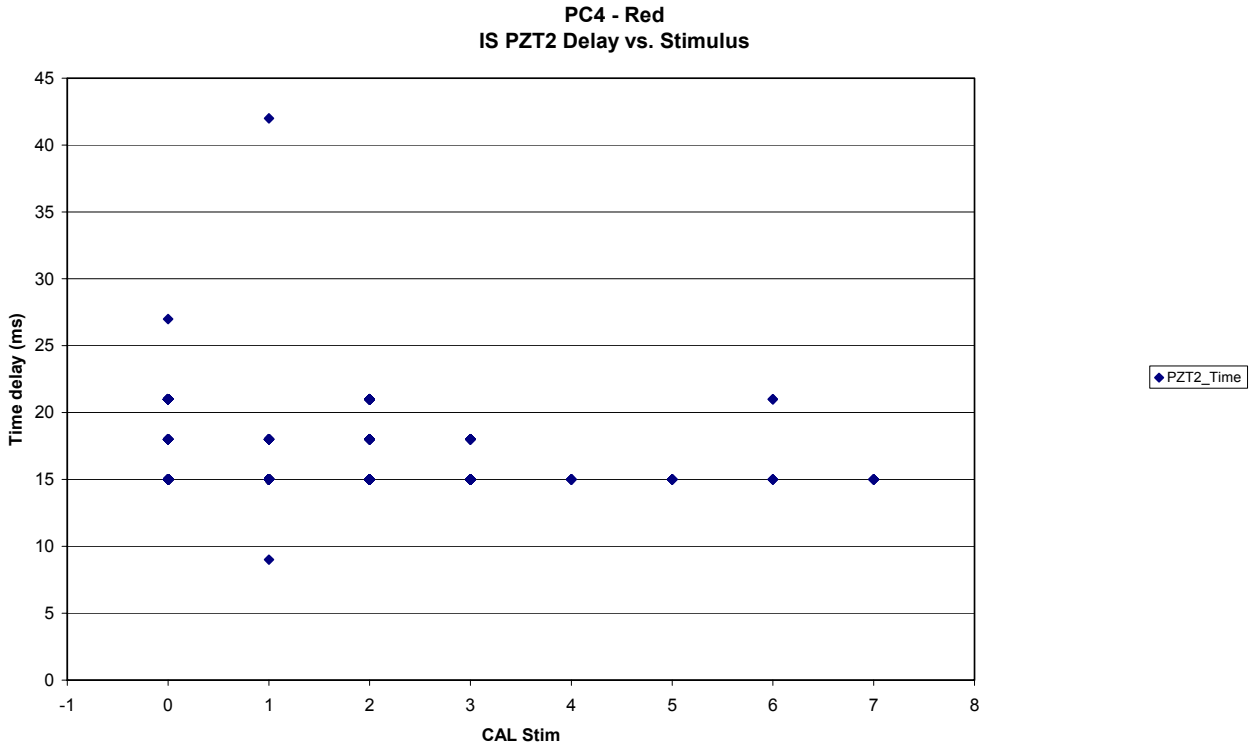


Figure 8.4-36. PZT 3 CAL Time delay vs. stimulus - Red

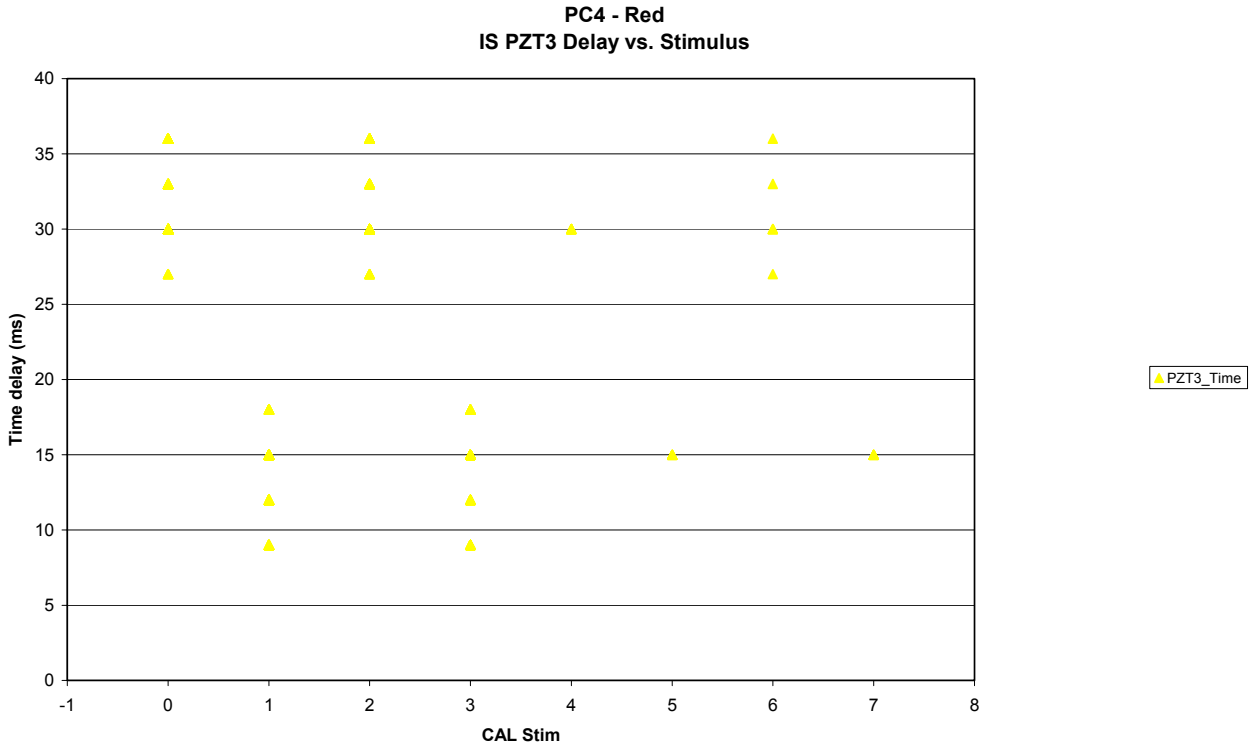


Figure 8.4-37. PZT 4 CAL Time delay vs. stimulus - Red

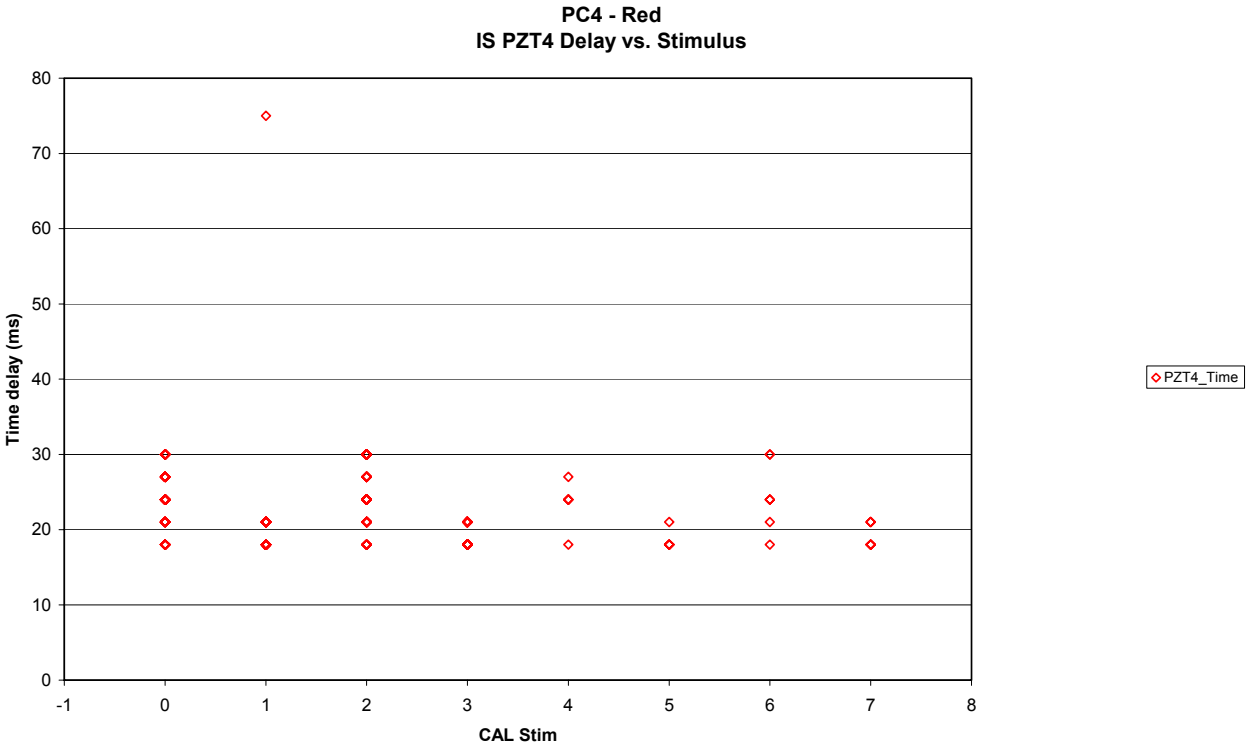
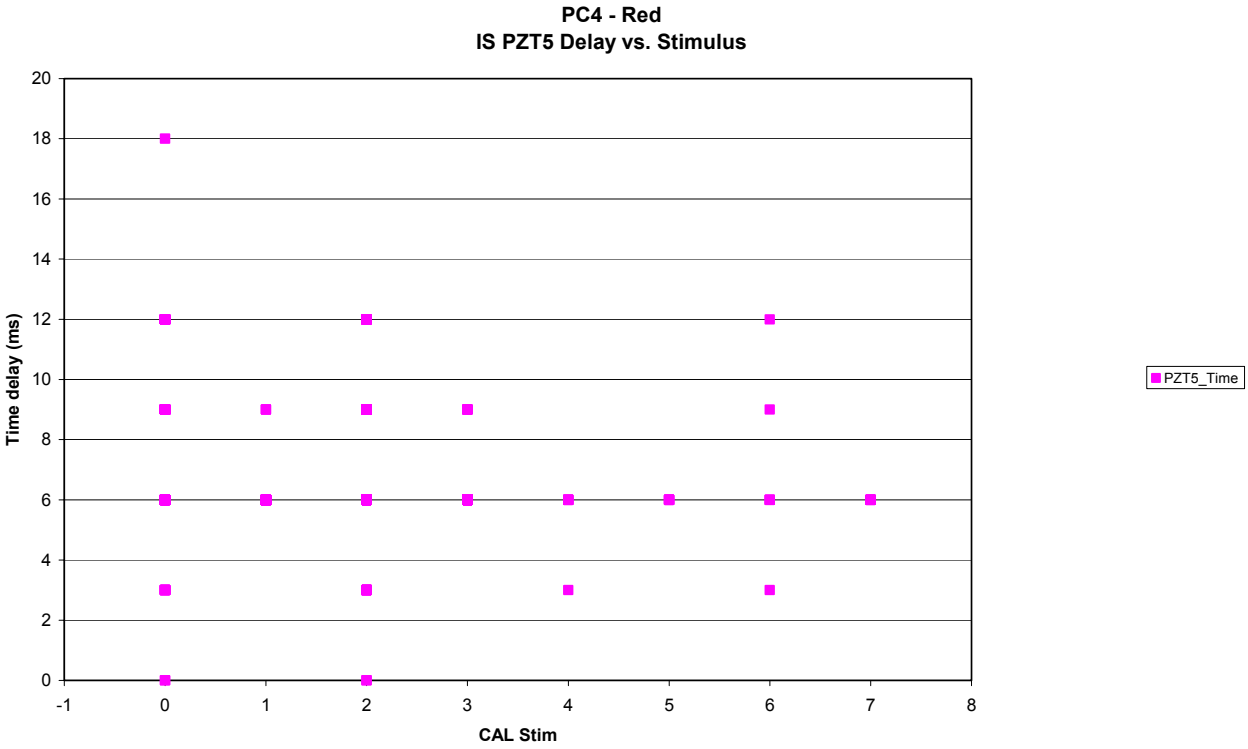


Figure 8.4-38. PZT 5 CAL Time delay vs. stimulus - Red



8.5 MICRO BALANCE SYSTEM (MBS)

8.5.1 MBS – Status

Figure 8.5-1. MBS Operation Status vs. time - Red

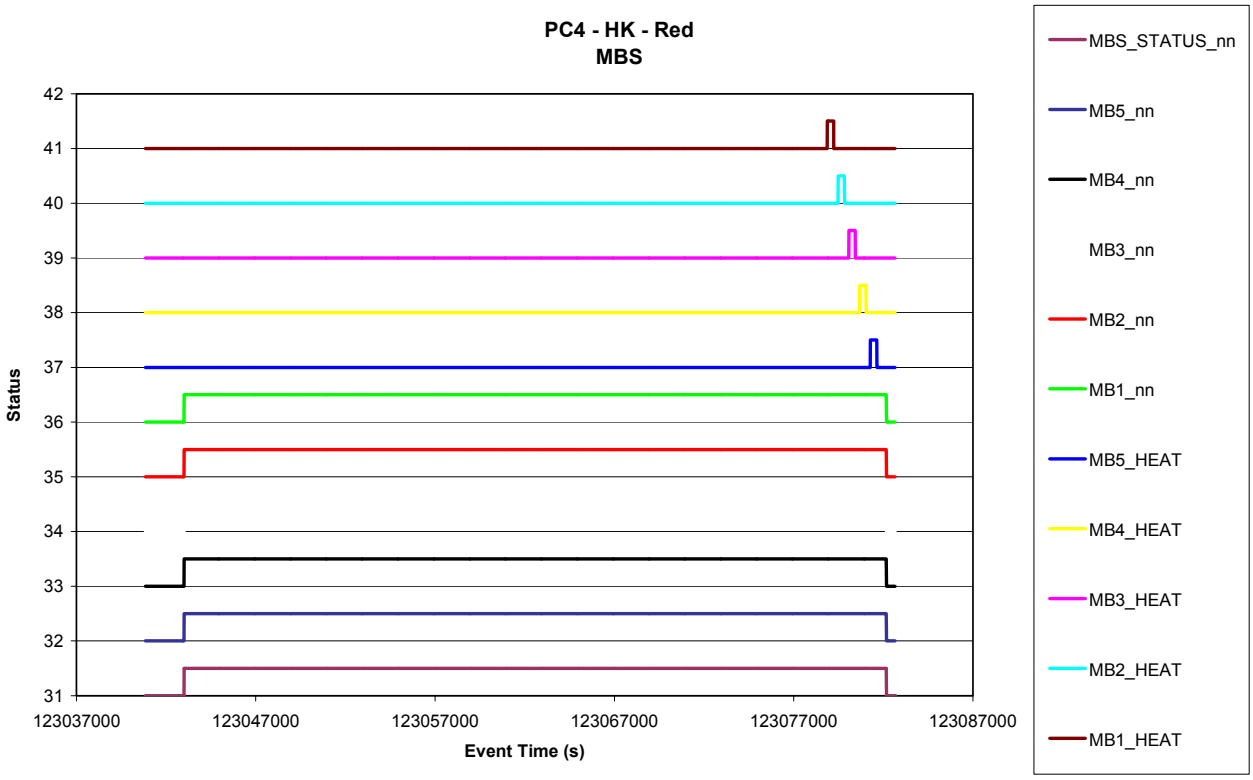


Figure 8.5-2. MBS 1 Temperature vs. time (HK, HK-SCI, SCI) – Red

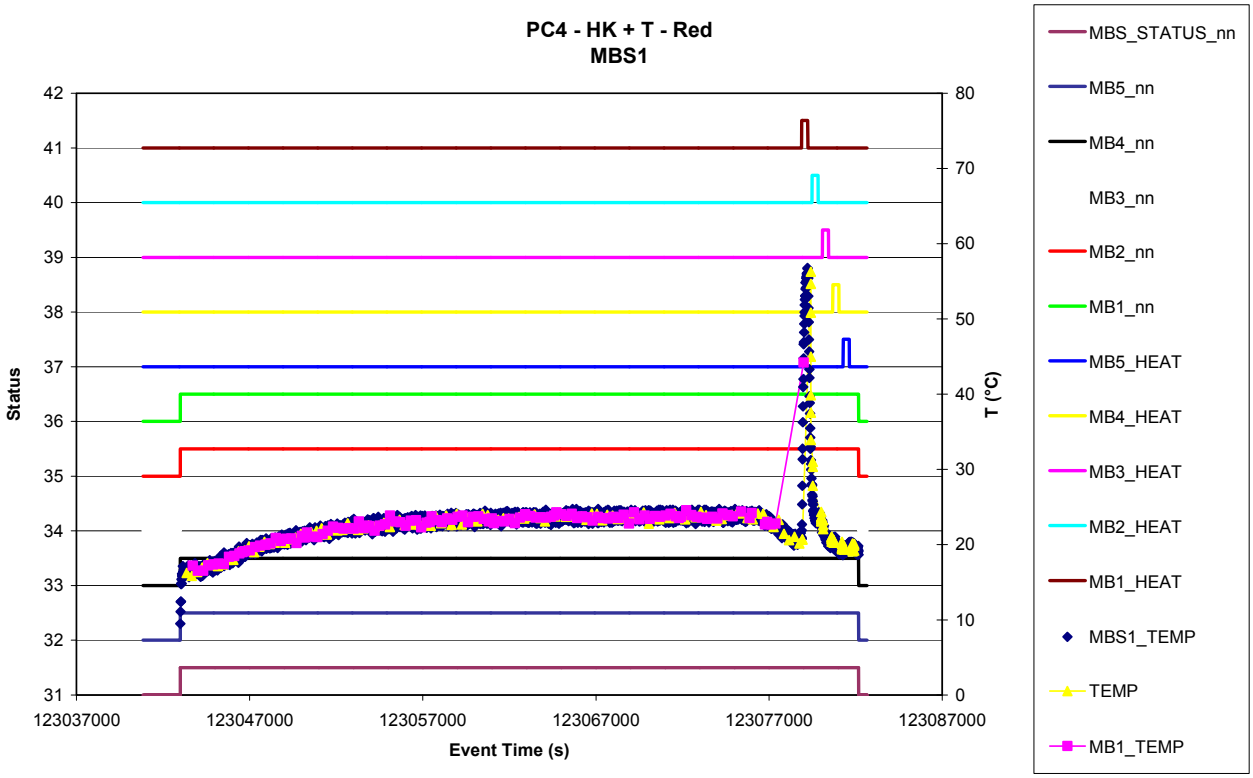


Figure 8.5-3. MBS 2 Temperature vs. time (HK, HK-SCI, SCI) - Red

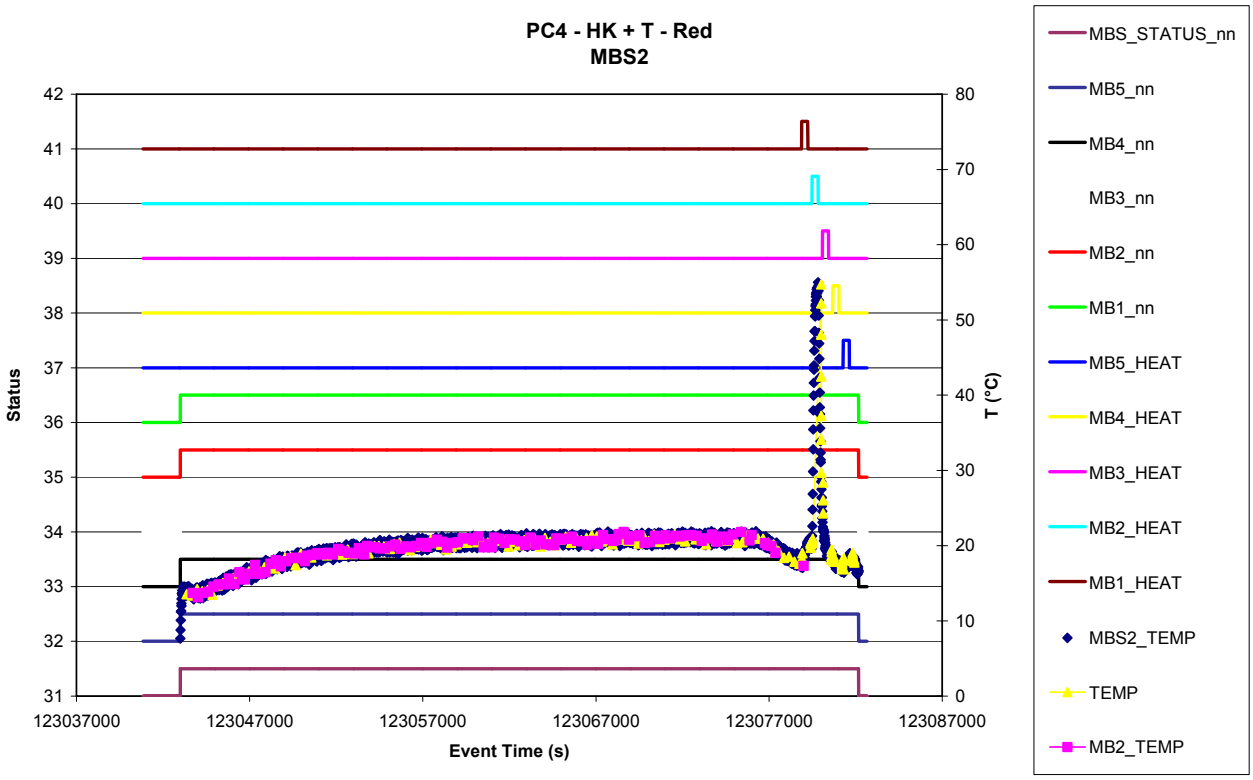


Figure 8.5-4. MBS 3 Temperature vs. time (HK, HK-SCI, SCI) - Red

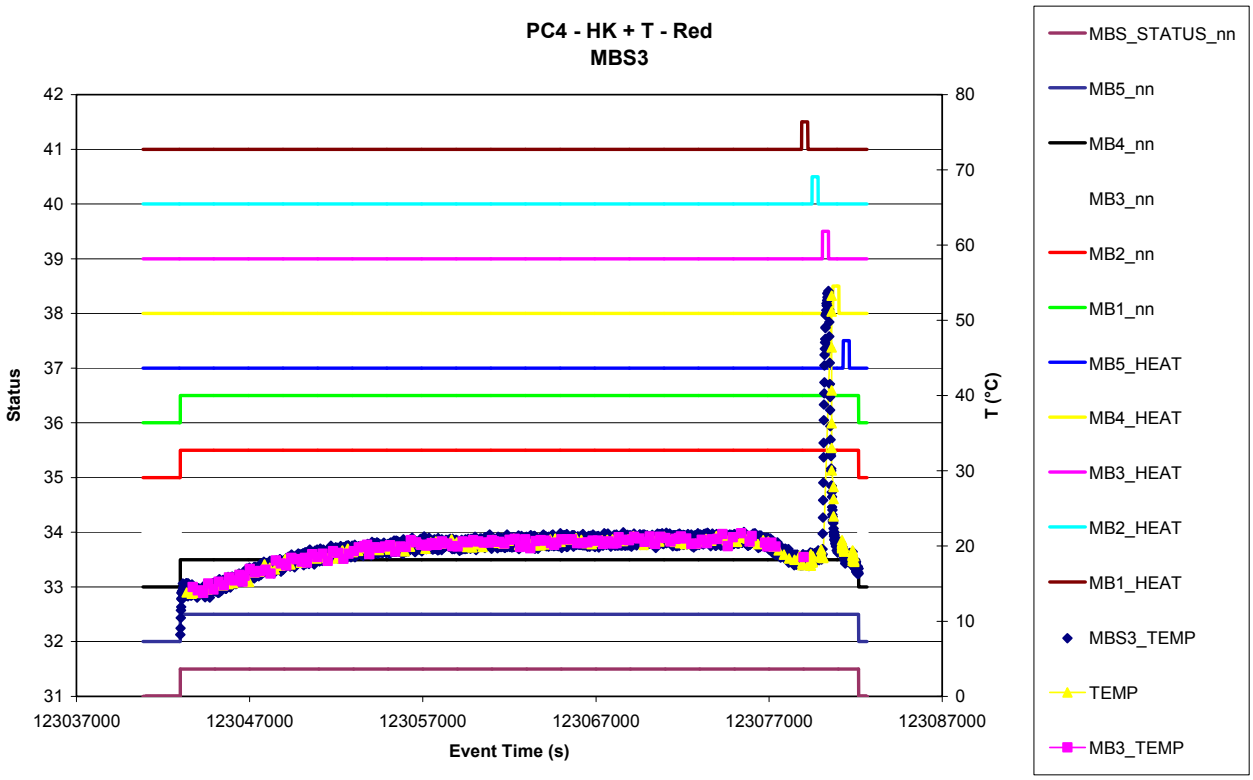


Figure 8.5-5. MBS 4 Temperature vs. time (HK, HK-SCI, SCI) - Red

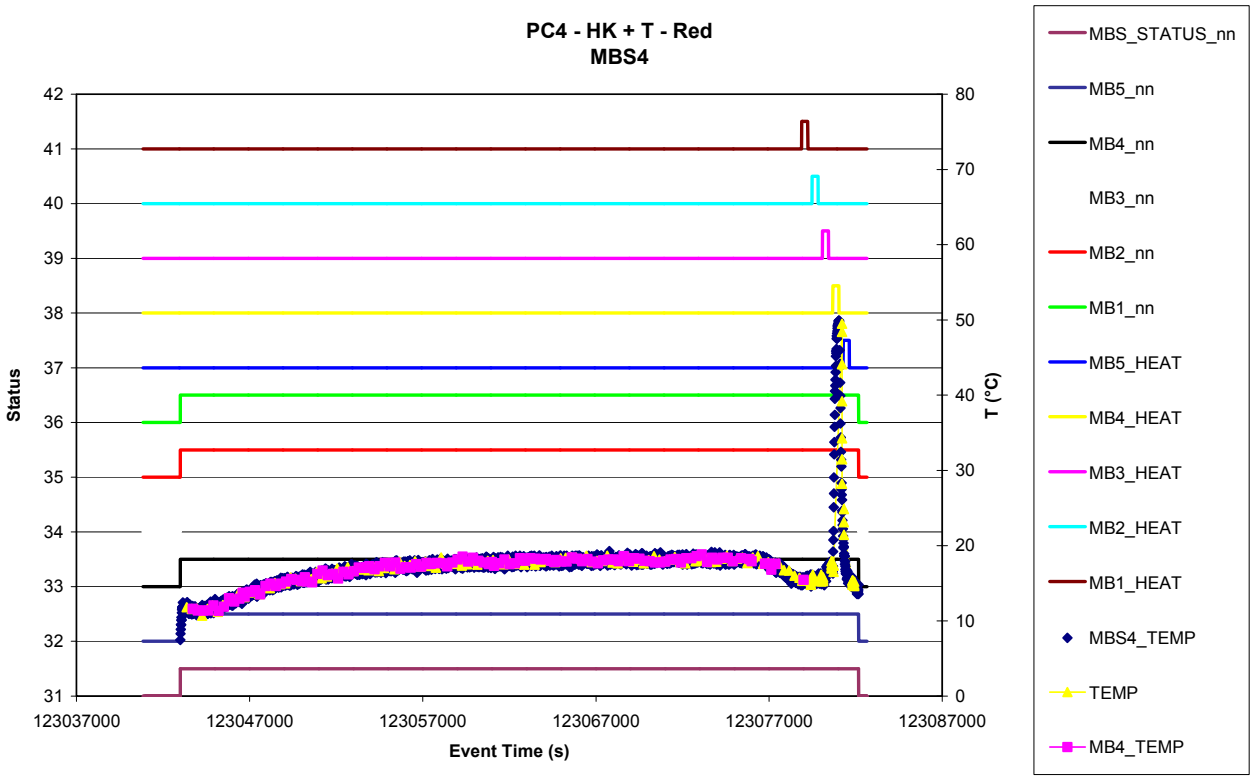
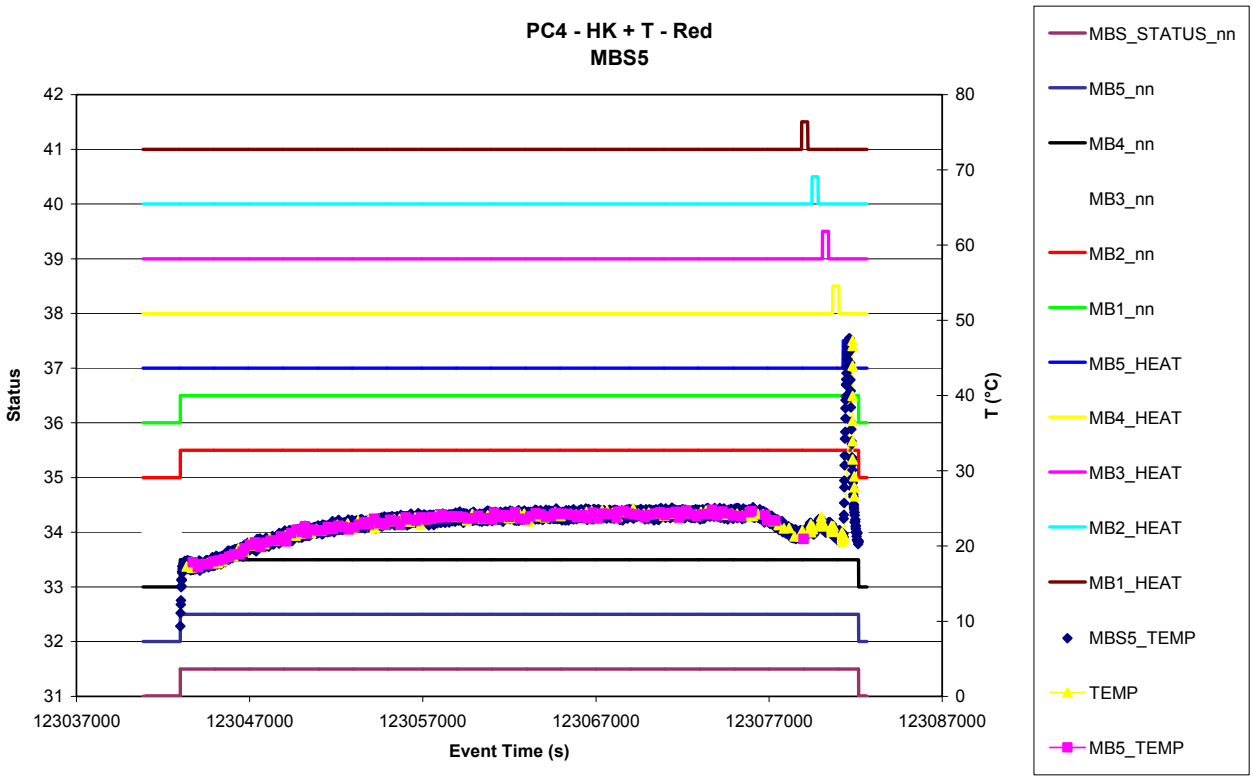


Figure 8.5-6. MBS 5 Temperature vs. time (HK, HK-SCI, SCI) - Red



8.5.2 MBS – Behaviour

8.5.2.1 Science Events (Normal + Heating)

Figure 8.5-7. MBS 1 Frequency and Temperature vs. time - Red

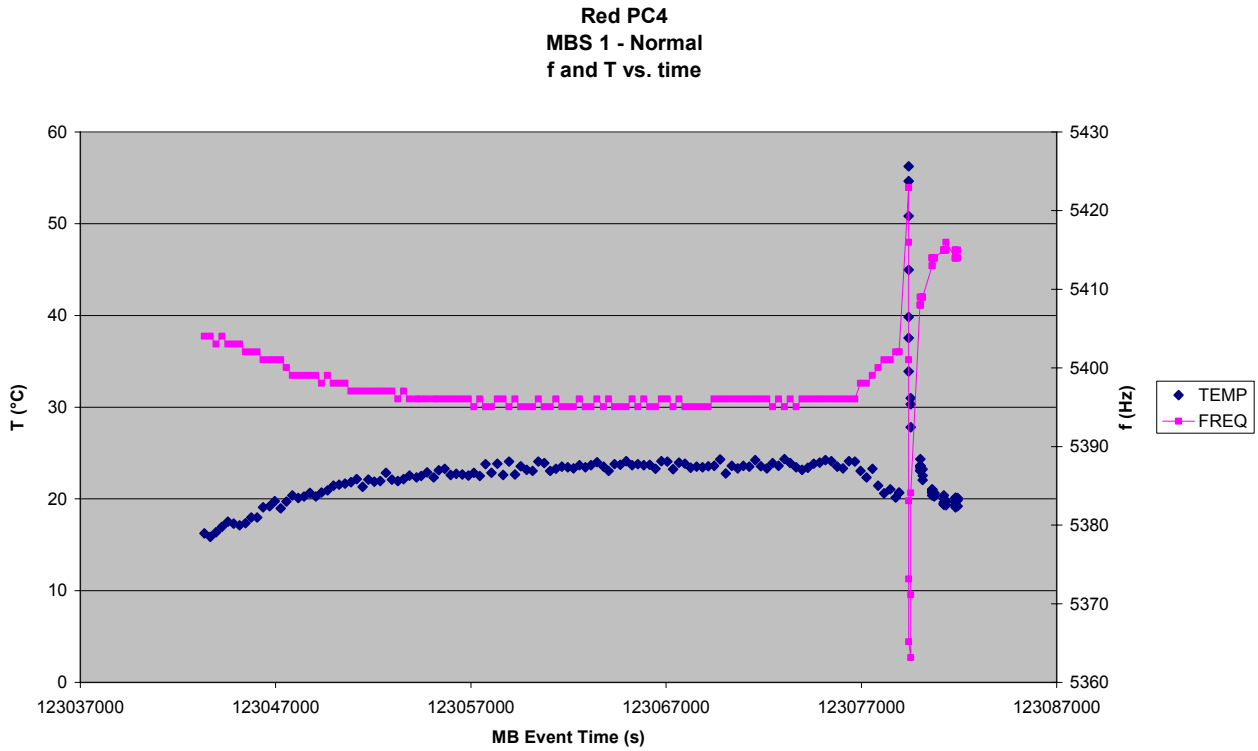


Figure 8.5-8. MBS 2 Frequency and Temperature vs. time - Red

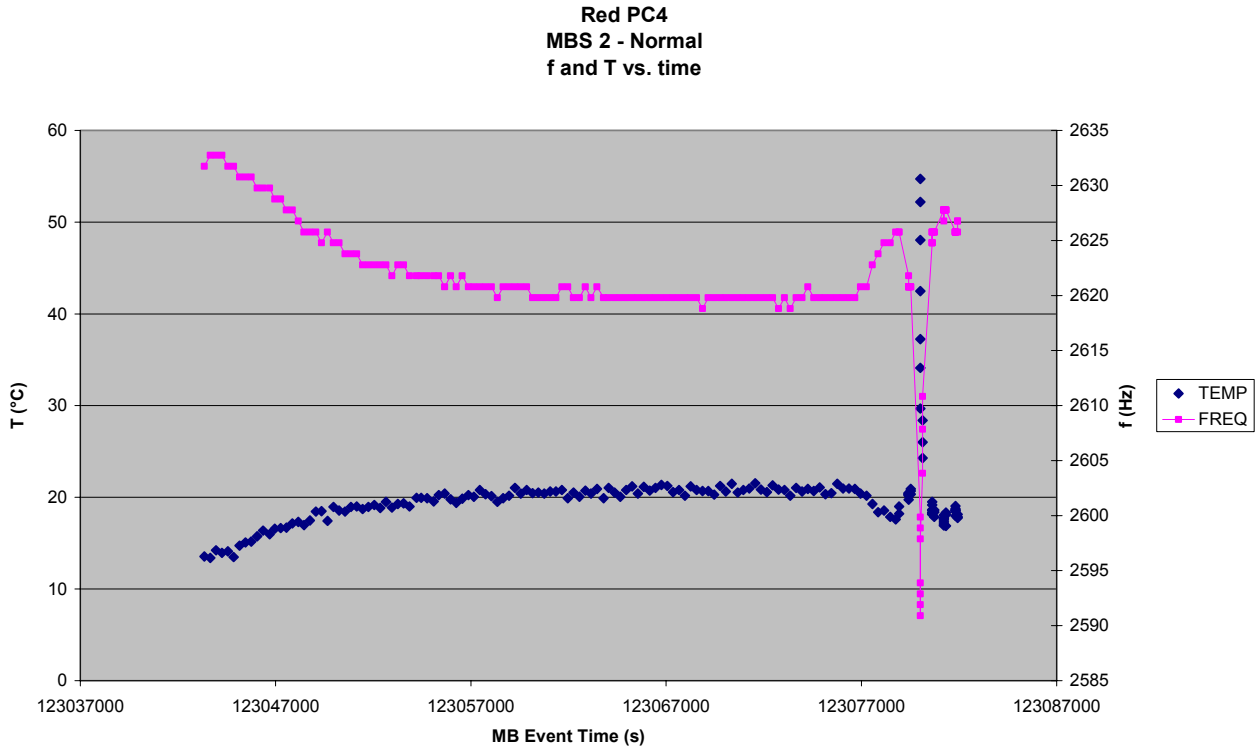


Figure 8.5-9. MBS 3 Frequency and Temperature vs. time - Red

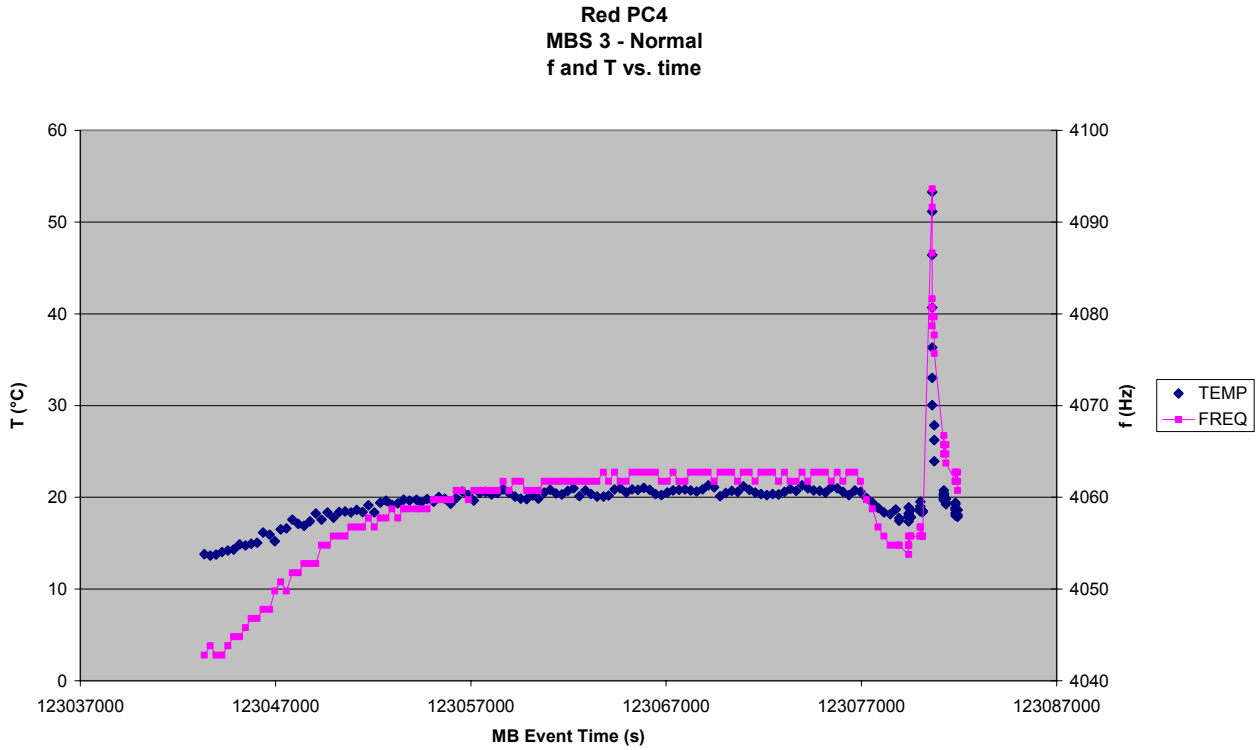


Figure 8.5-10. MBS 4 Frequency and Temperature vs. time - Red

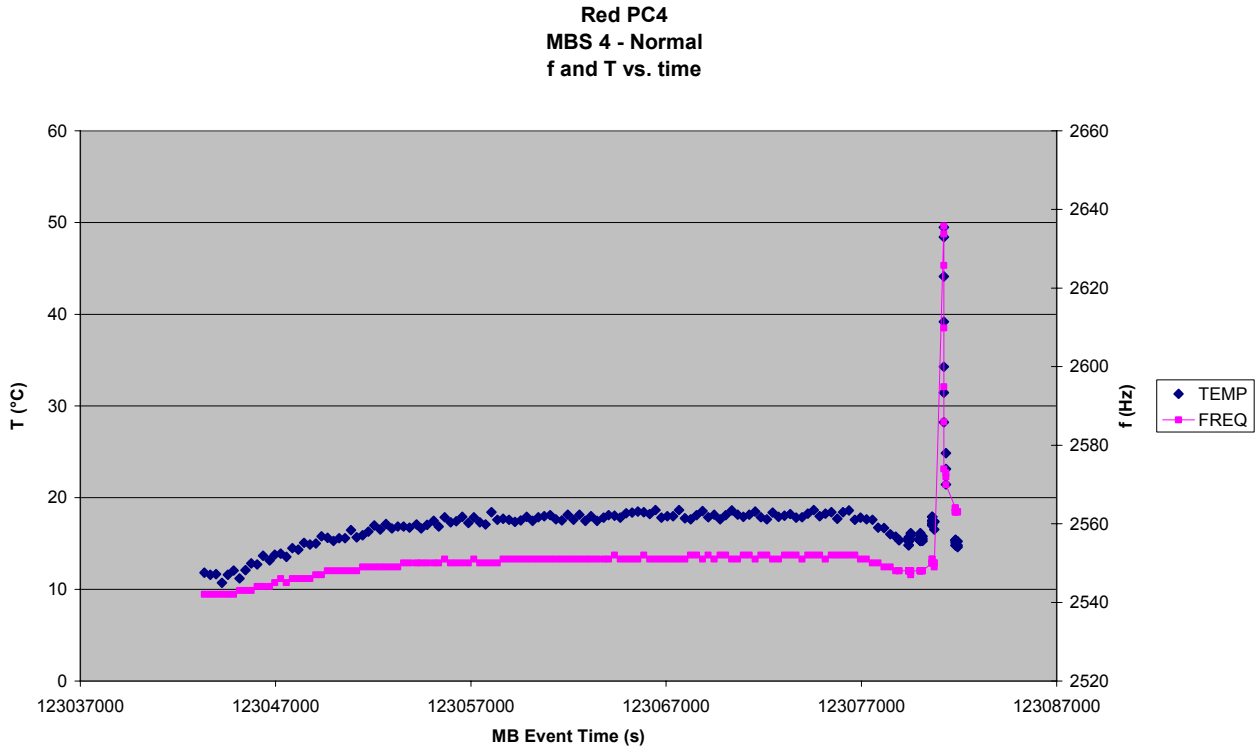


Figure 8.5-11. MBS 5 Frequency and Temperature vs. time - Red

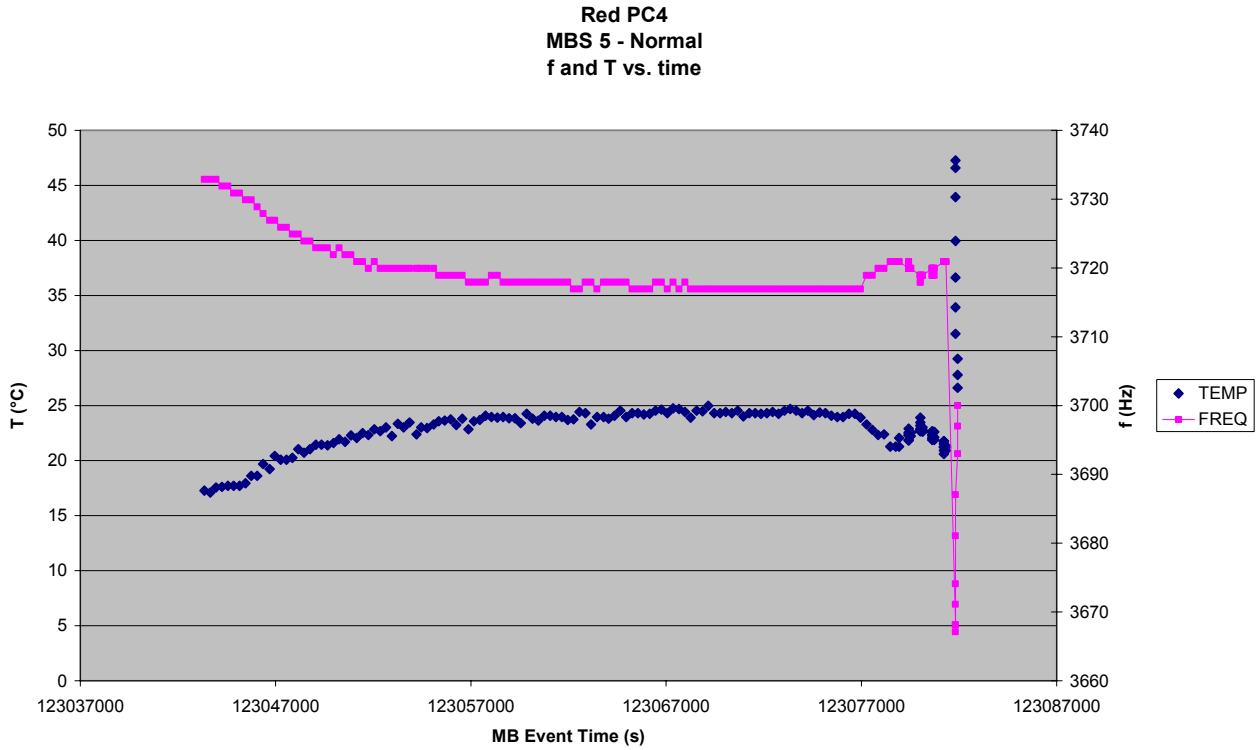


Figure 8.5-12. MBS 1 Frequency vs. Temperature - Red

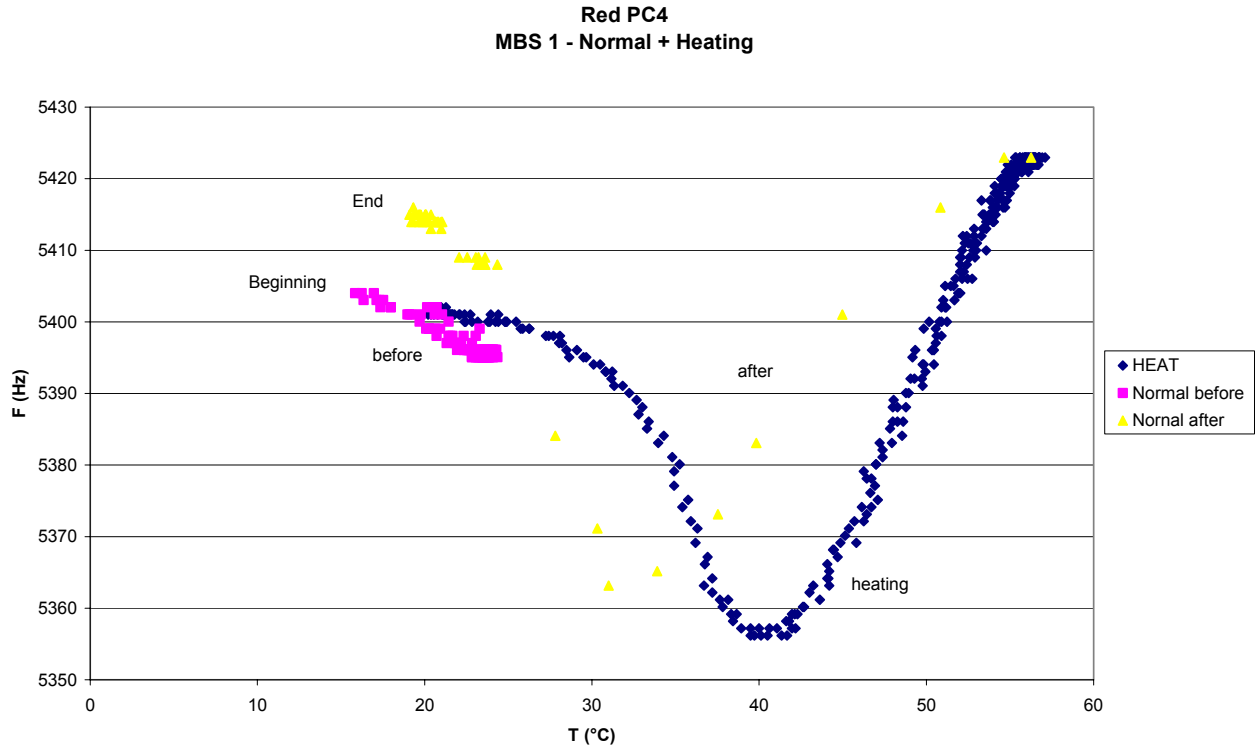


Figure 8.5-13. MBS 2 Frequency vs. Temperature - Red

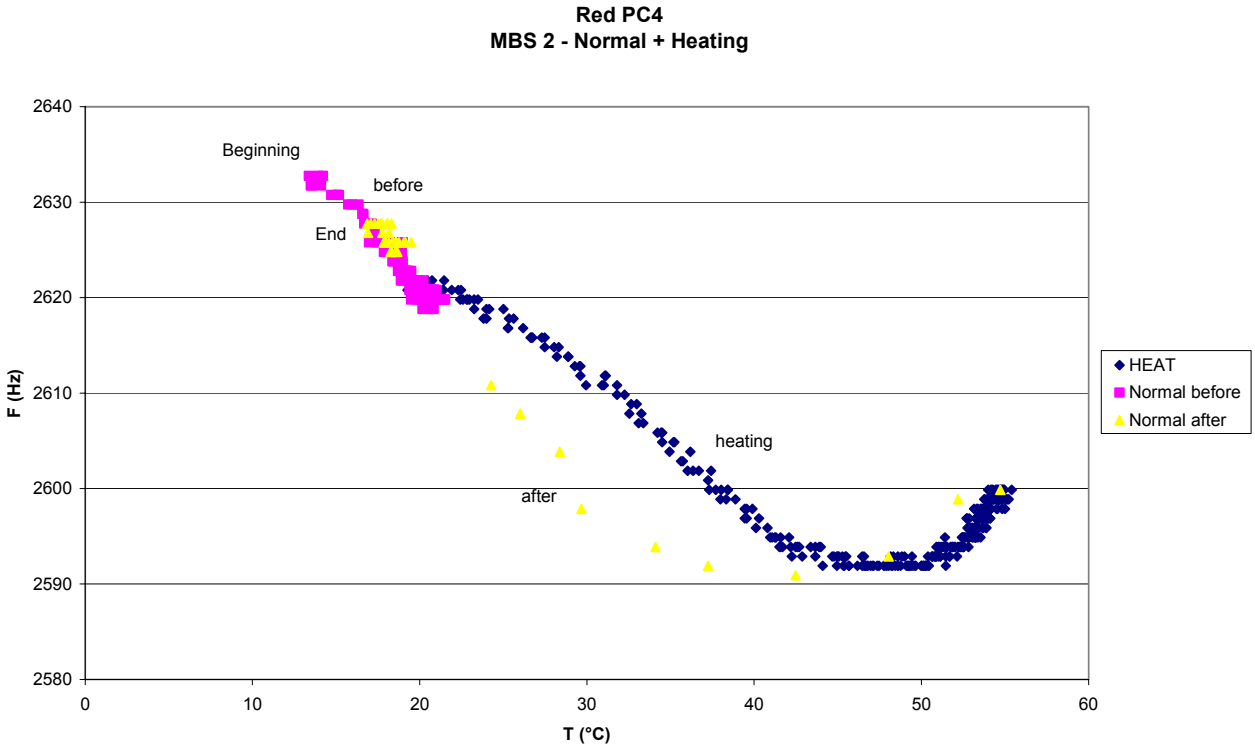


Figure 8.5-14. MBS 3 Frequency vs. Temperature - Red

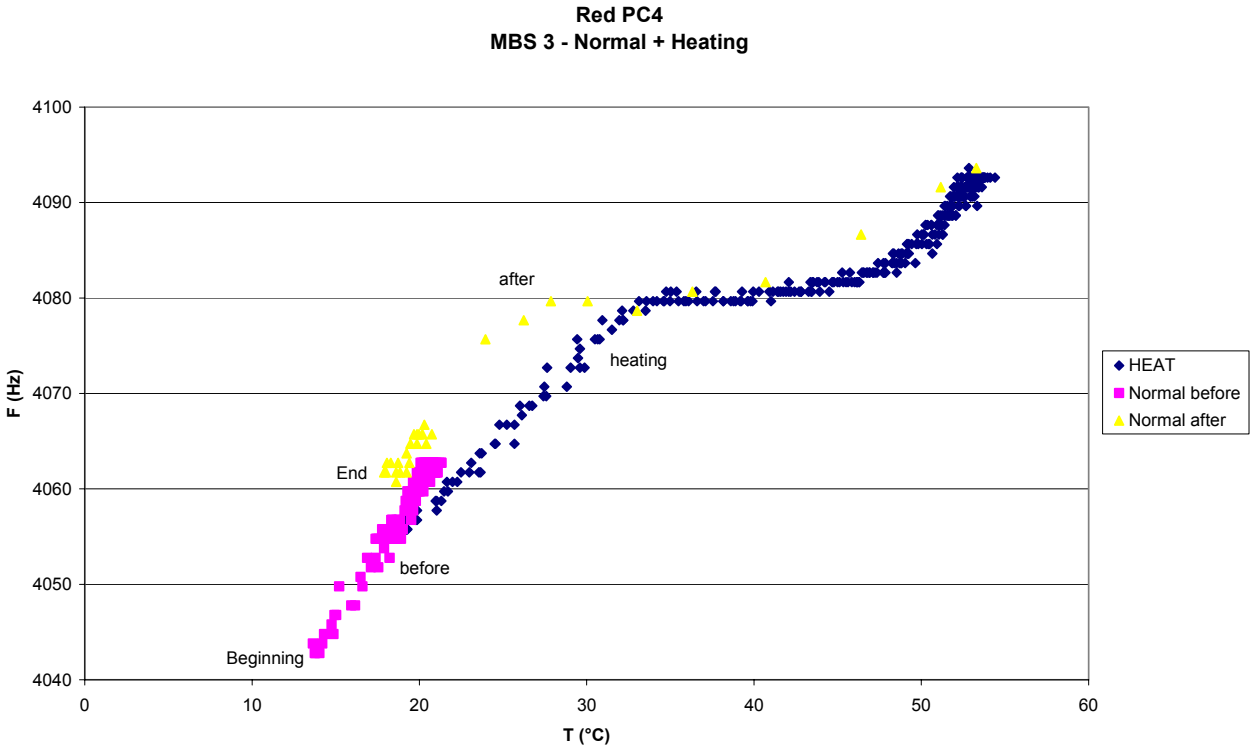


Figure 8.5-15. MBS 4 Frequency vs. Temperature - Red

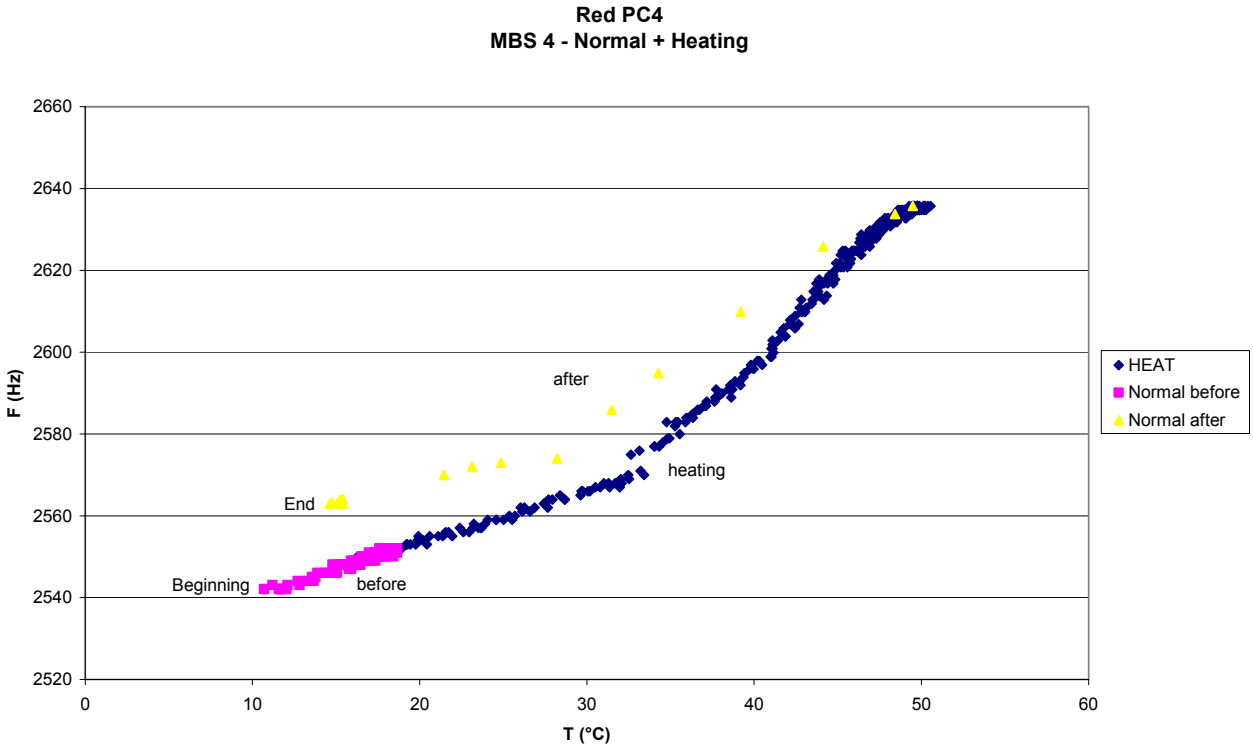
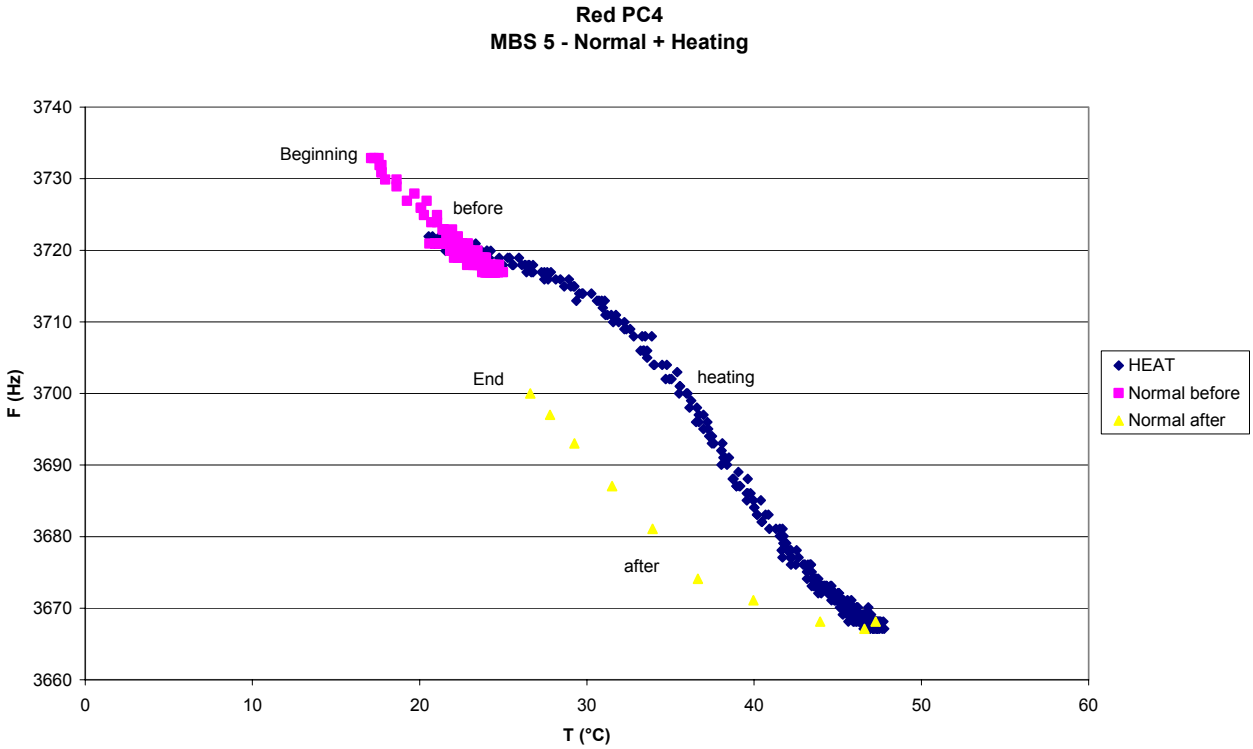


Figure 8.5-16. MBS 5 Frequency vs. Temperature - Red



9. PC4 DATA ANALYSIS – MAIN INTERFACE (ACTIVE TEST)

9.1 GIADA STATUS

Figure 9.1-1. HK Status of GIADA and S/S vs. time - Main

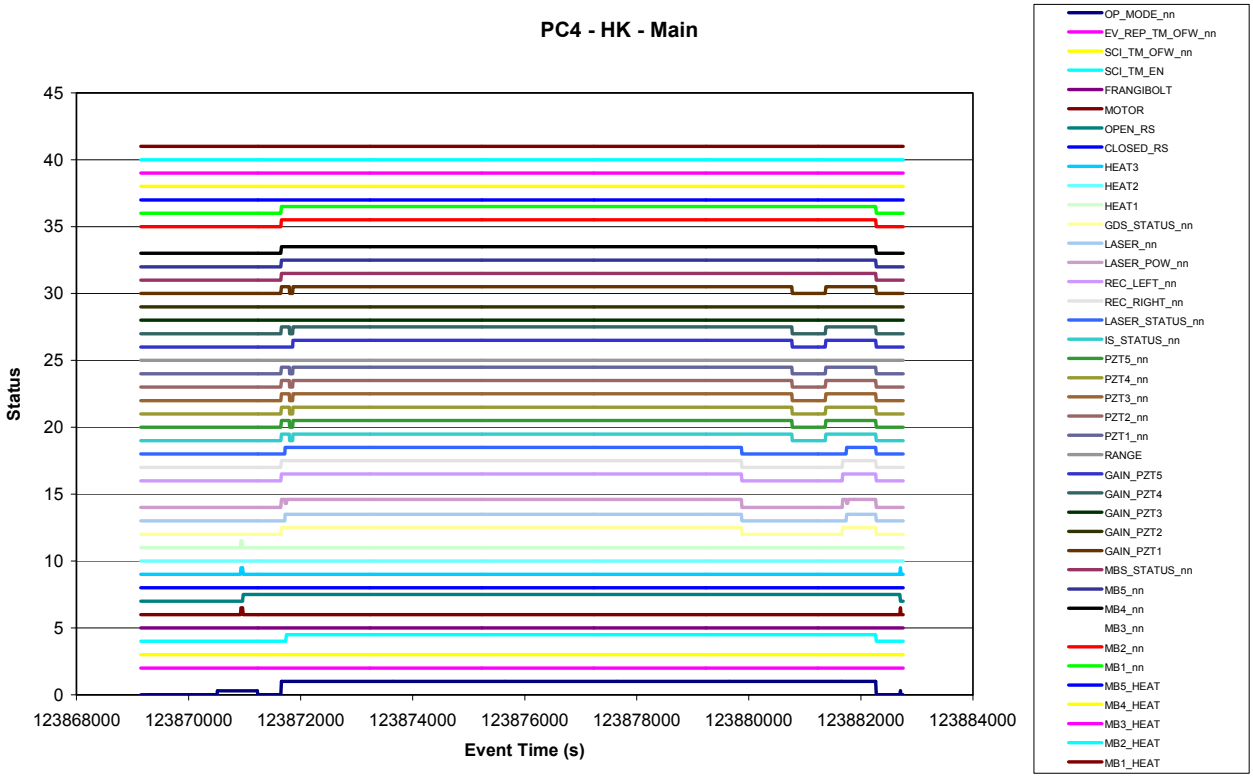


Figure 9.1-2. Evolution of all temperatures vs. time - HK, HK-SCI, SCI - Main

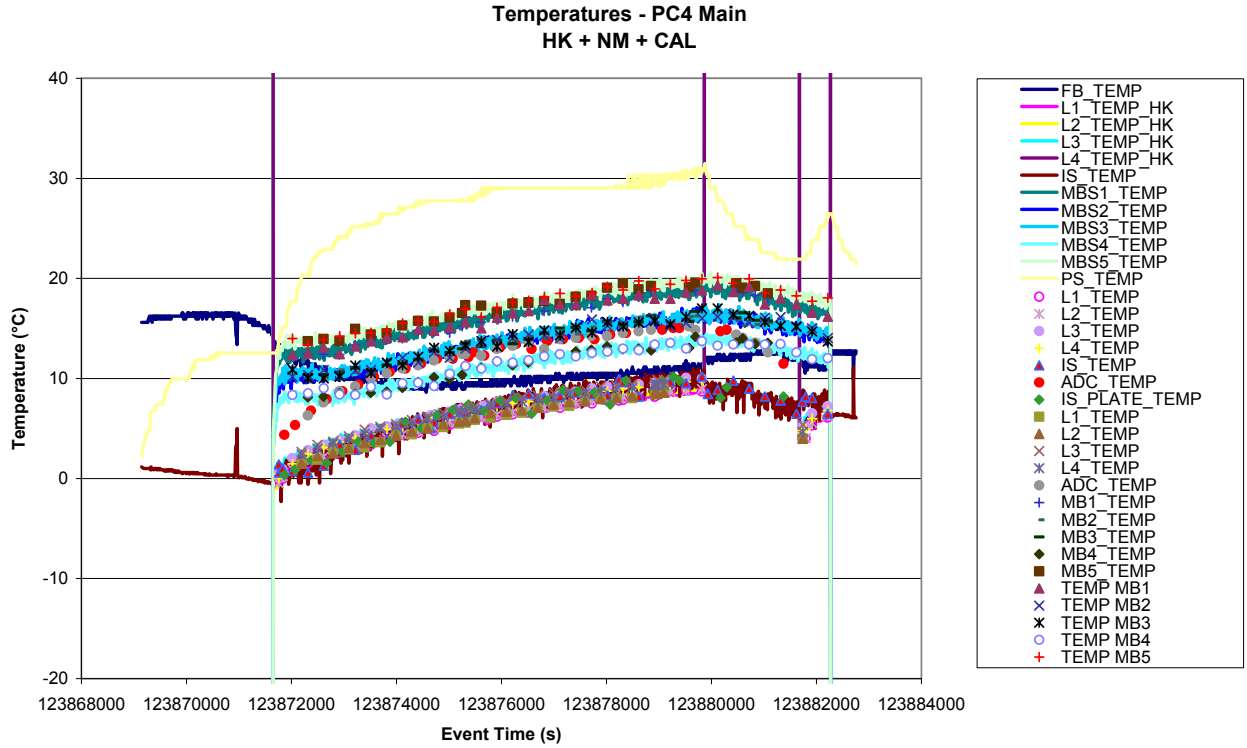


Figure 9.1-3. Evolution of temperatures of system elements vs. time - HK, HK-SCI, SCI - Main

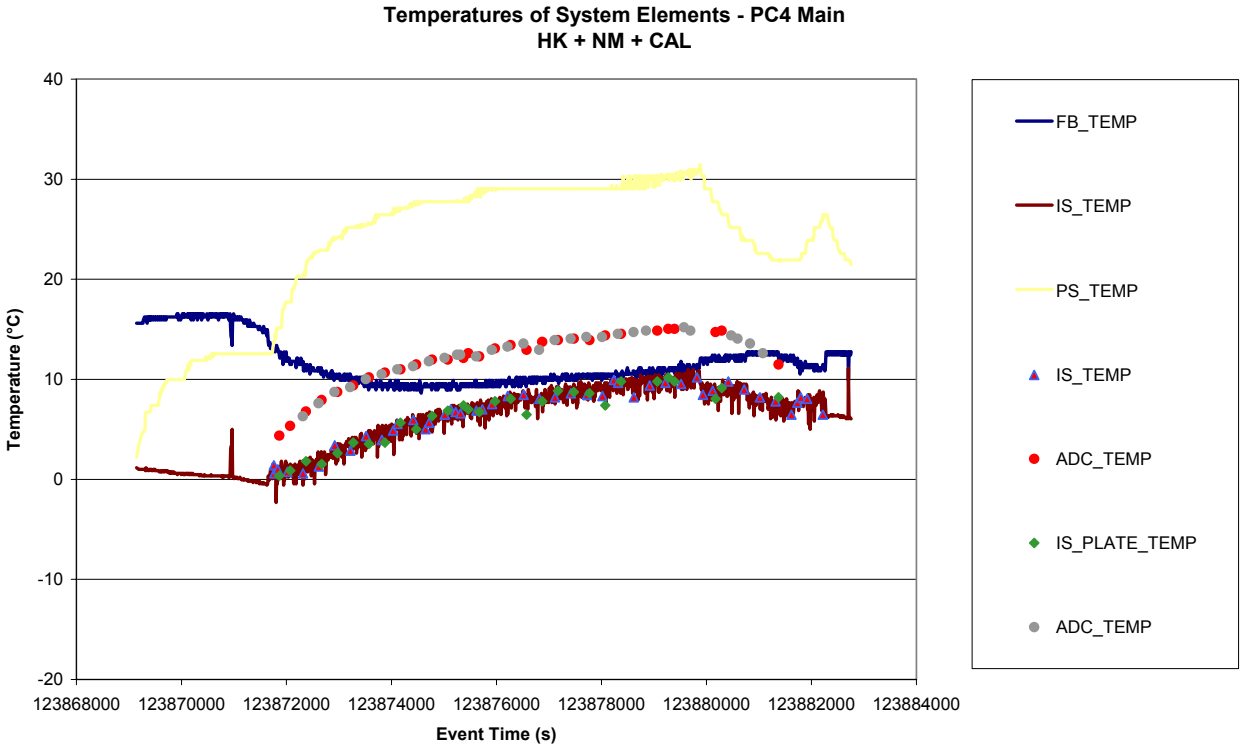


Figure 9.1-4. Evolution of temperatures of sub-systems vs. time - HK, HK-SCI, SCI - Main

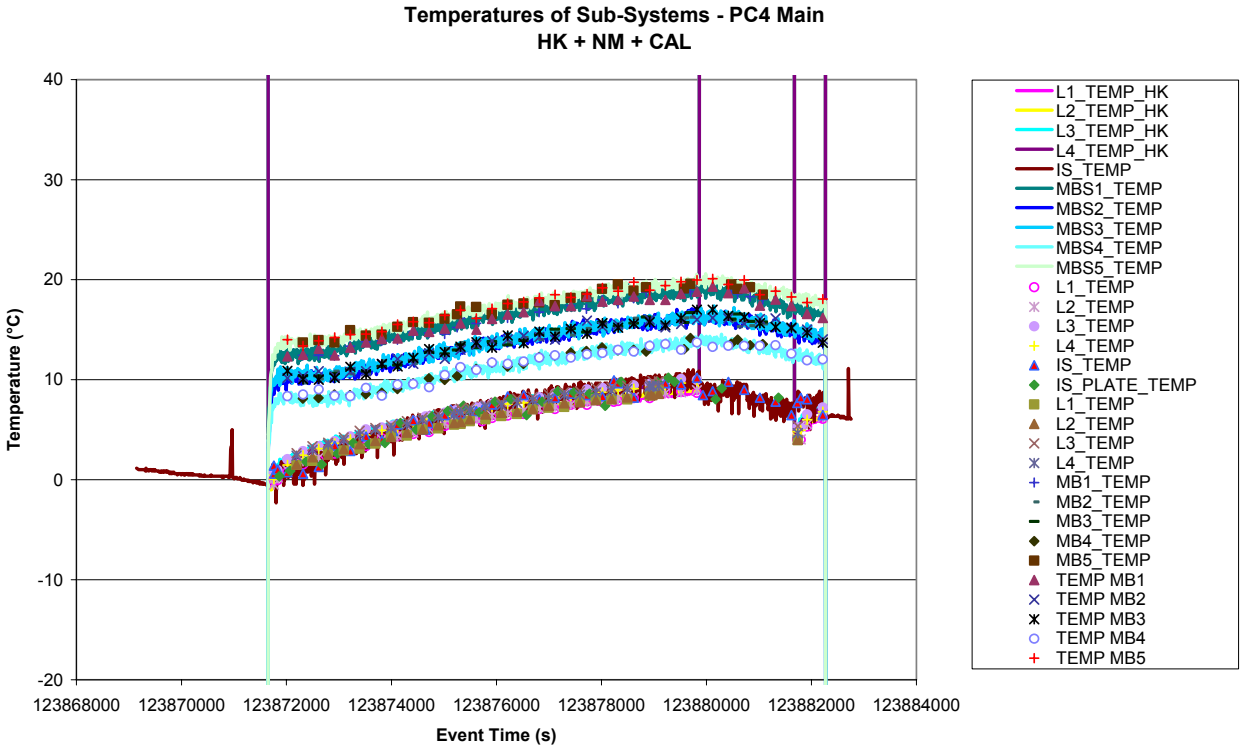


Figure 9.1-5. Operation Status vs. time - Main

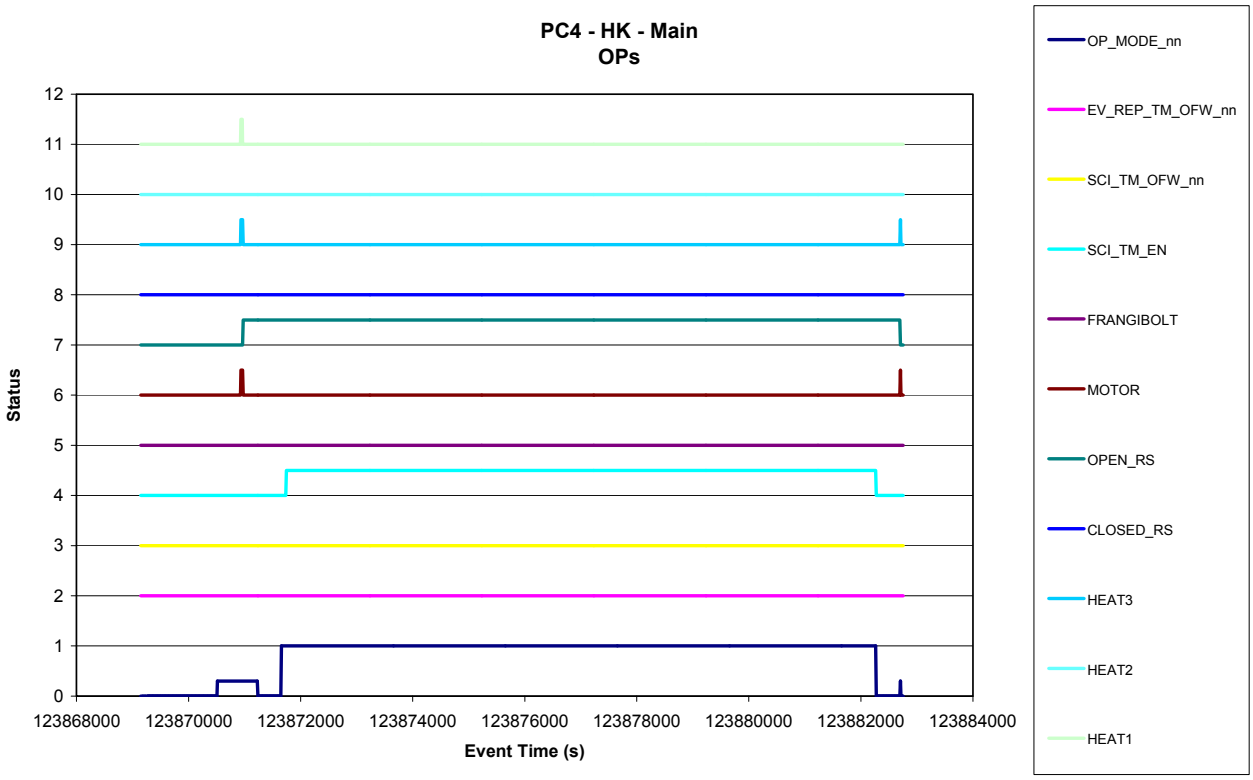


Figure 9.1-6. Power behaviour - Main

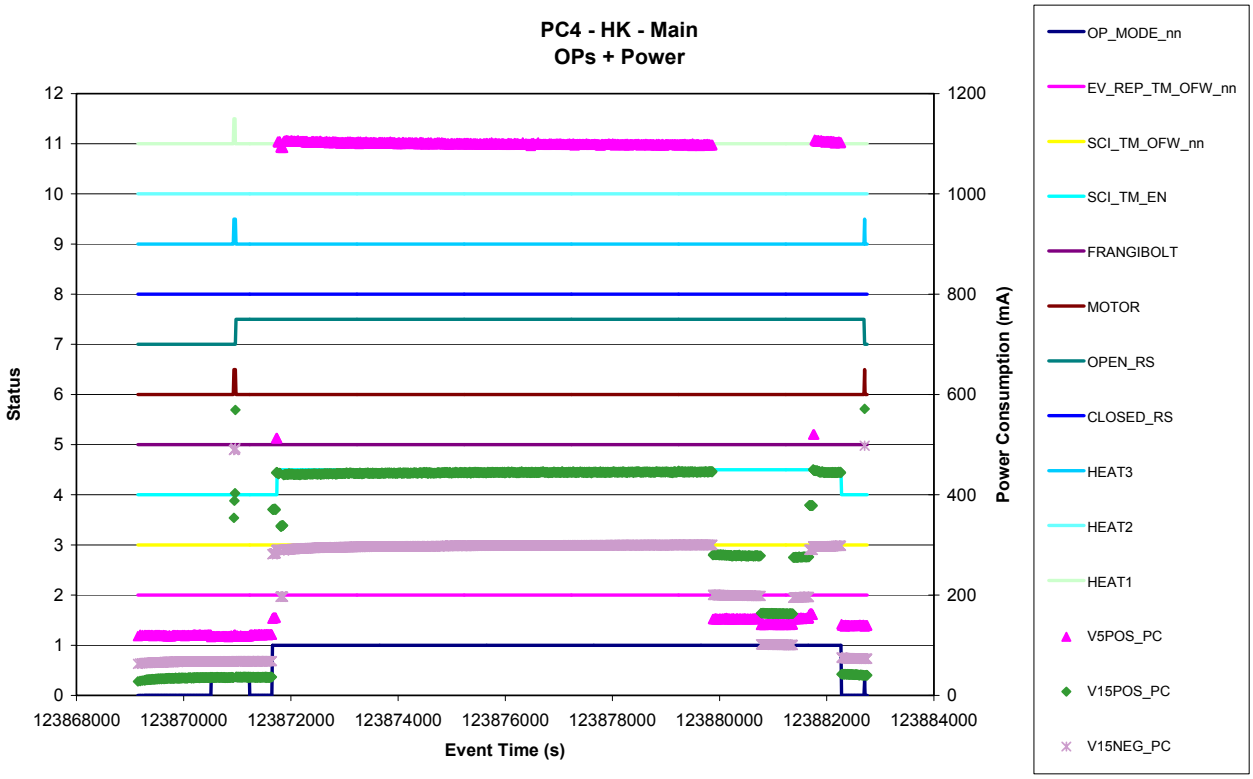


Figure 9.1-7. Power and PS temperature behaviour - Main

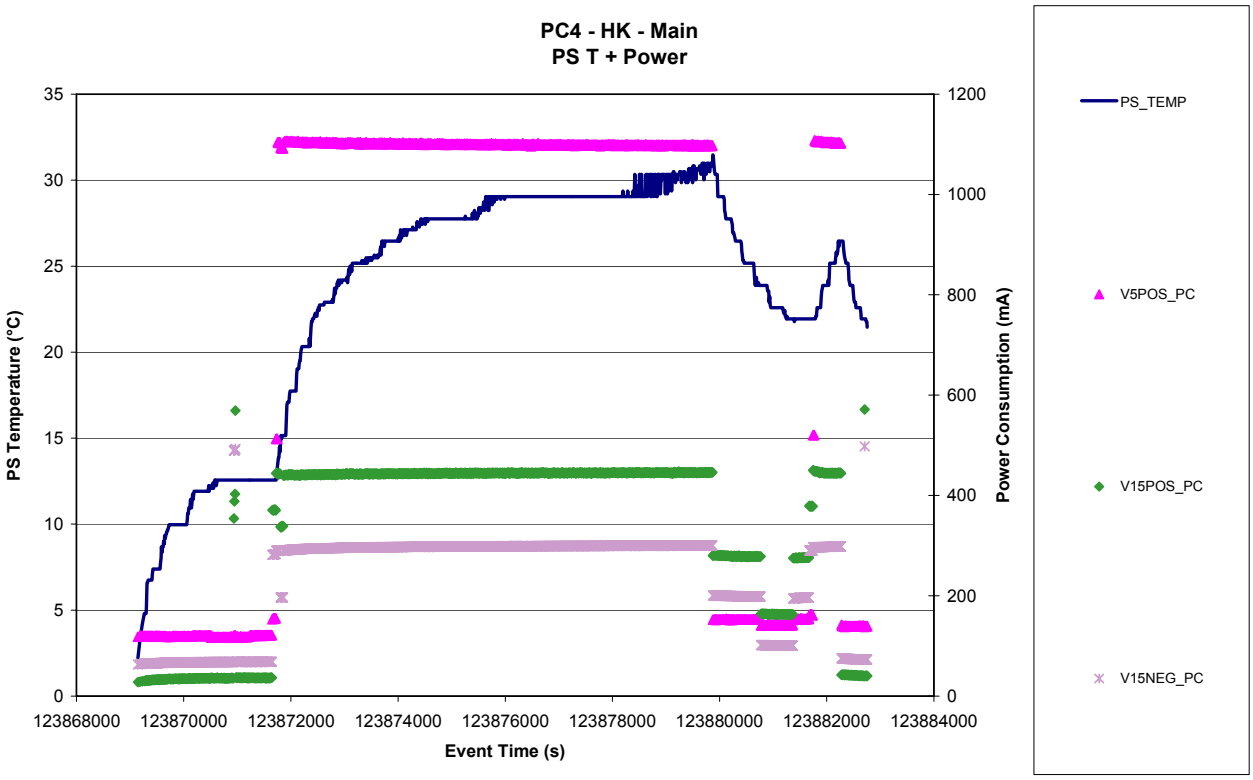


Figure 9.1-8. Source Sequence Count (SSC) of HK Telemetry vs. Time - Main

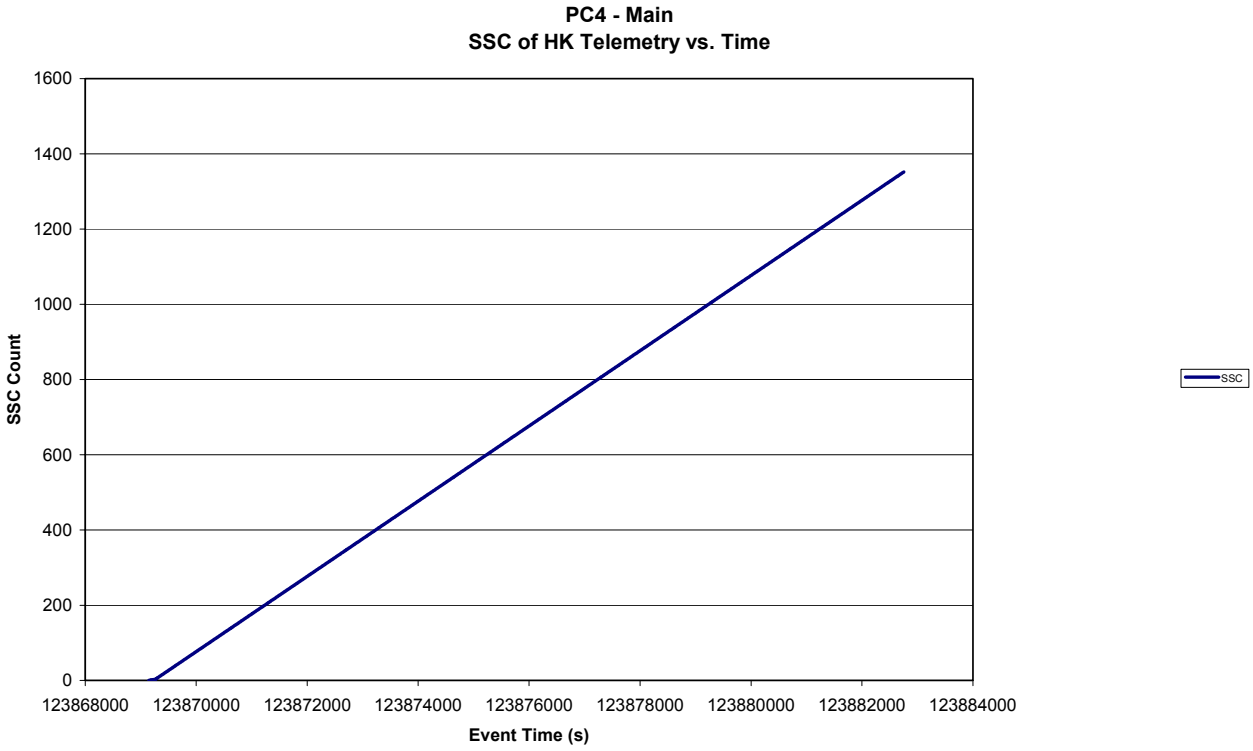


Figure 9.1-9. Source Sequence Count (SSC) of HK Telemetry vs. Number - Main

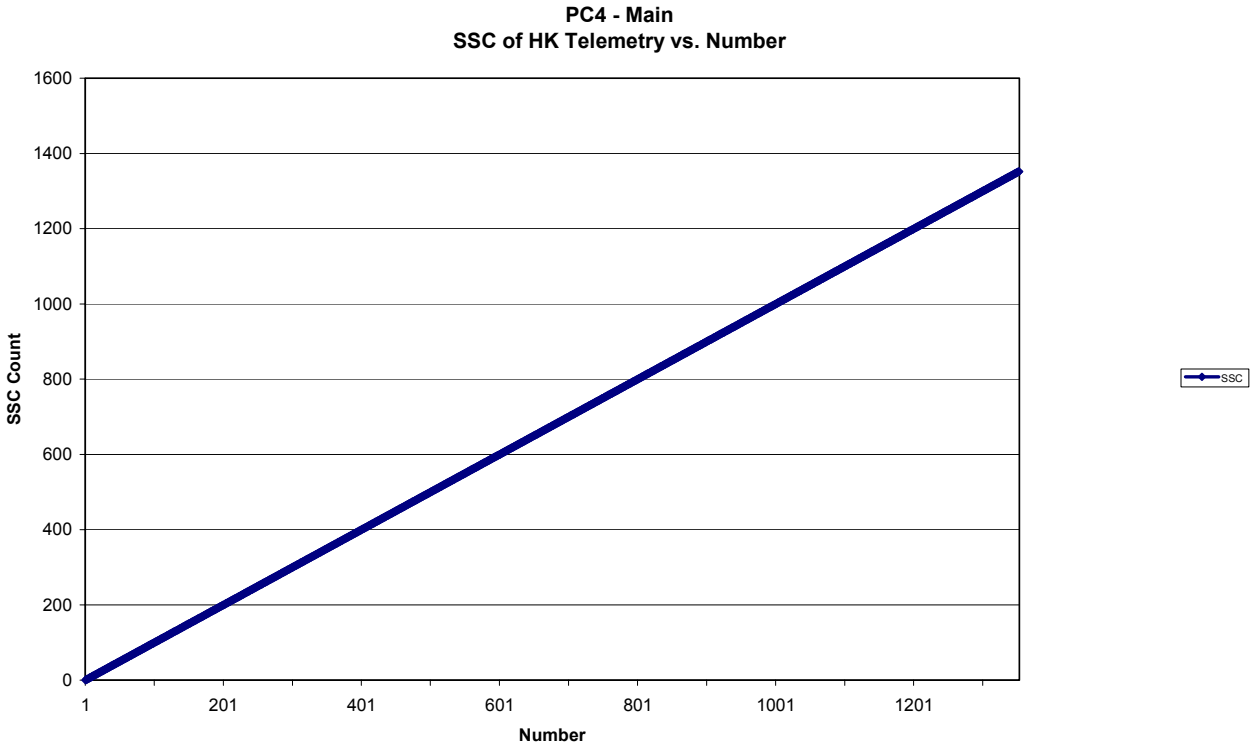


Figure 9.1-10. Source Sequence Count (SSC) of SCI Telemetry vs. Time - Main

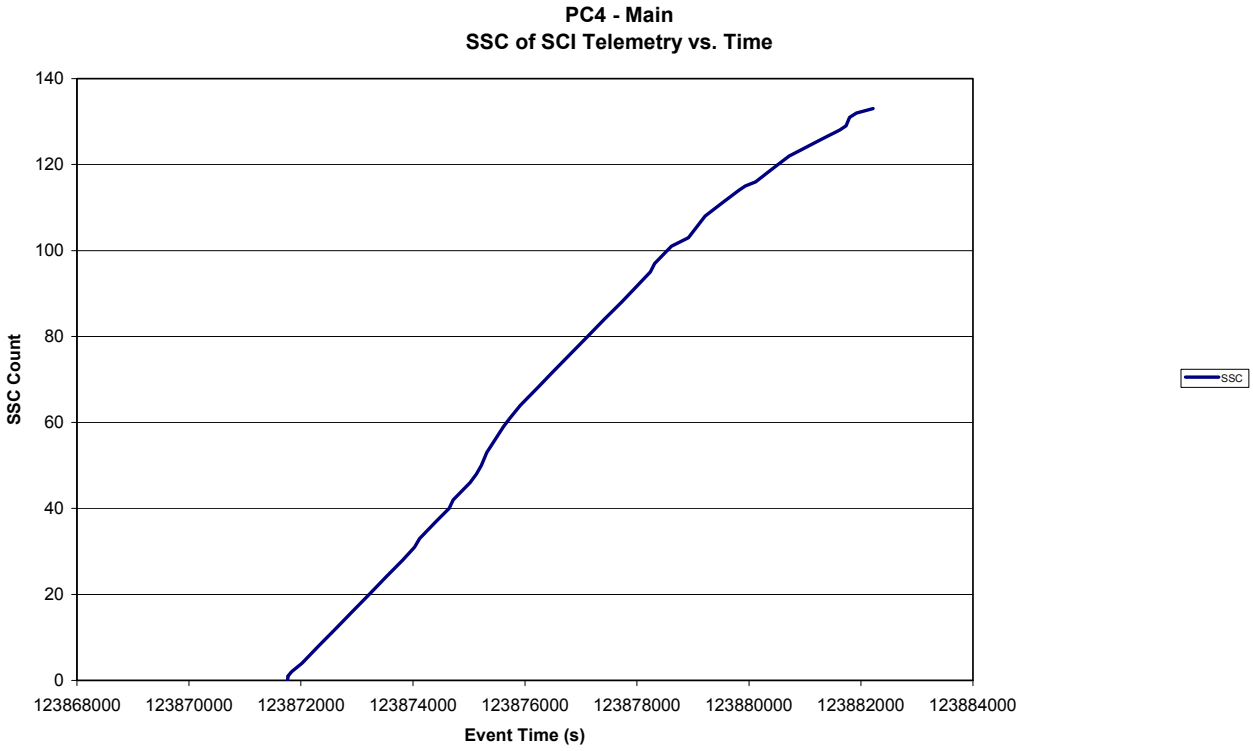
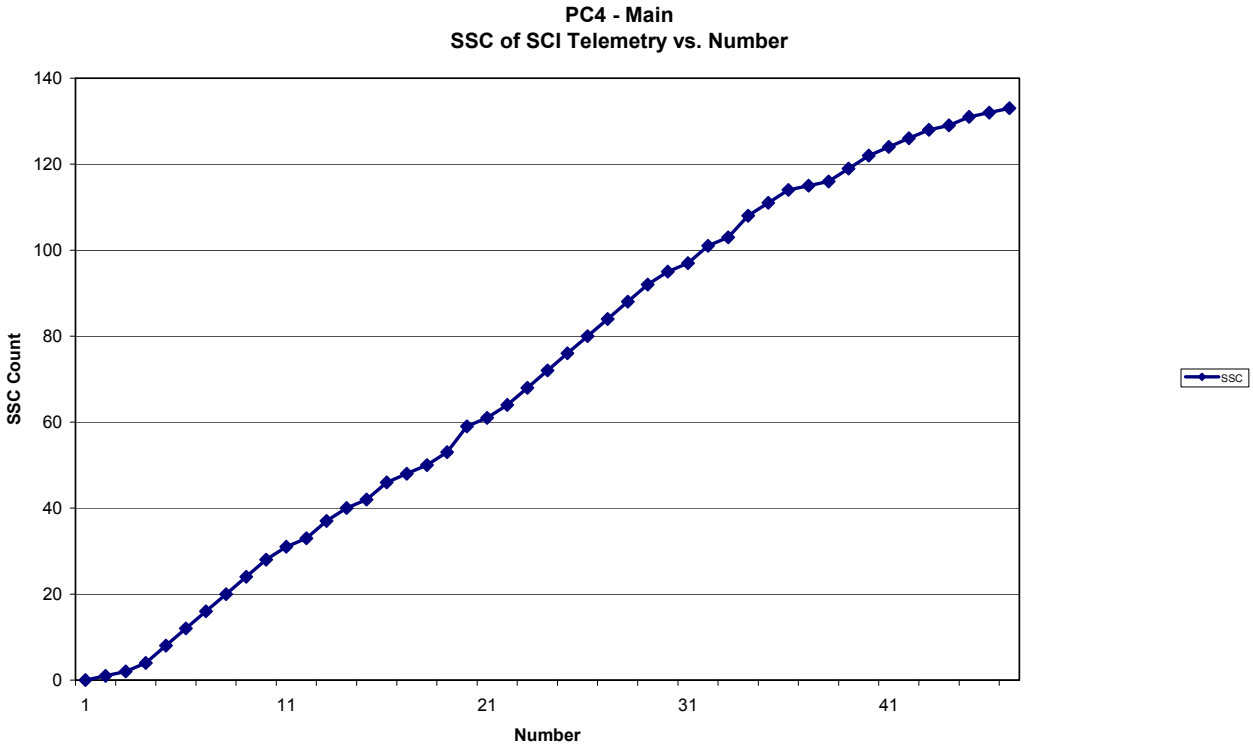


Figure 9.1-11. Source Sequence Count (SSC) of SCI Telemetry vs. Number - Main

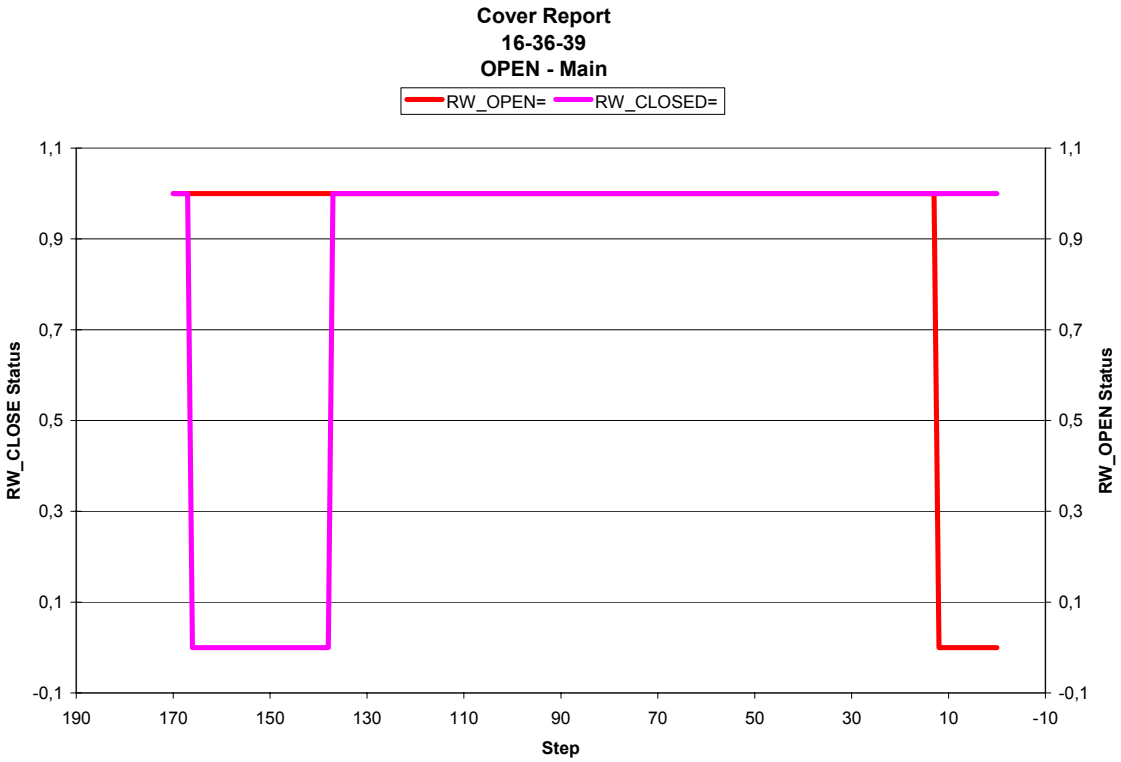


9.2 COVER REPORTS

9.2.1 Open Cover

```
HEADER_START
CREATION_TIME=2006-12-04T16:36:39Z
USER=AA0000
HEADER_END
//
// Generated by 'GIADA_EGSE_SW '
//
MOVEMENT DIRECTION: To open
BEGIN TIME OF OPERATION: 123870968.000000
END TIME OF OPERATION: 123870968.000000
```

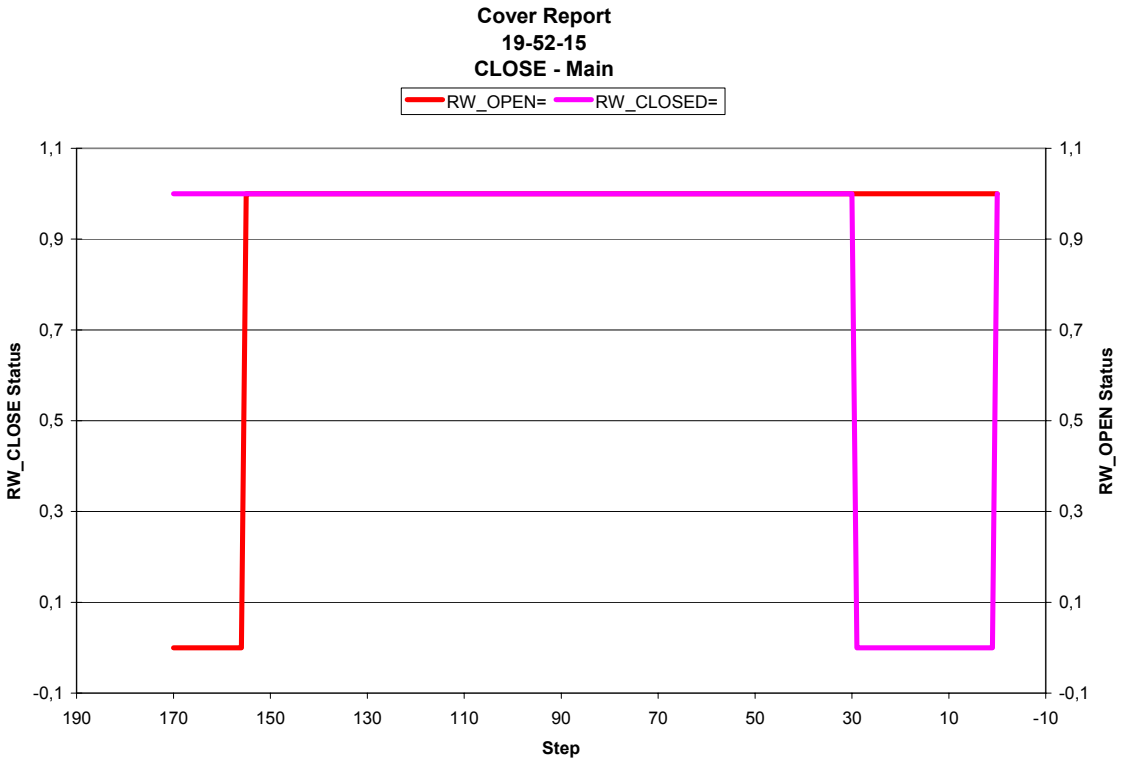
Figure 9.2-1 Cover Report – Open - Main



9.2.2 Close Cover

HEADER_START
CREATION_TIME=2006-12-04T19:52:15Z
USER=AA0000
HEADER_END
//
// Generated by 'GIADA_EGSE_SW '
//
MOVEMENT DIRECTION: To close
BEGIN TIME OF OPERATION: 123882704.000000
END TIME OF OPERATION: 123882704.000000

Figure 9.2-2 Cover Report – Close - Main



9.3 GRAIN DETECTION SYSTEM (GDS)

9.3.1 GDS – Status

Figure 9.3-1. GDS Operation Status vs. time - Main

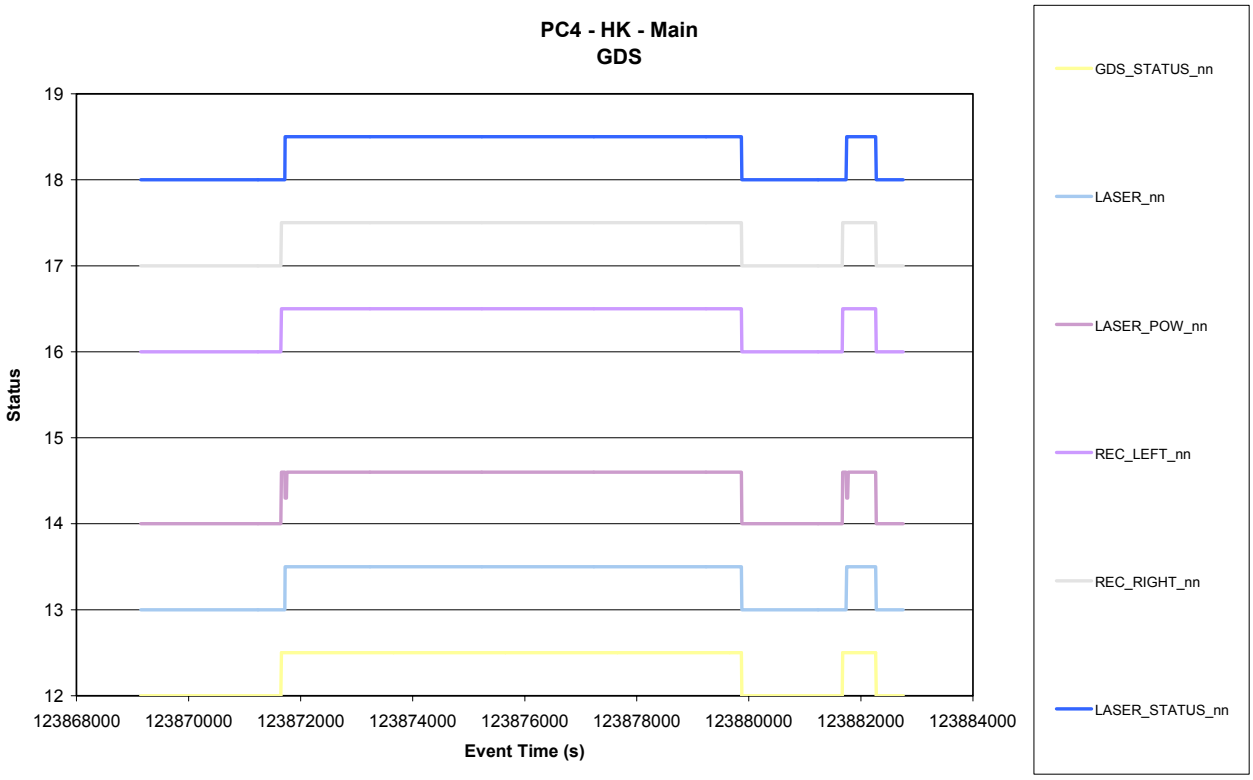


Figure 9.3-2. GDS Thresholds change vs. time - Main

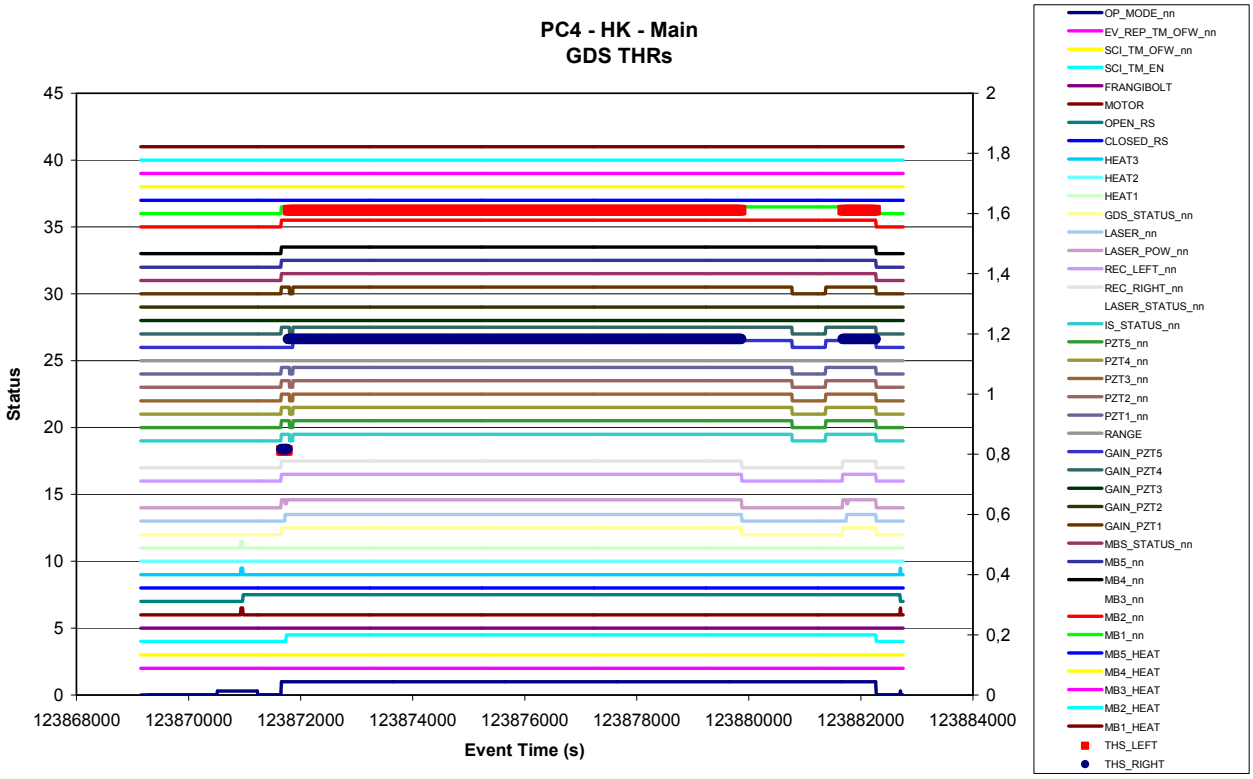


Figure 9.3-3. GDS Laser Temperatures vs. time (HK, HK-SCI, SCI) - Main

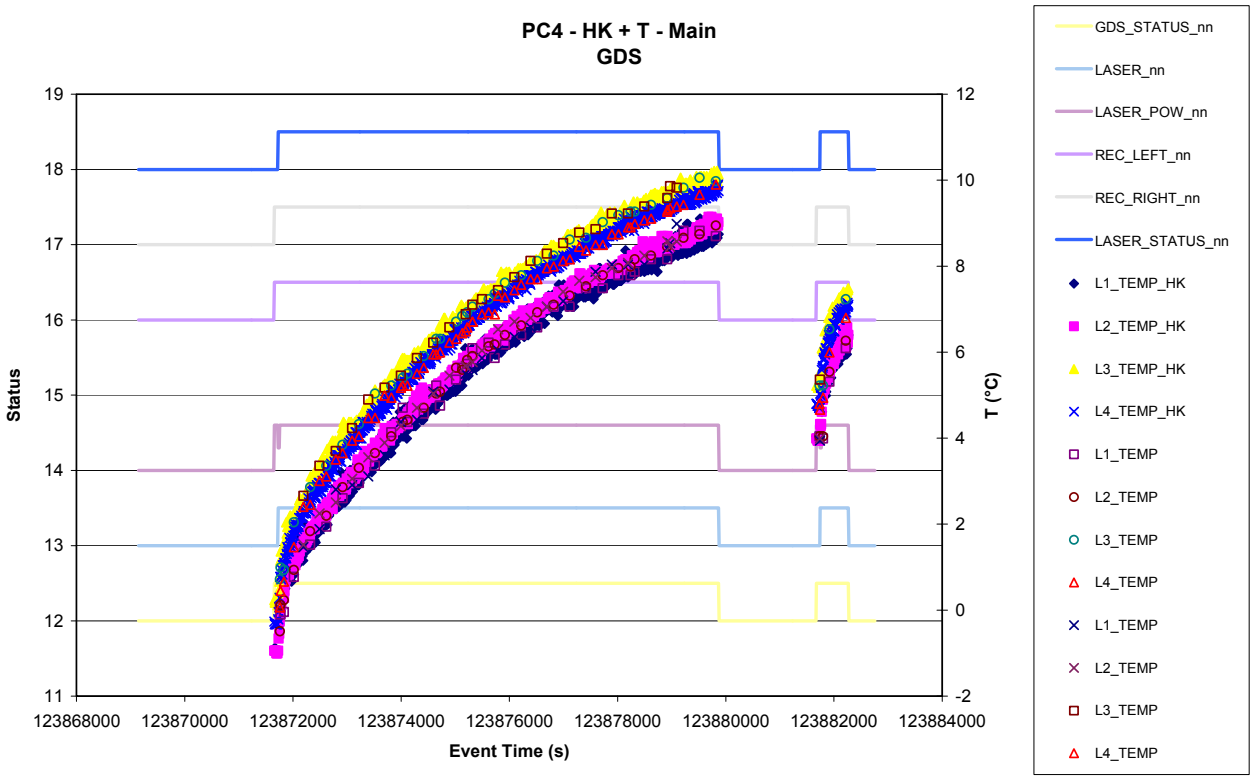


Figure 9.3-4. GDS Laser Monitor vs. time (HK, HK-SCI, SCI) - Main

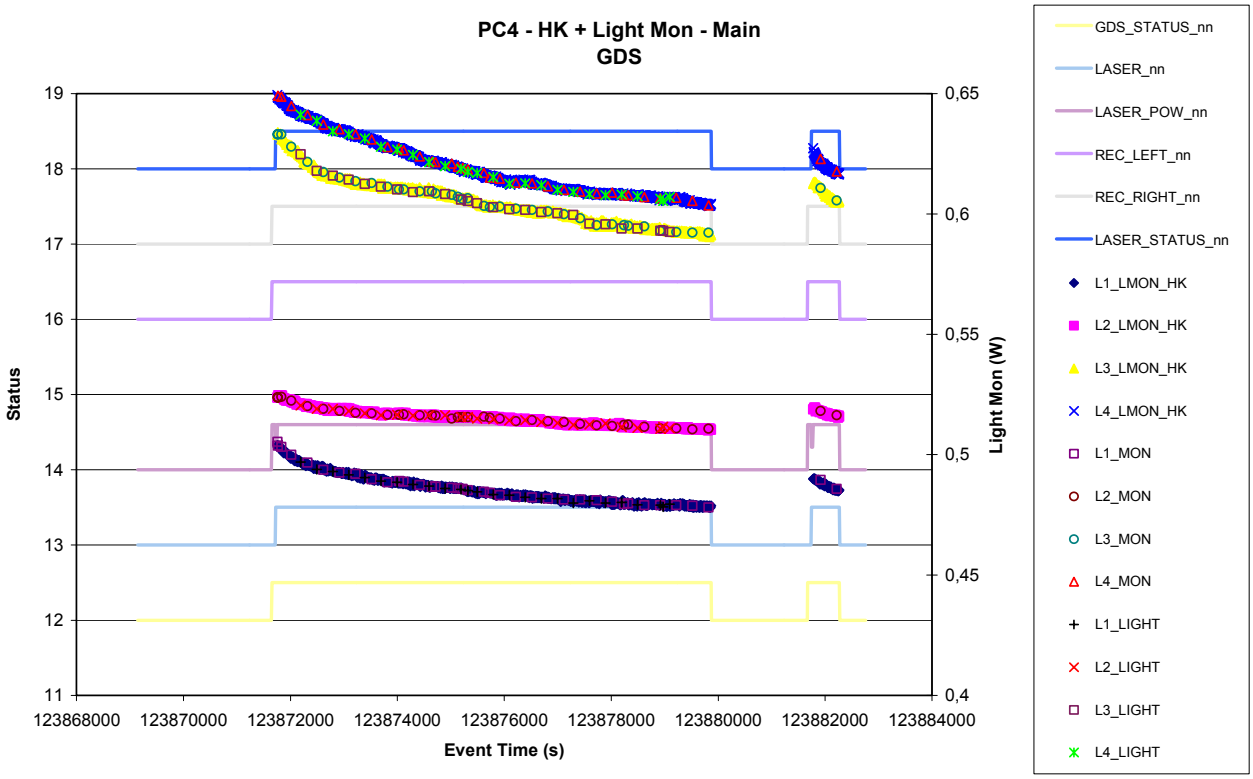


Figure 9.3-5. Laser 1 Light Monitor versus Temperature (HK, HK-SCI, SCI) - Main

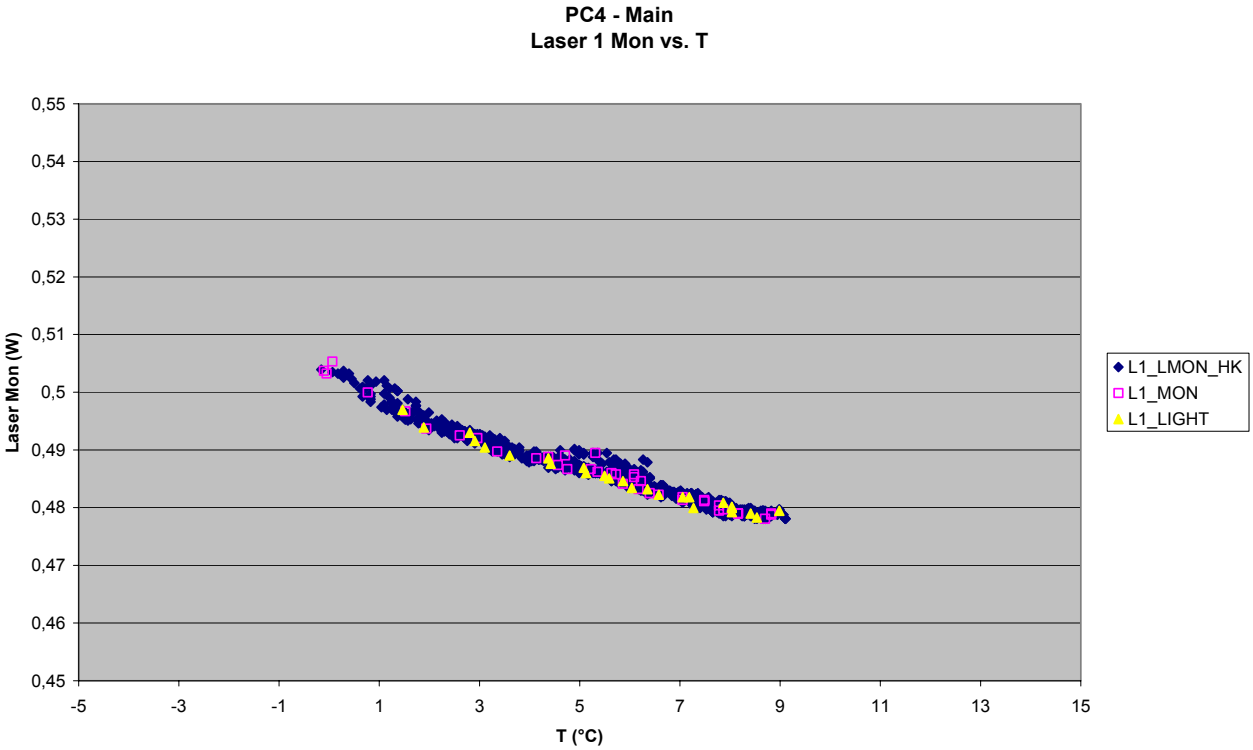


Figure 9.3-6. Laser 2 Light Monitor versus Temperature (HK, HK-SCI, SCI) - Main

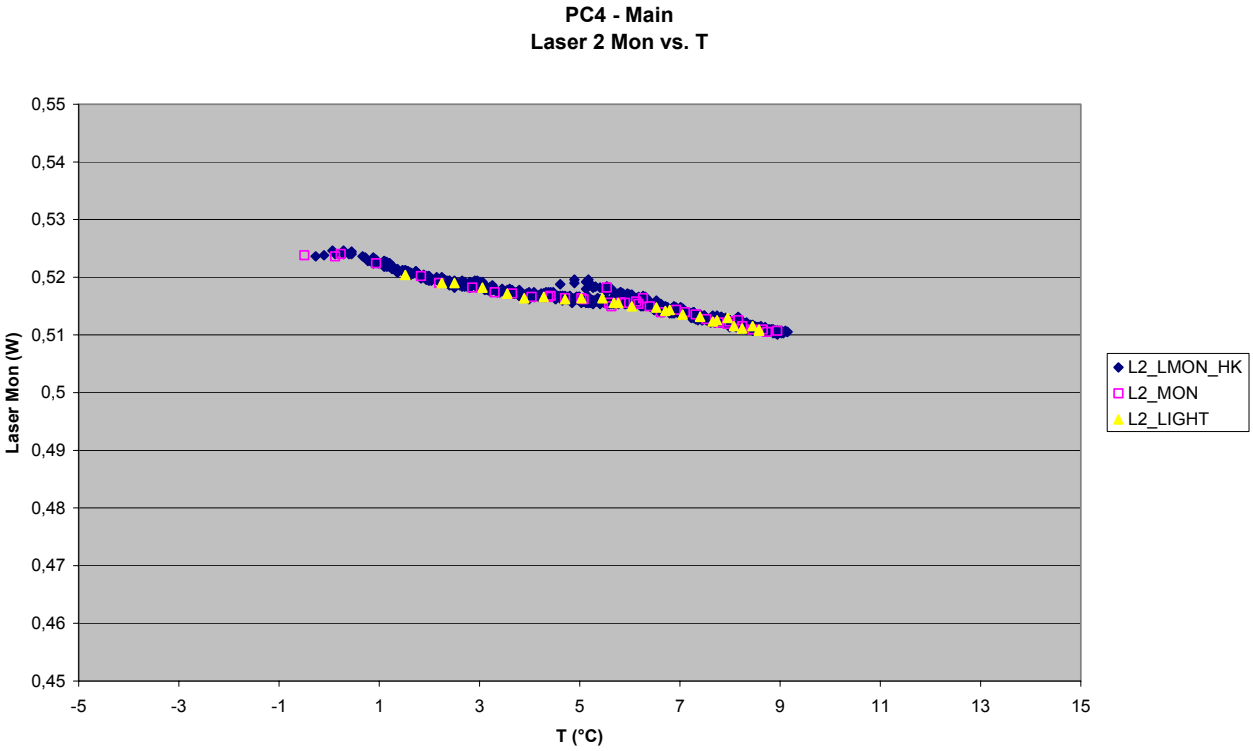


Figure 9.3-7. Laser 3 Light Monitor versus Temperature (HK, HK-SCI, SCI) - Main

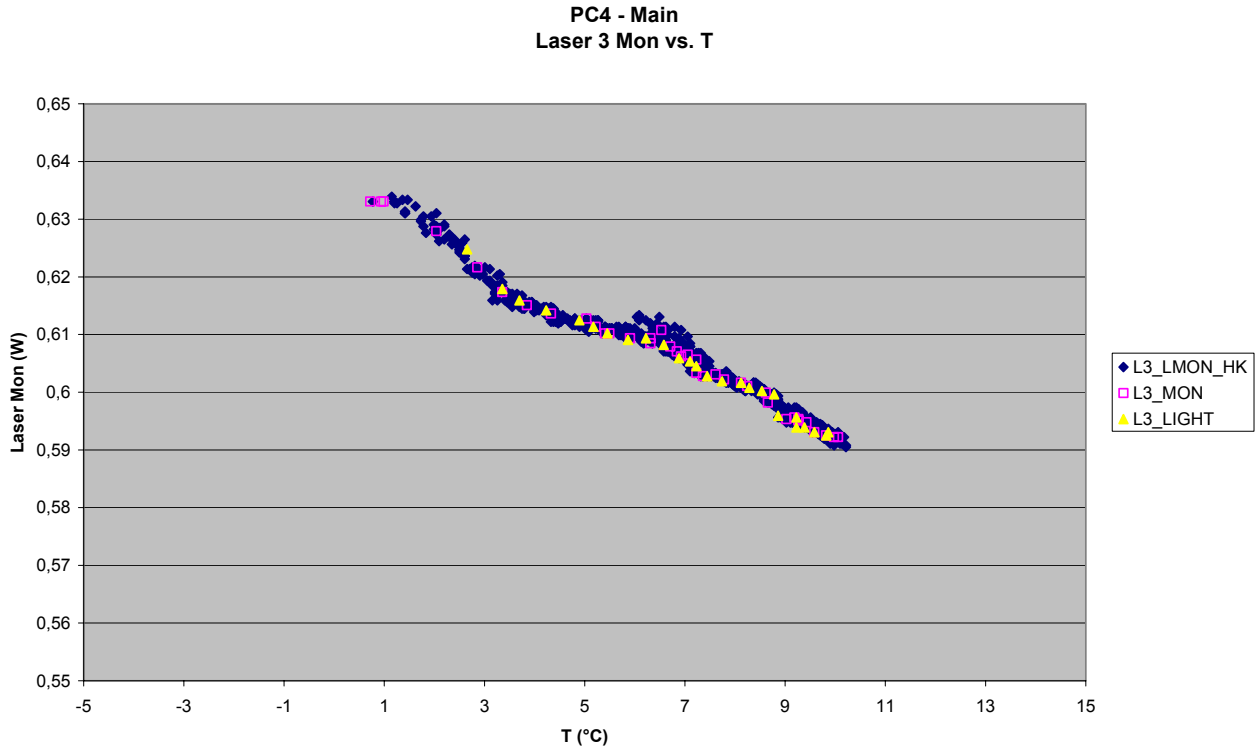
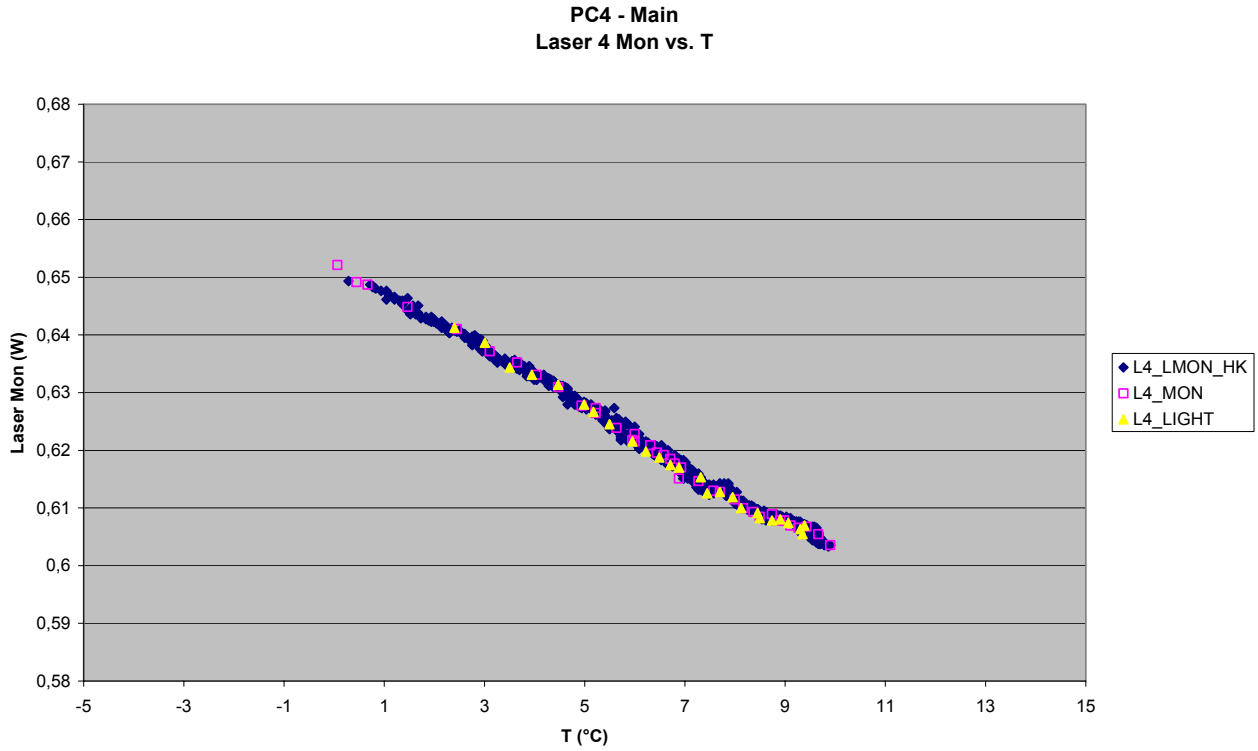


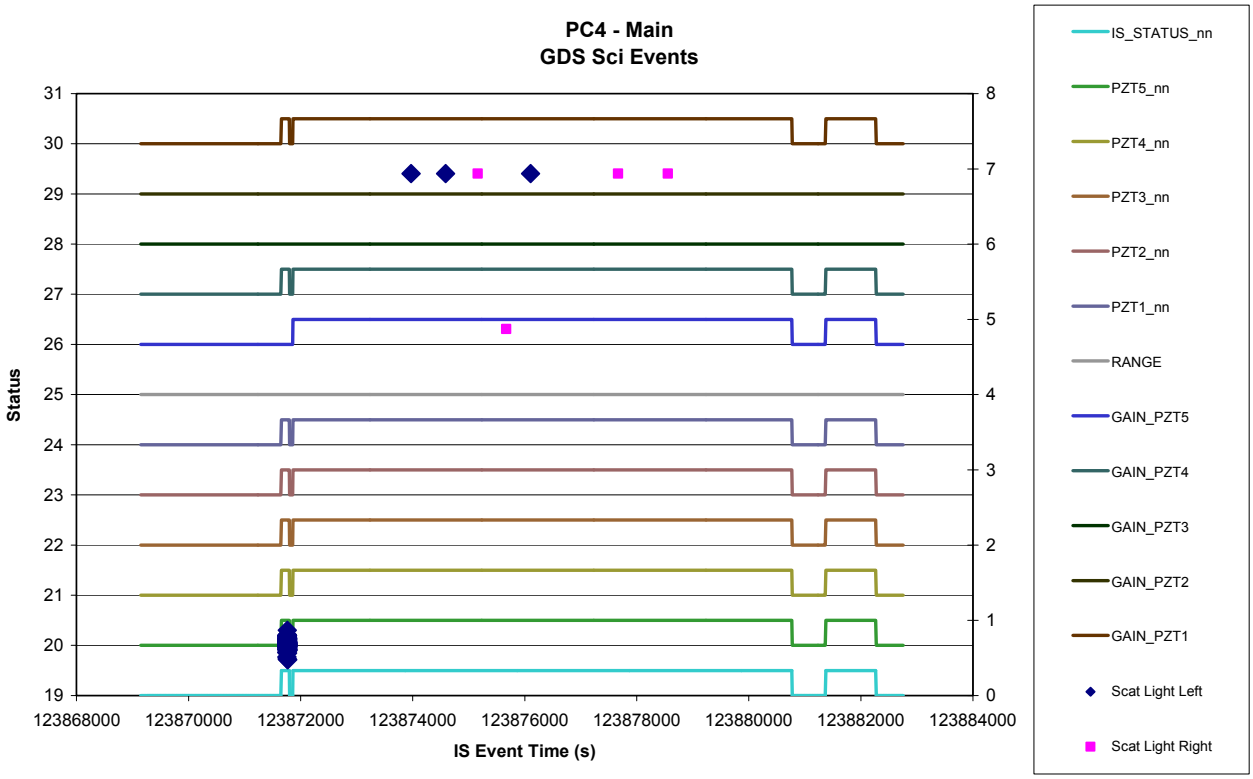
Figure 9.3-8. Laser 4 Light Monitor versus Temperature (HK, HK-SCI, SCI) - Main



9.3.2 GDS – Behaviour

9.3.2.1 Science Events

Figure 9.3-9. GDS Left and Right SCI events vs. time - Main

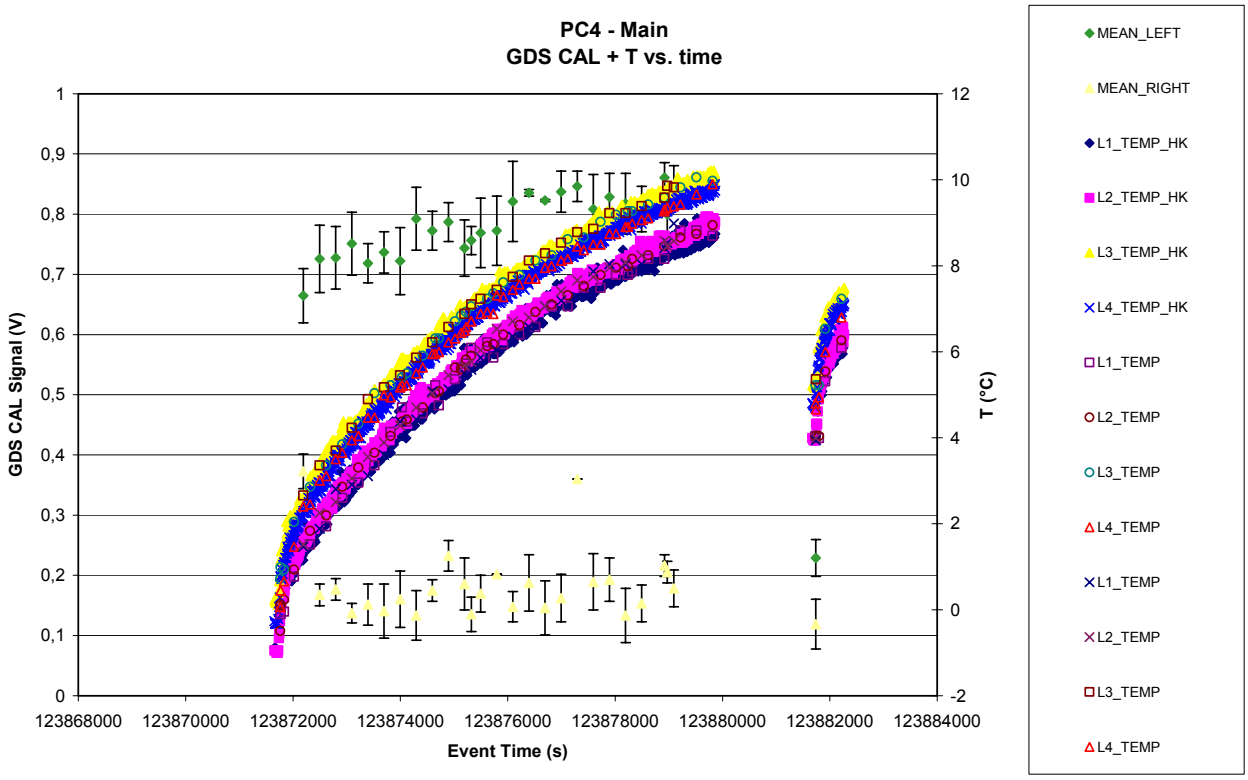


9.3.2.2 Event Rates

Not applicable

9.3.2.3 CAL

Figure 9.3-10. Evolution of GDS CAL Left and Right signals (and T) vs. time (Main)



9.4 IMPACT SENSOR (IS)

9.4.1 IS – Status

Figure 9.4-1. IS Operation Status vs. time - Main

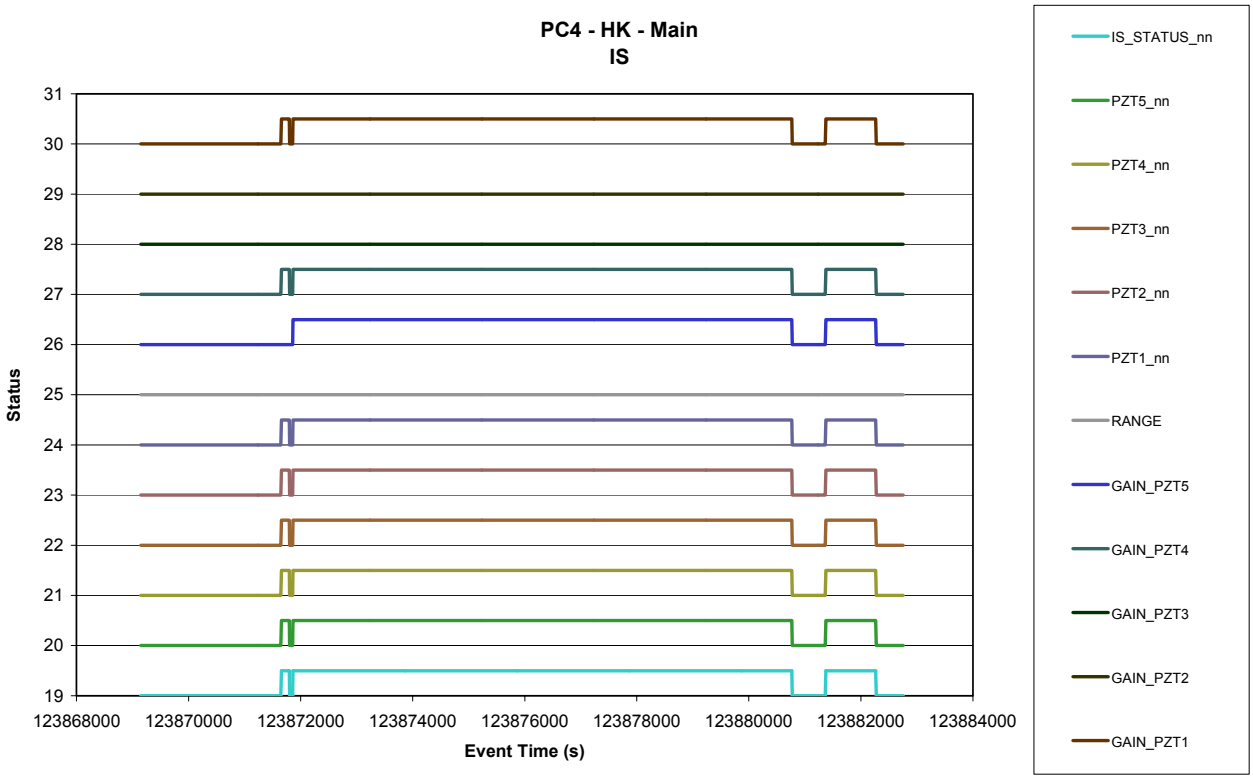


Figure 9.4-2. IS PZT 3 Thresholds change vs. time - Main

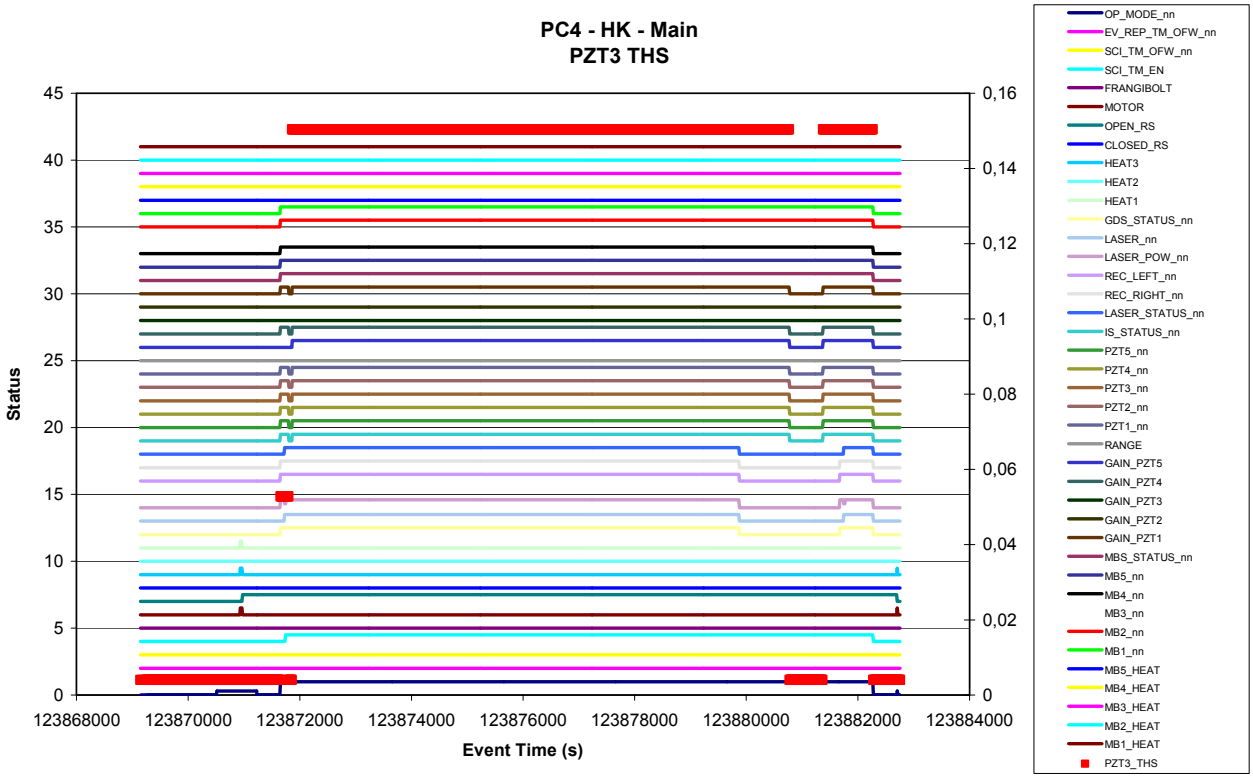


Figure 9.4-3. IS PZT 5 Thresholds change vs. time - Main

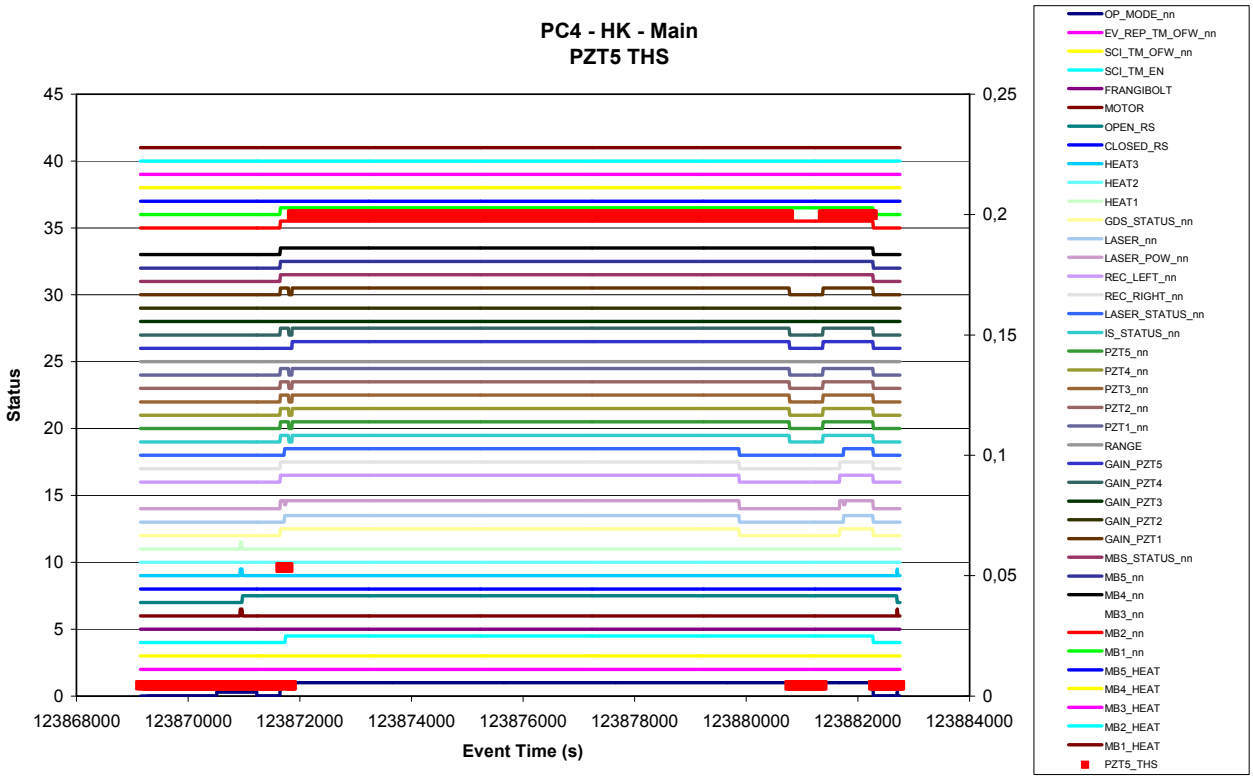
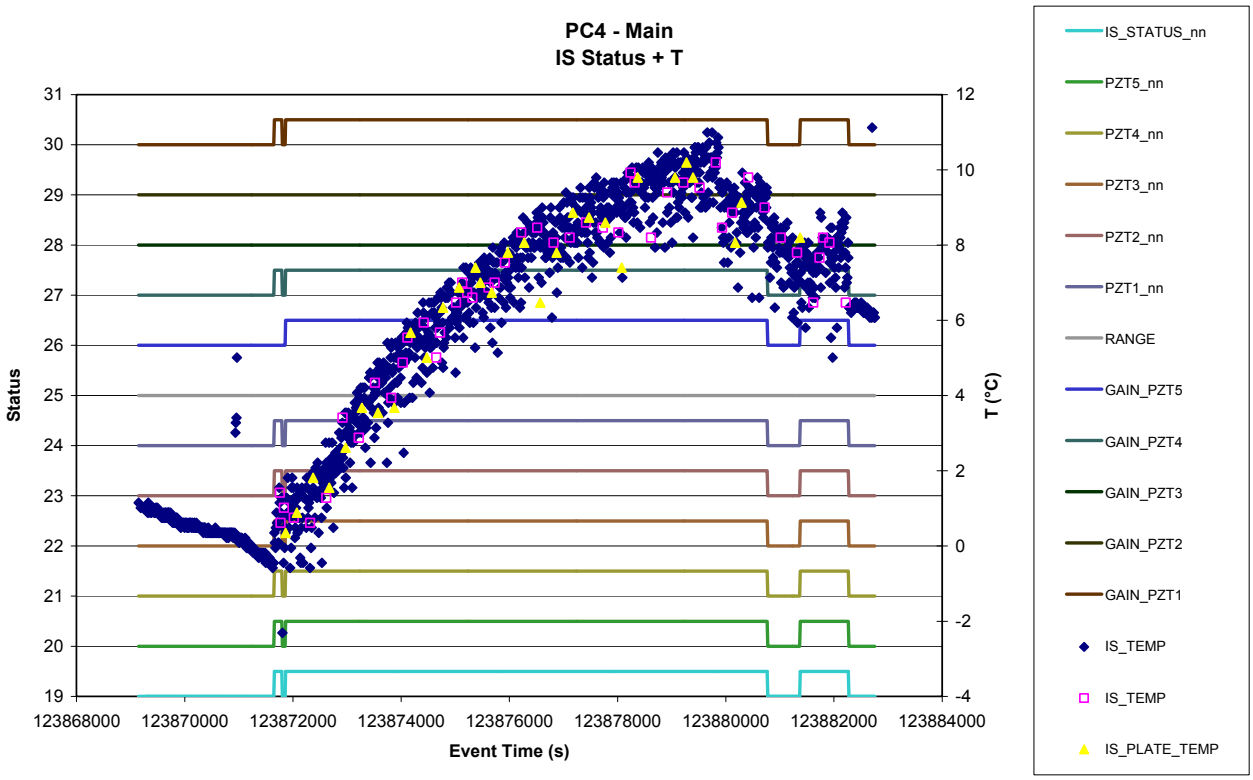


Figure 9.4-4. IS Temperature vs. time (HK, HK-SCI, SCI) - Main



9.4.2 IS – Behaviour

9.4.2.1 Science Events

Figure 9.4-5. All PZT Events (det and non-det) vs. time - Main

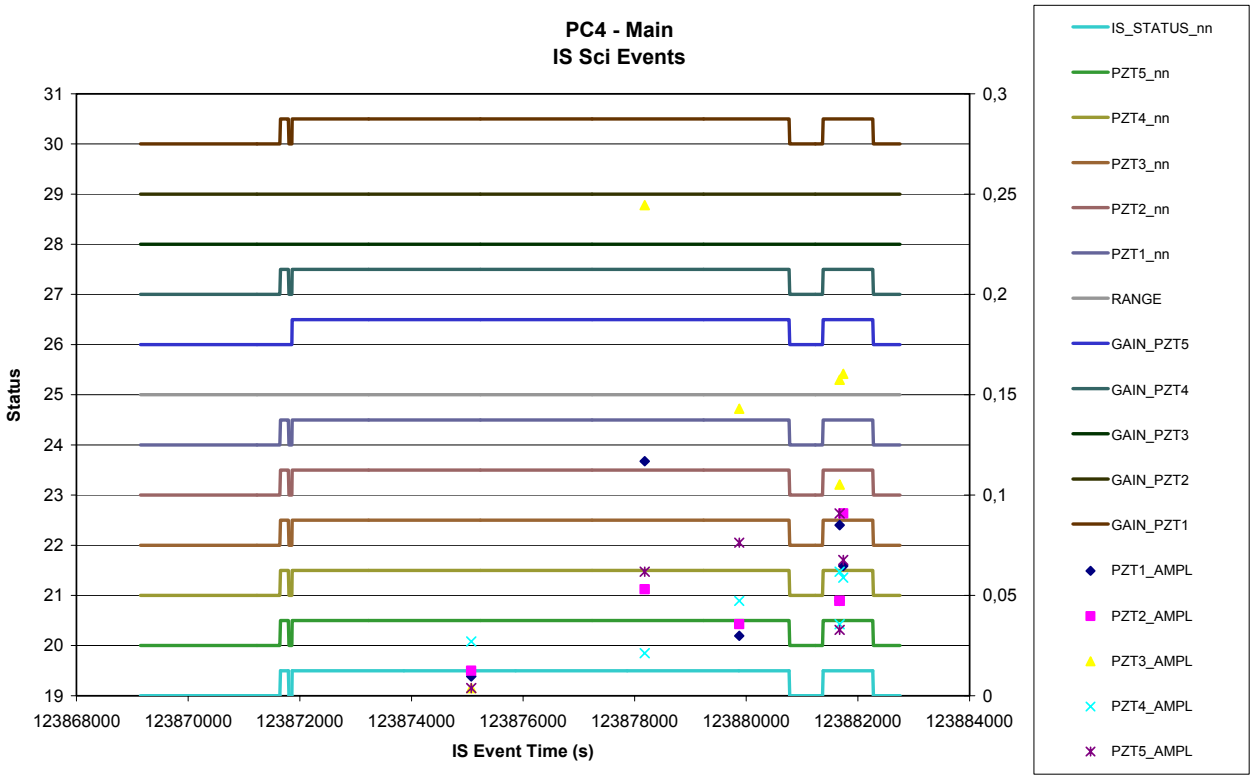


Figure 9.4-6. PZT 1-2-3-4-5 Detected Events vs. time - Main

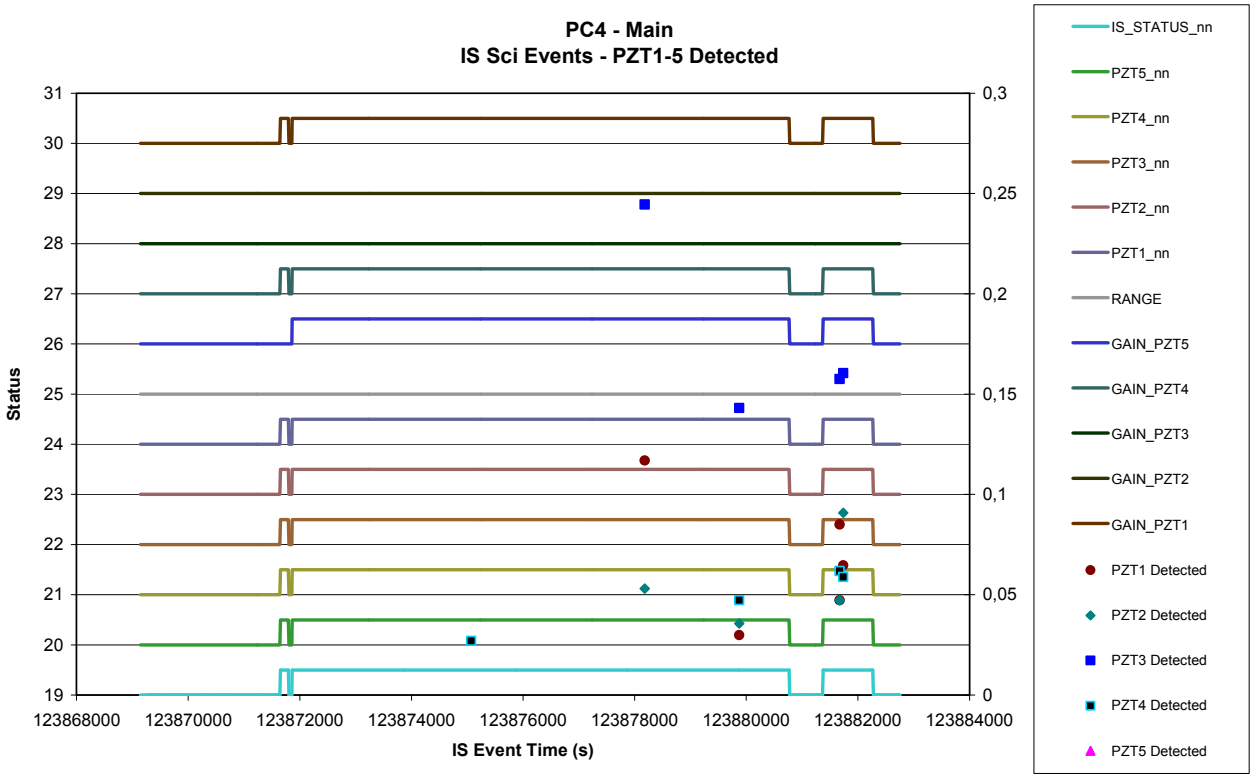


Figure 9.4-7. PZT 1 Detected Events vs. time - Main

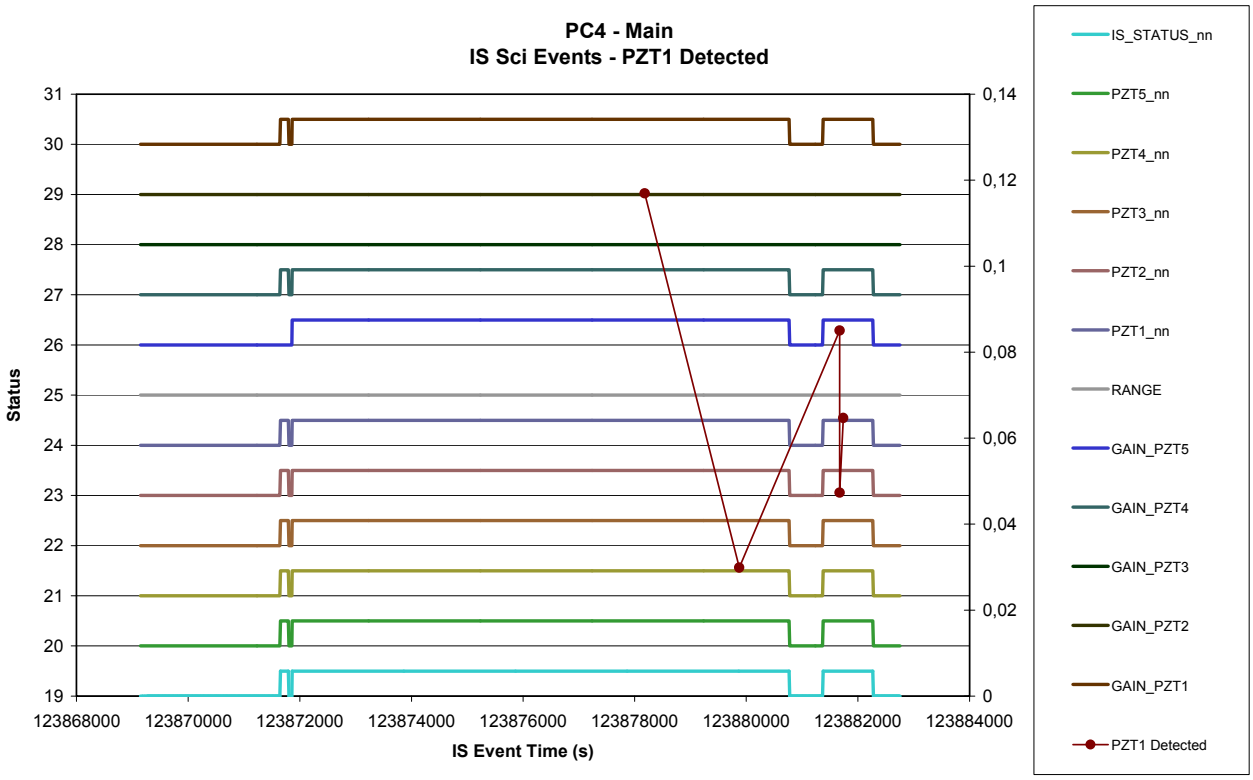


Figure 9.4-8. PZT 2 Detected Events vs. time - Main

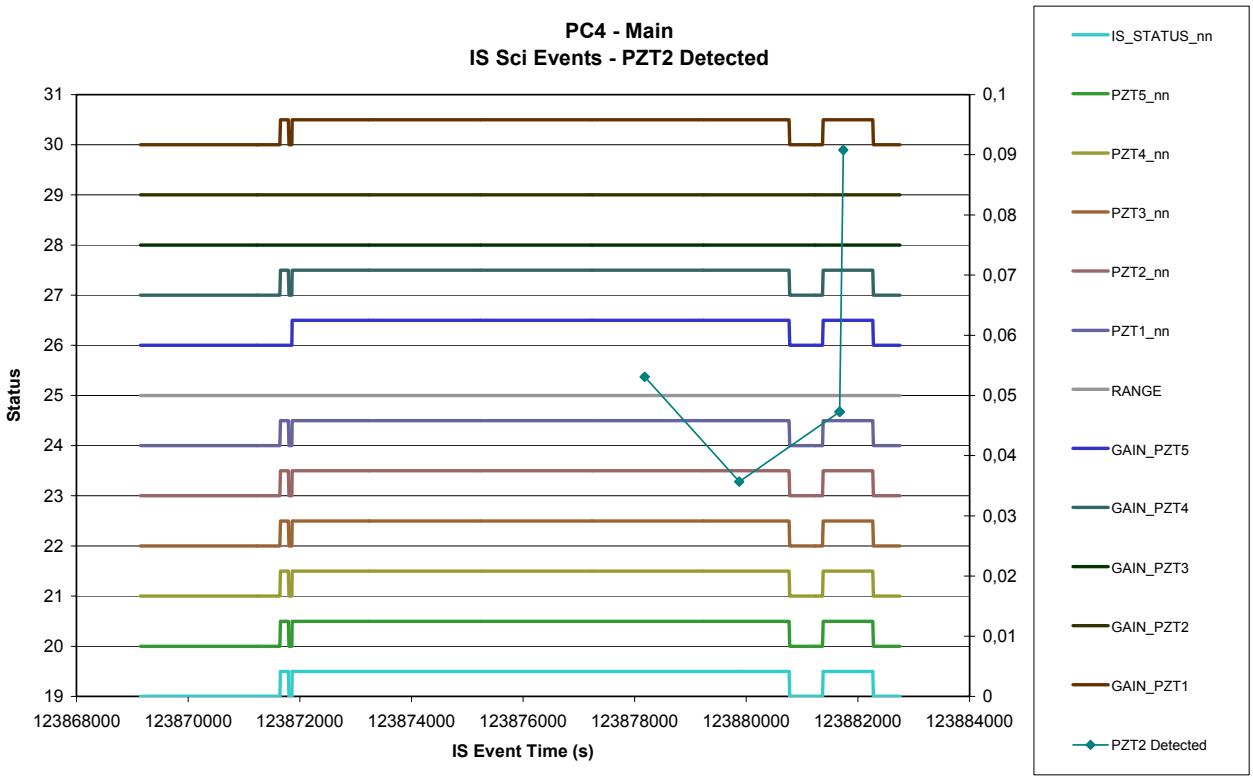


Figure 9.4-9. PZT 3 Detected Events vs. time - Main

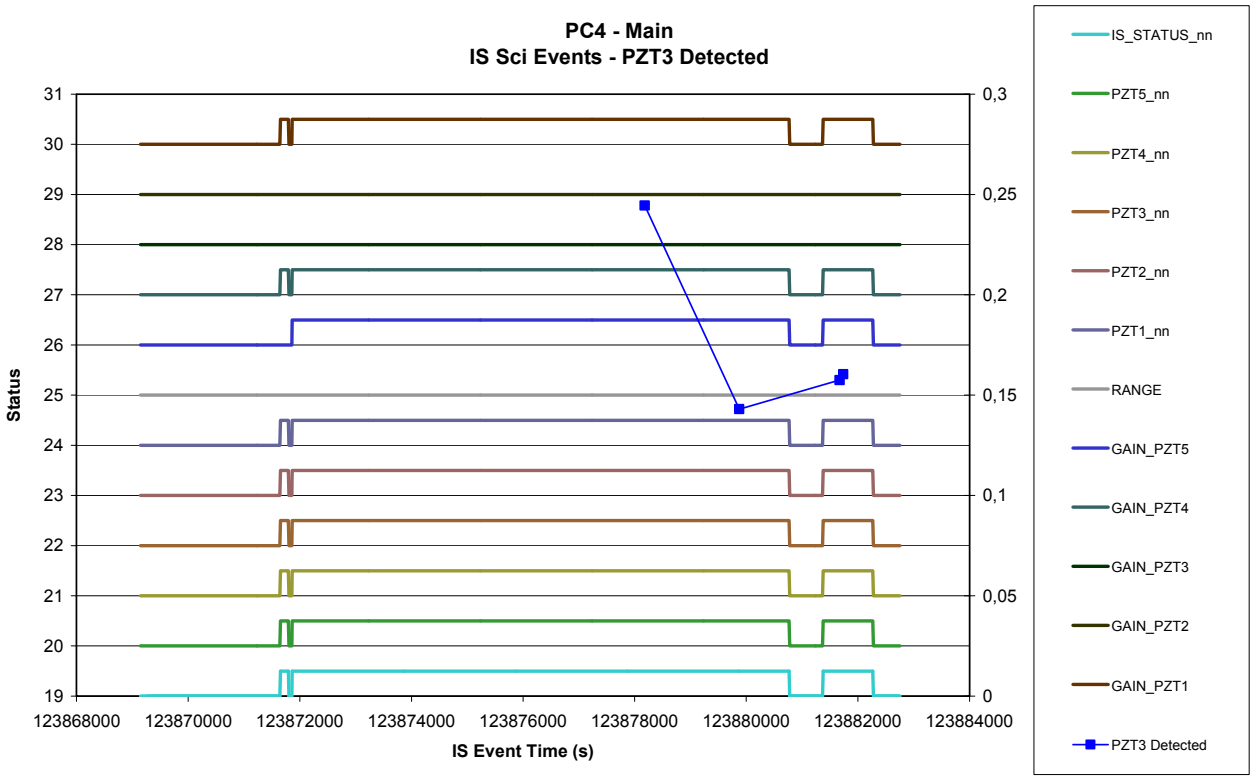


Figure 9.4-10. PZT 4 Detected Events vs. time - Main

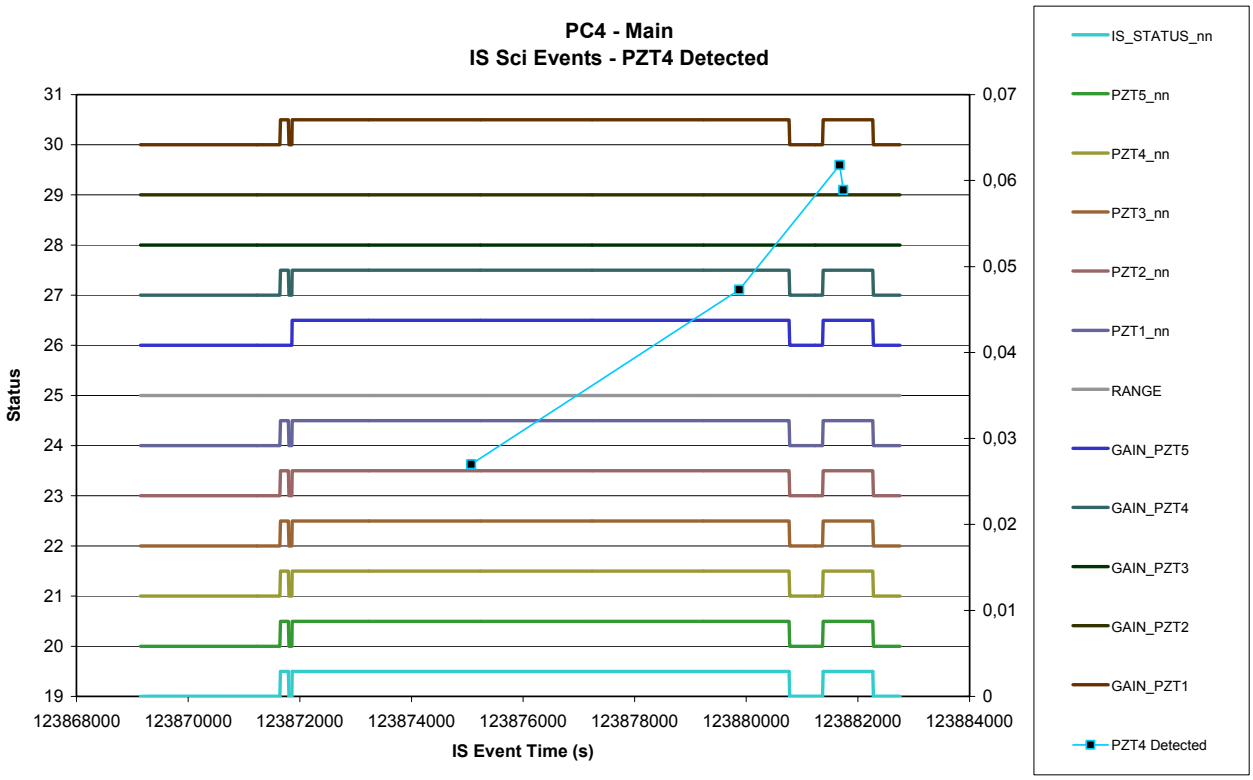


Figure 9.4-11. PZT 5 Detected Events vs. time - Main

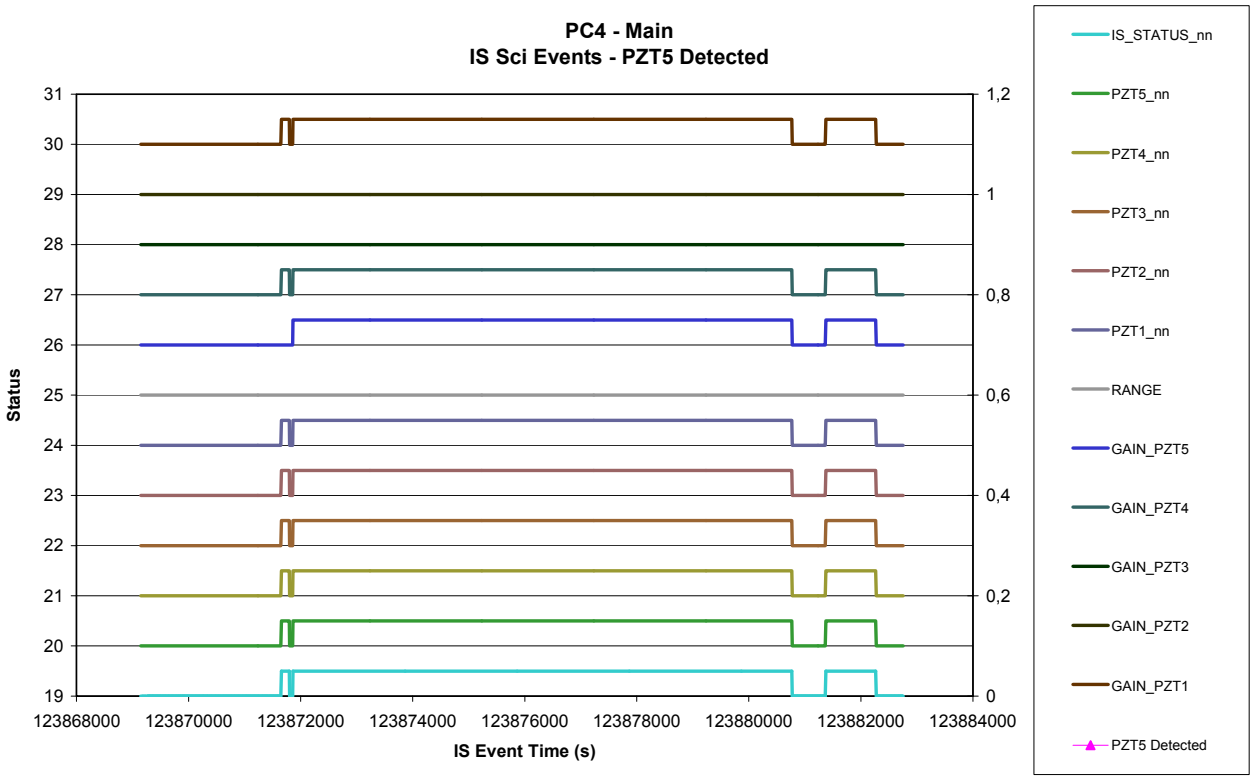
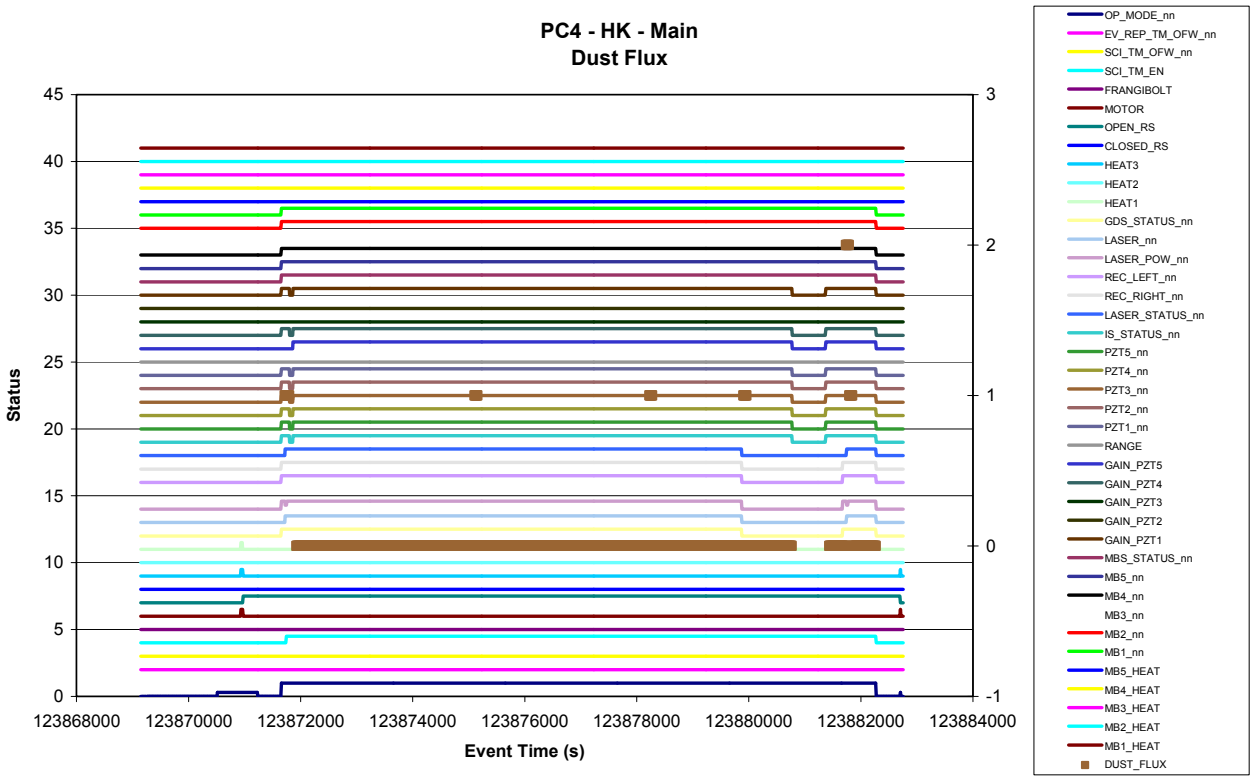


Figure 9.4-12. Dust Flux vs. time - Main



9.4.2.2 Event Rates

Not applicable

9.4.2.3 CAL

Figure 9.4-13. PZT 1 Mean and St Dev. CAL vs. time - Main

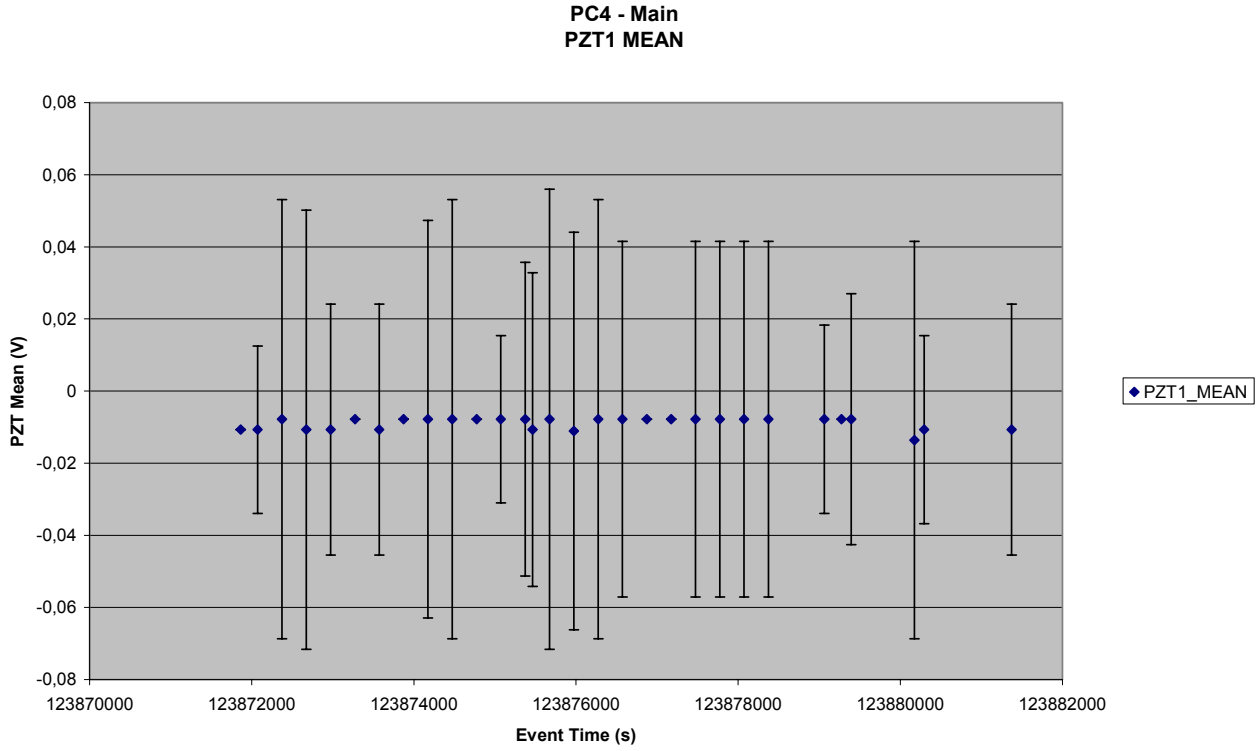


Figure 9.4-14. PZT 2 Mean and St Dev. CAL vs. time - Main

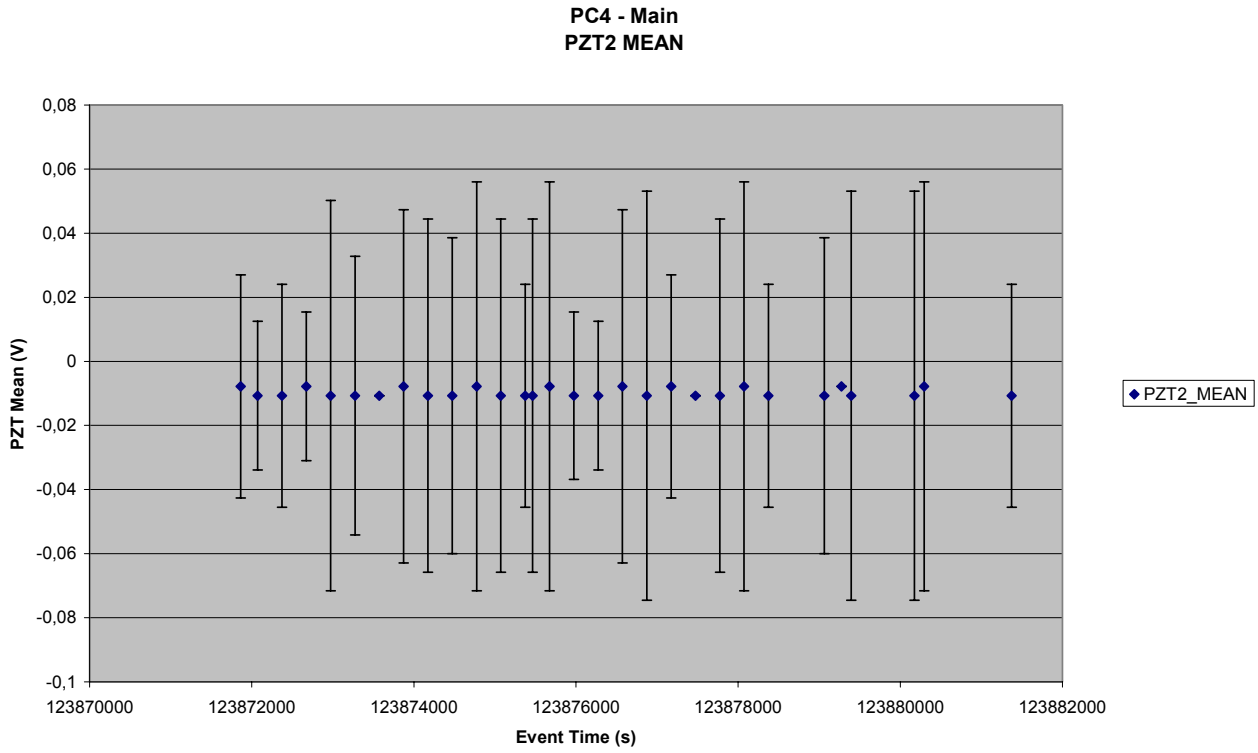


Figure 9.4-15. PZT 3 Mean and St Dev. CAL vs. time - Main

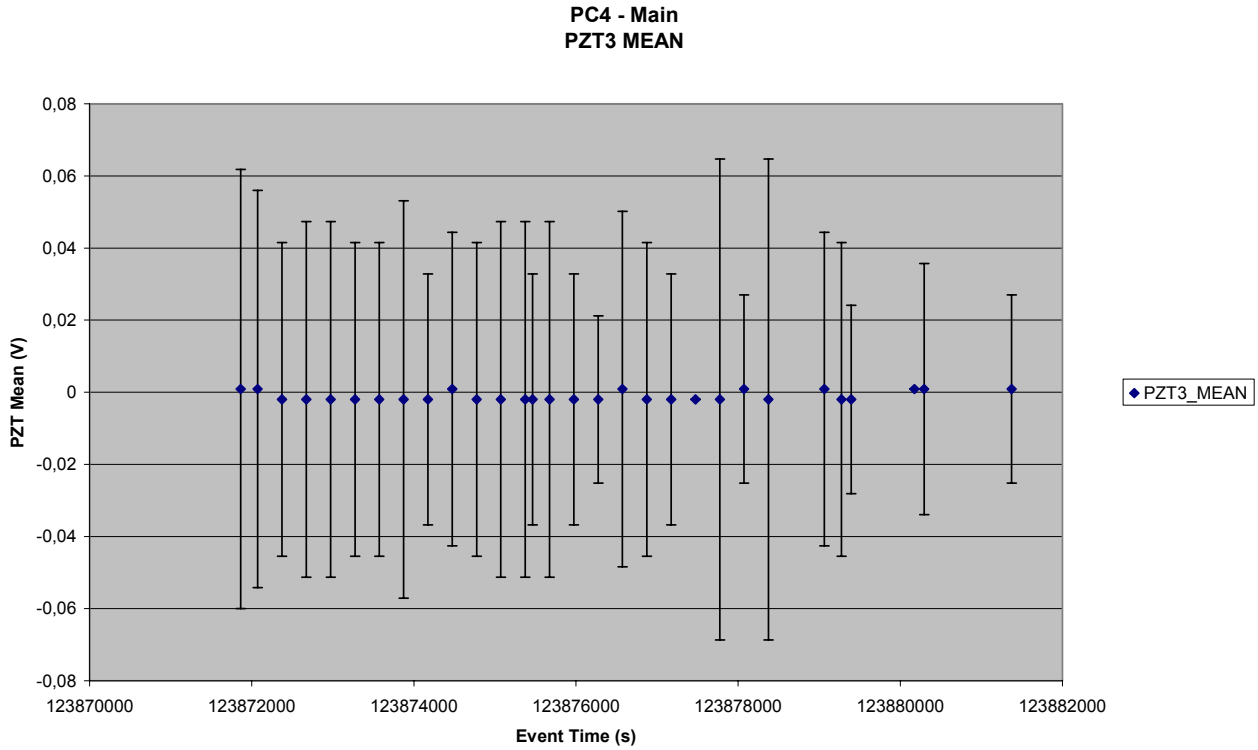


Figure 9.4-16. PZT 4 Mean and St Dev. CAL vs. time - Main

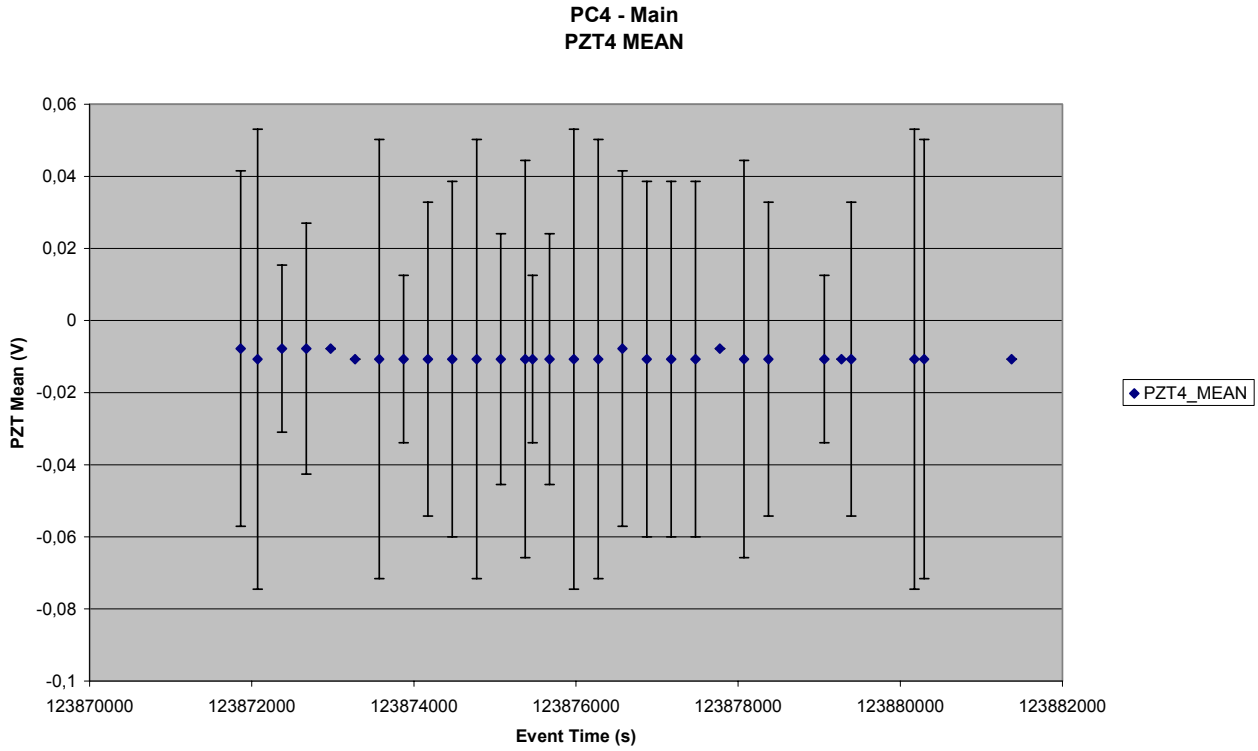


Figure 9.4-17. PZT 5 Mean and St Dev. CAL vs. time - Main

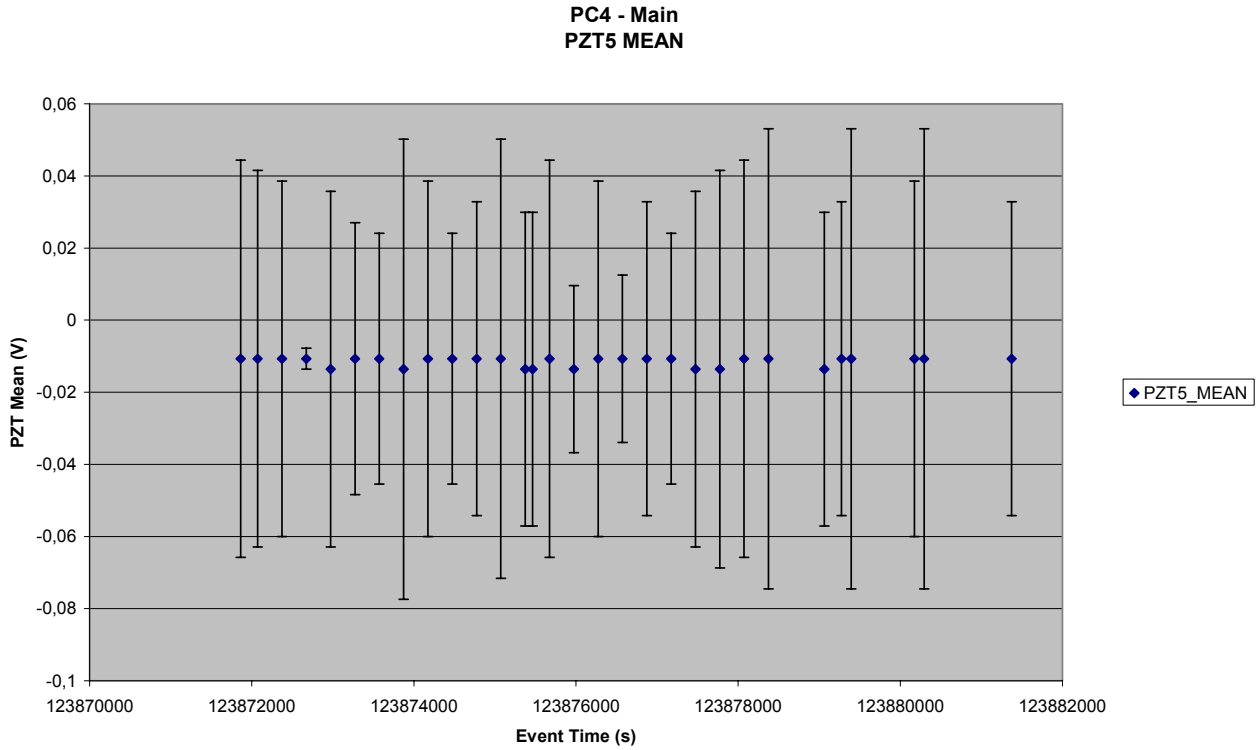


Figure 9.4-18. Reference Voltages for IS calibration vs. time - Main

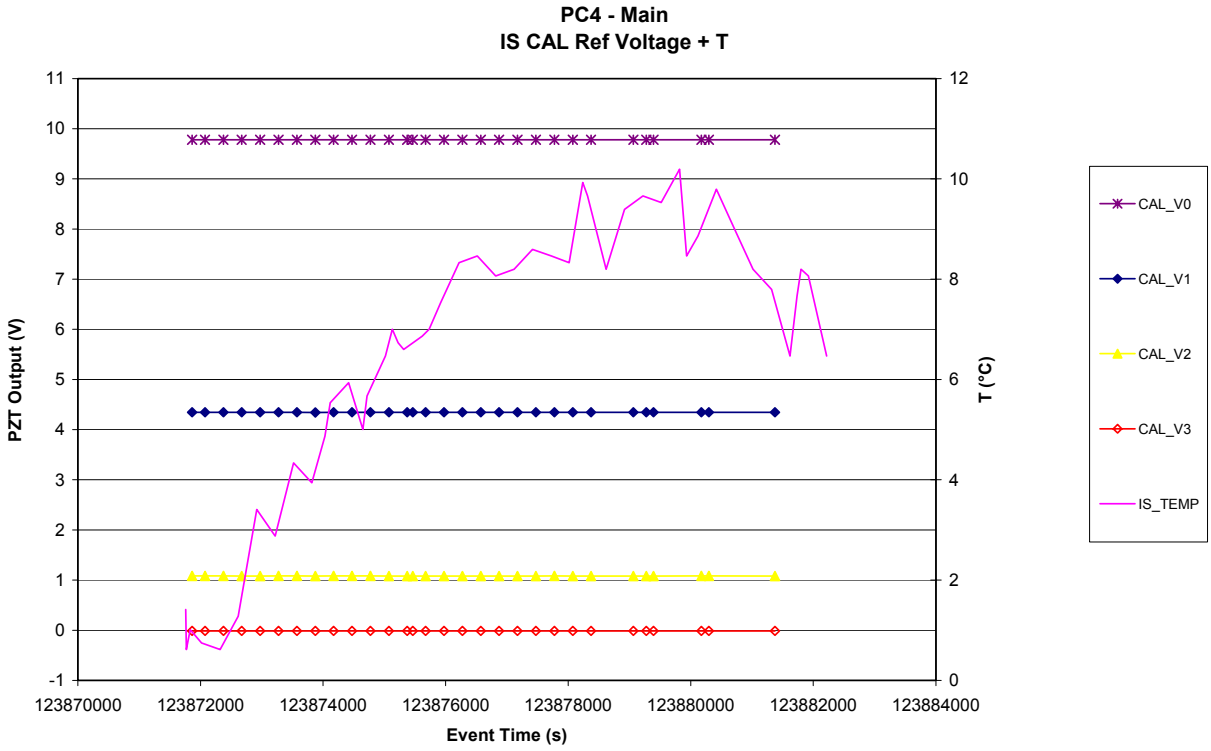


Figure 9.4-19. PZT 1 CAL Signal vs. time - Main

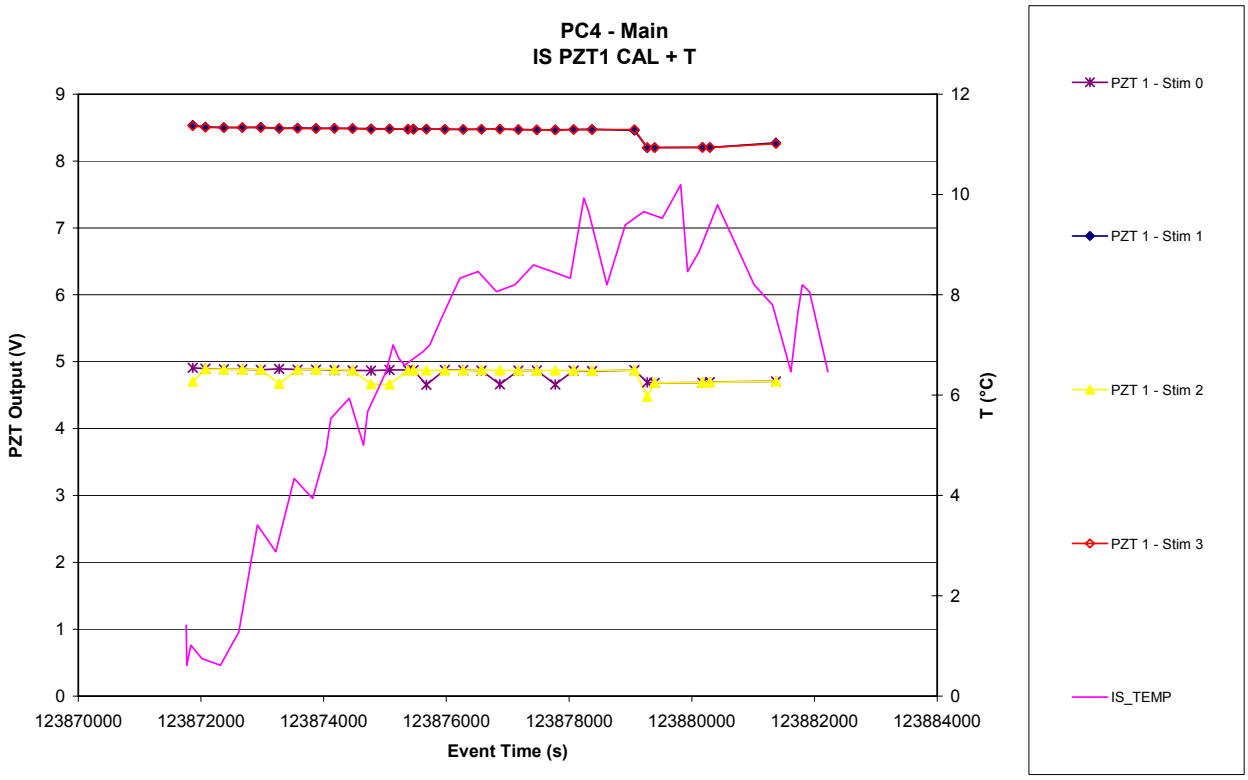


Figure 9.4-20. PZT 2 CAL Signal vs. time - Main

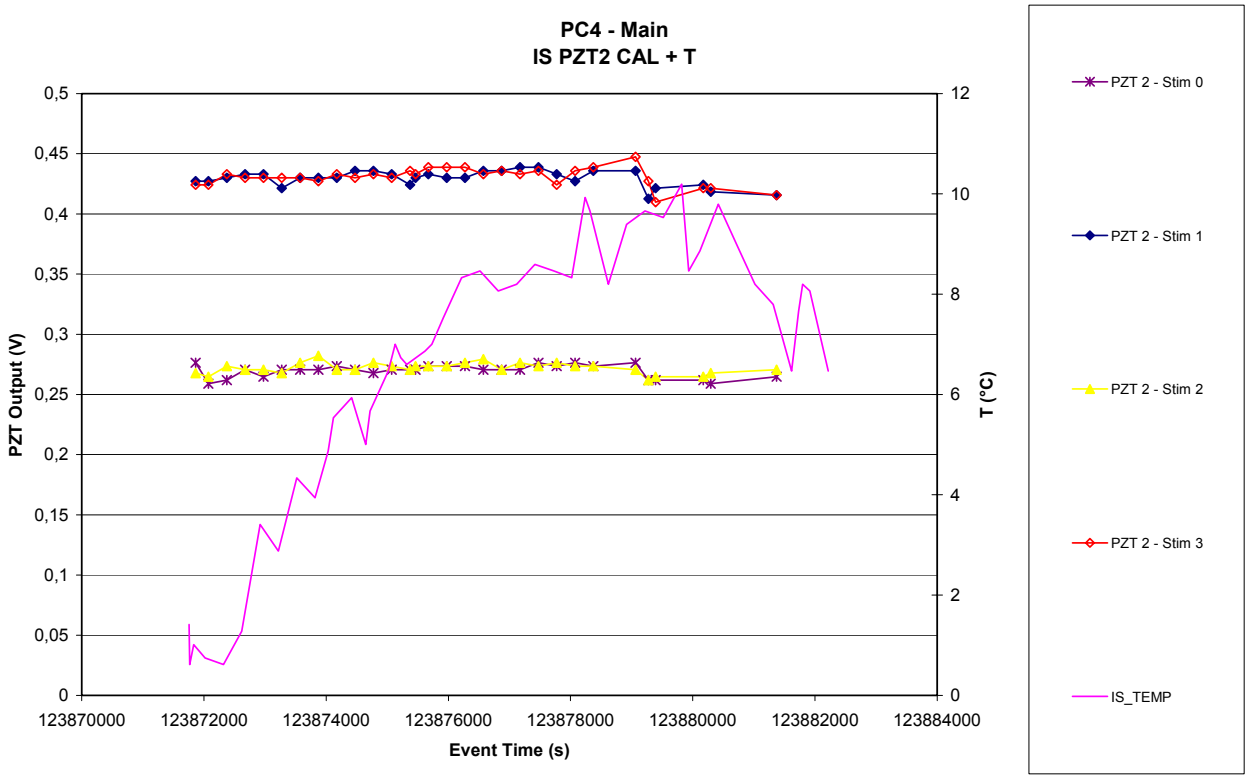


Figure 9.4-21. PZT 3 CAL Signal vs. time - Main

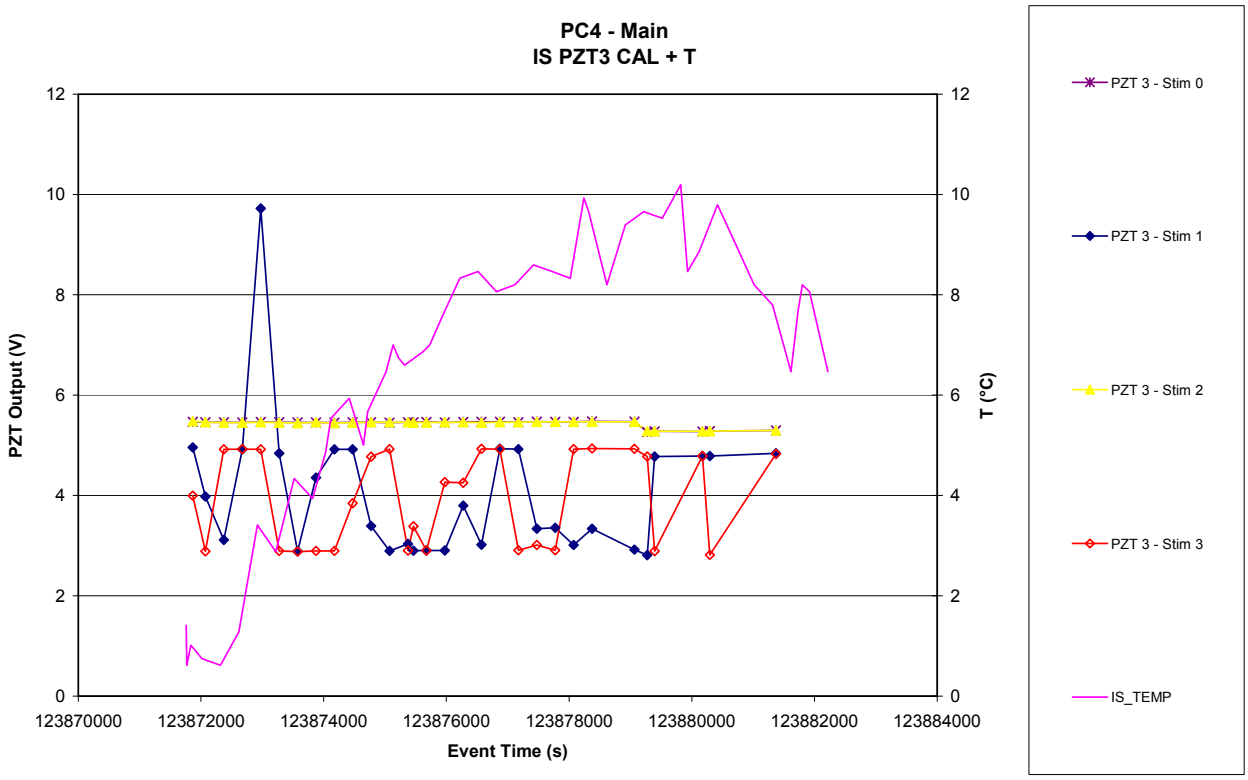


Figure 9.4-22. PZT 4 CAL Signal vs. time - Main

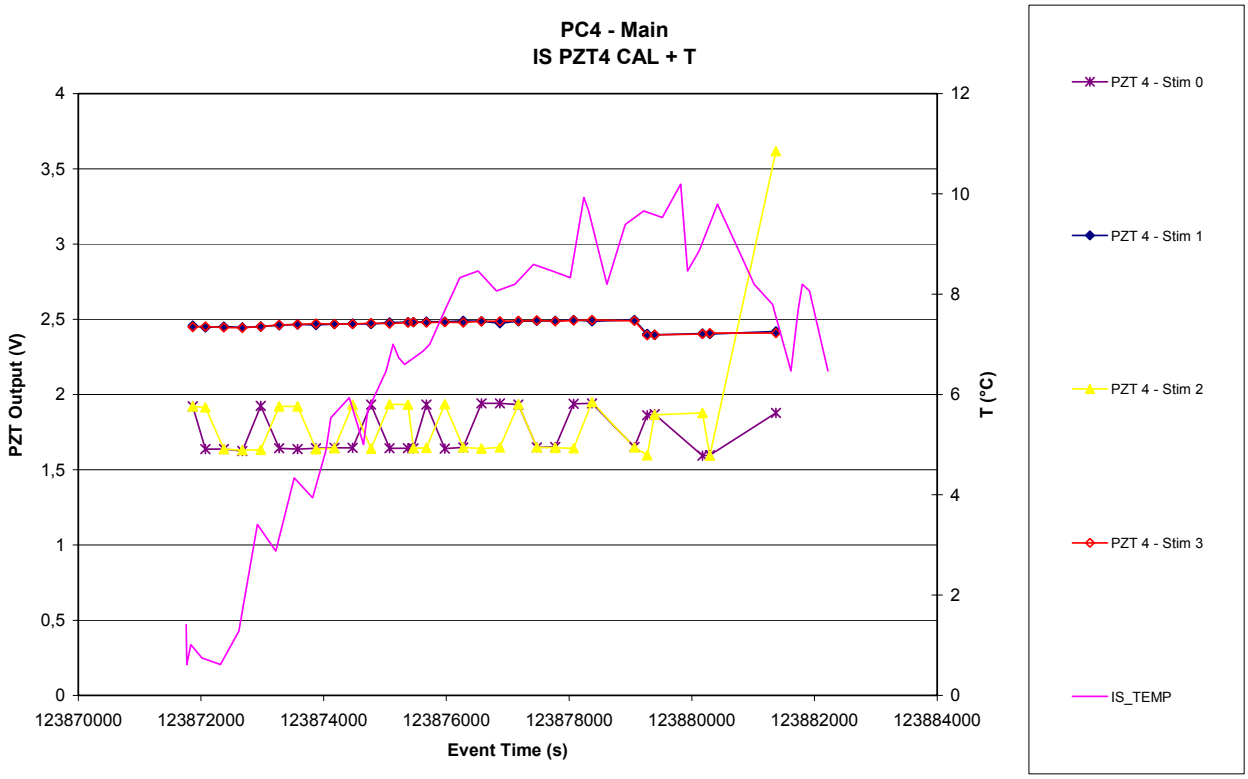


Figure 9.4-23. PZT 5 CAL Signal vs. time - Main

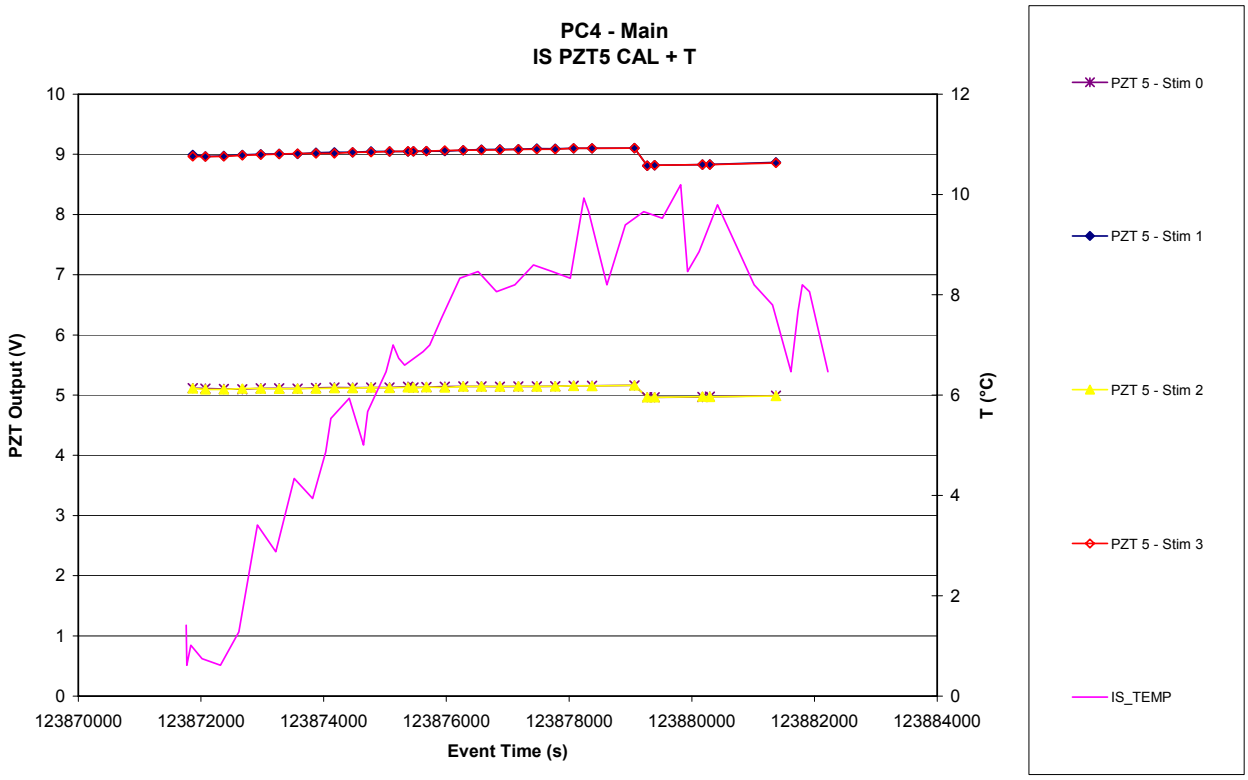


Figure 9.4-24. PZT 1 CAL Time delay vs. time - Main

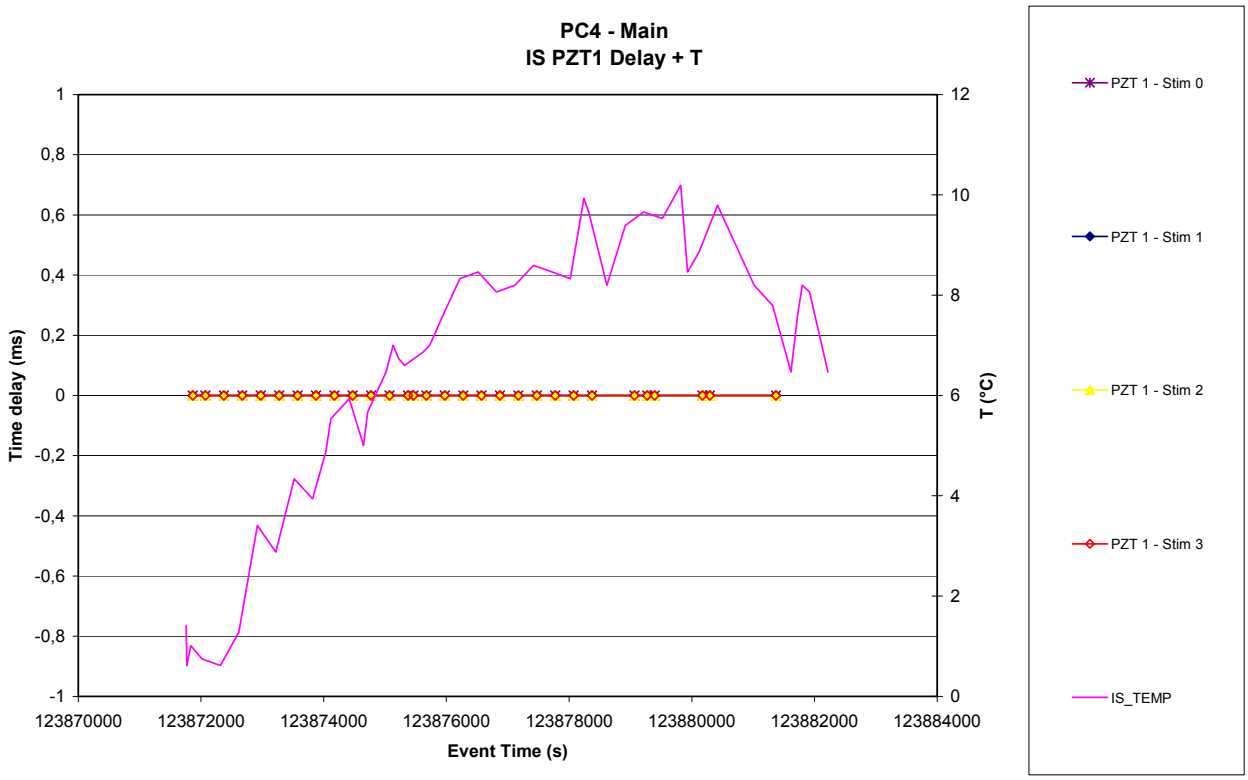


Figure 9.4-25. PZT 2 CAL Time delay vs. time - Main

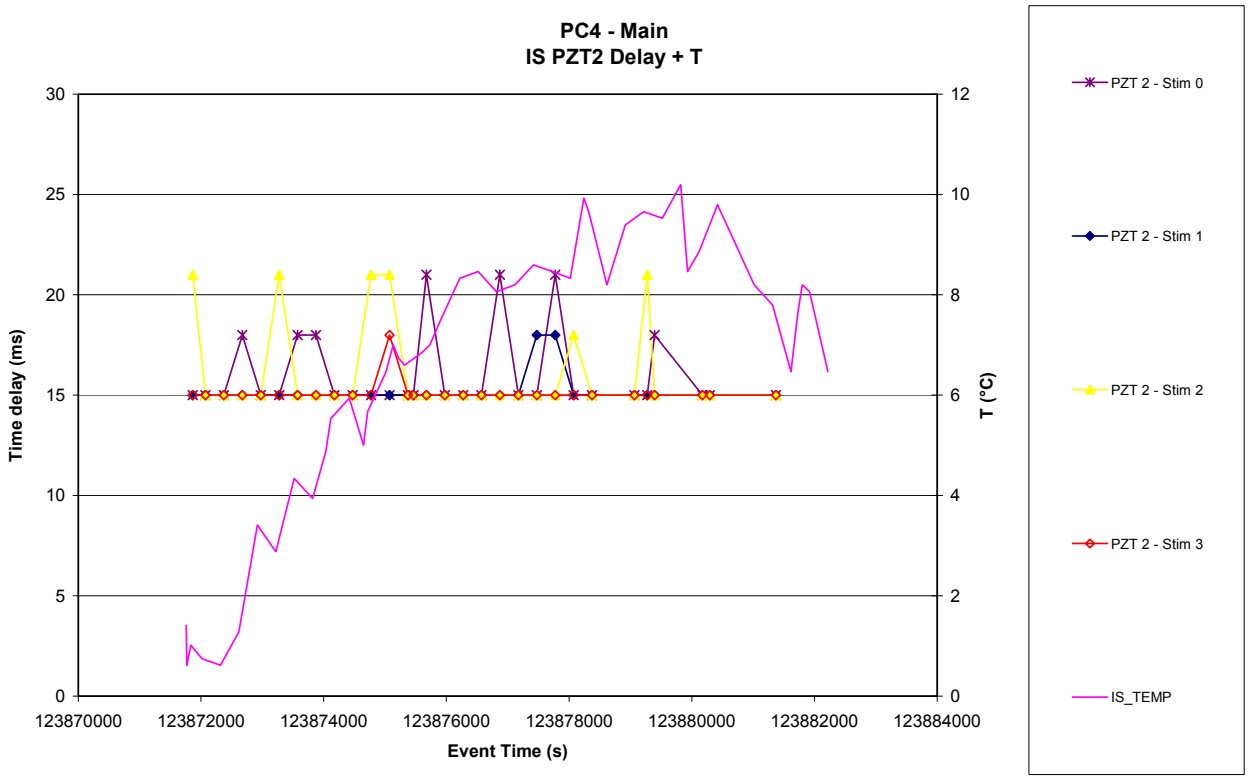


Figure 9.4-26. PZT 3 CAL Time delay vs. time - Main

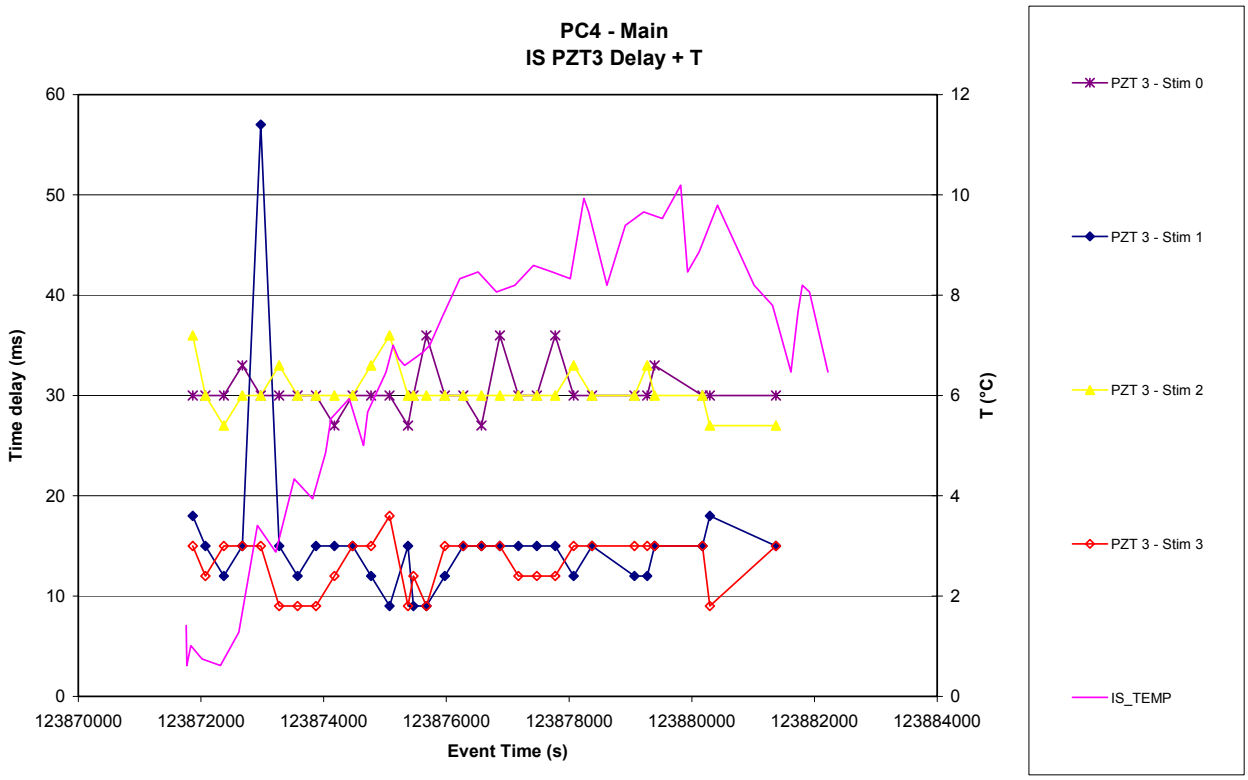


Figure 9.4-27. PZT 4 CAL Time delay vs. time - Main

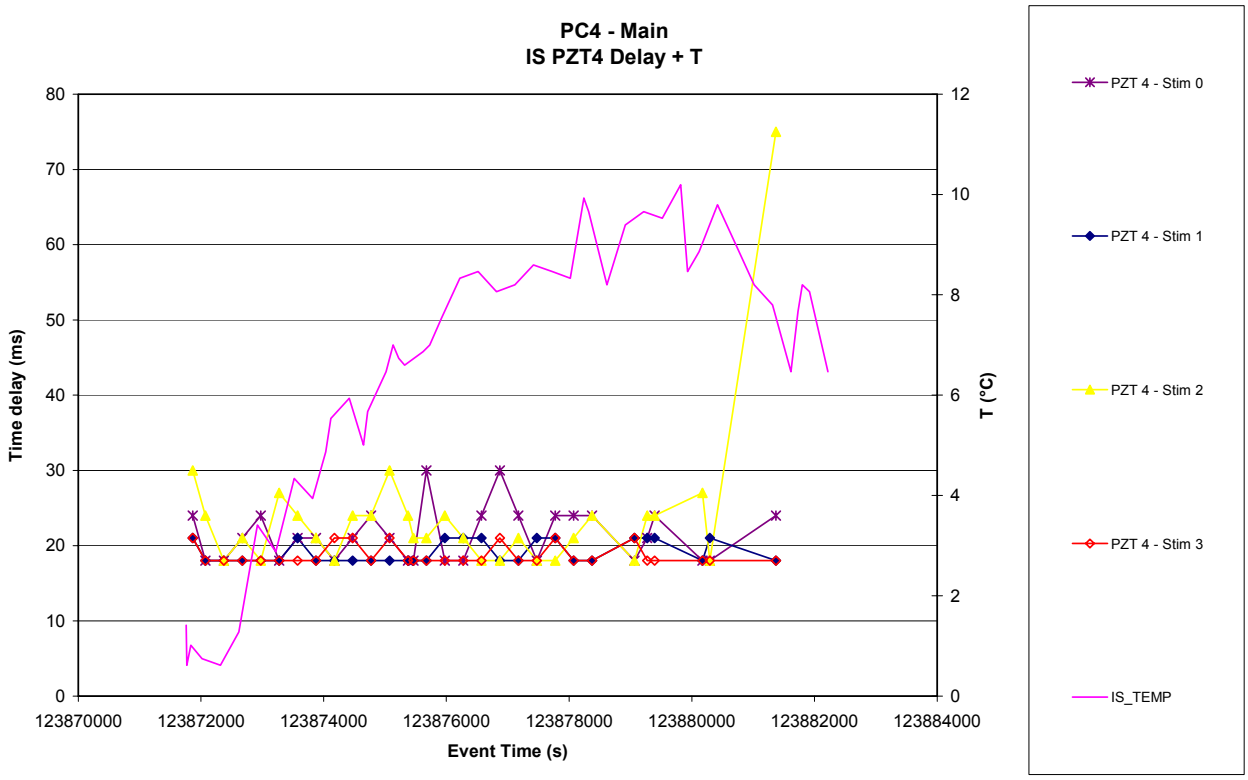


Figure 9.4-28. PZT 5 CAL Time delay vs. time - Main

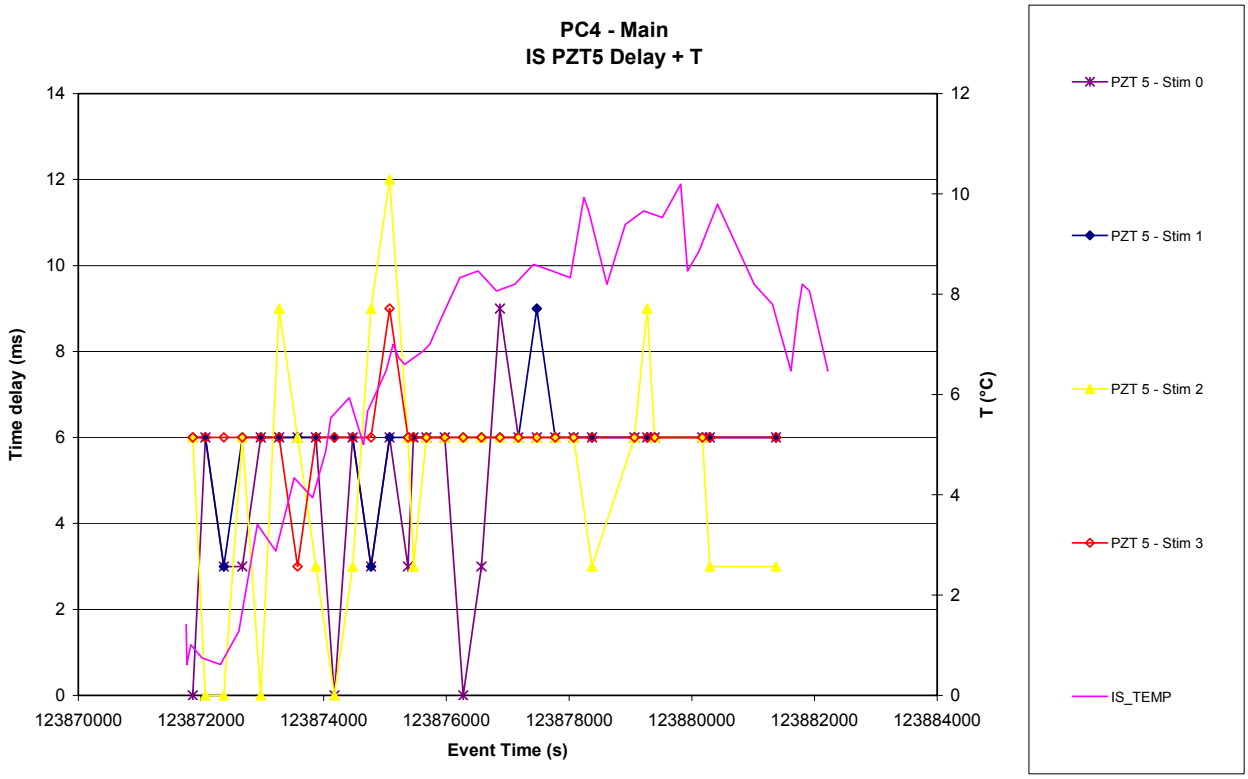


Figure 9.4-29. PZT 1 CAL Signal vs. stimulus – Main

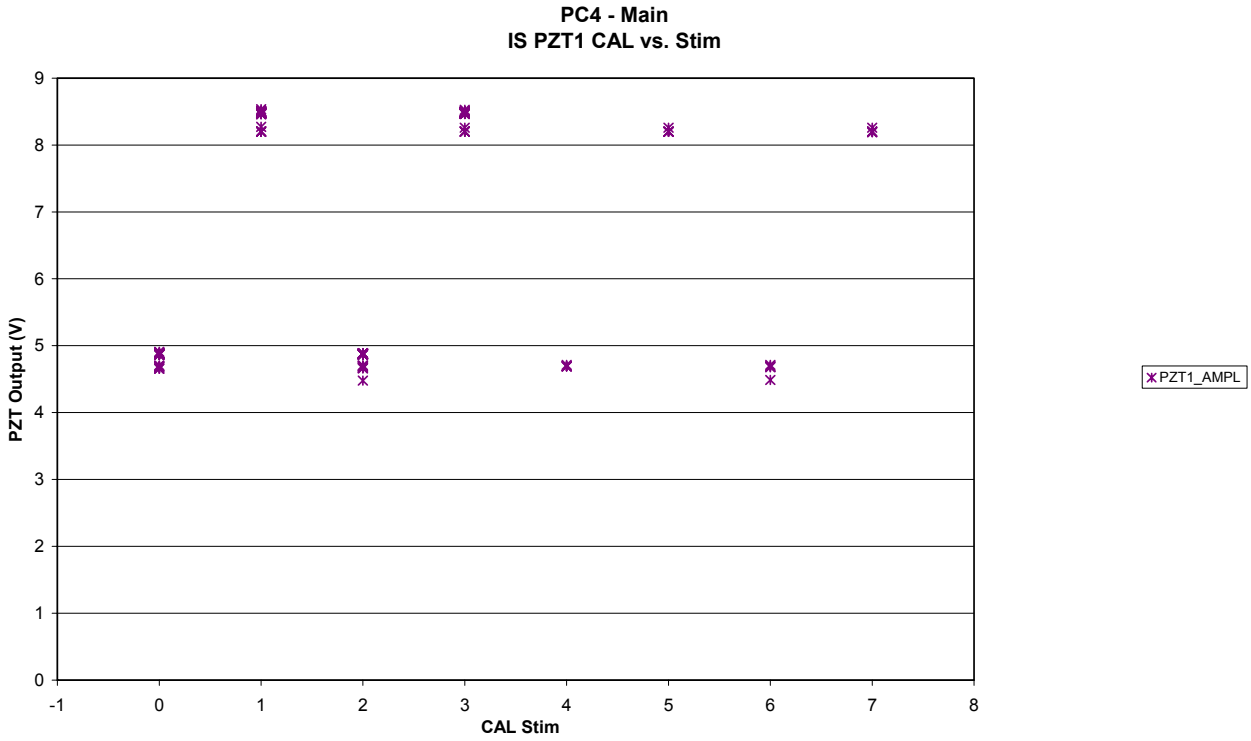


Figure 9.4-30. PZT 2 CAL Signal vs. stimulus – Main

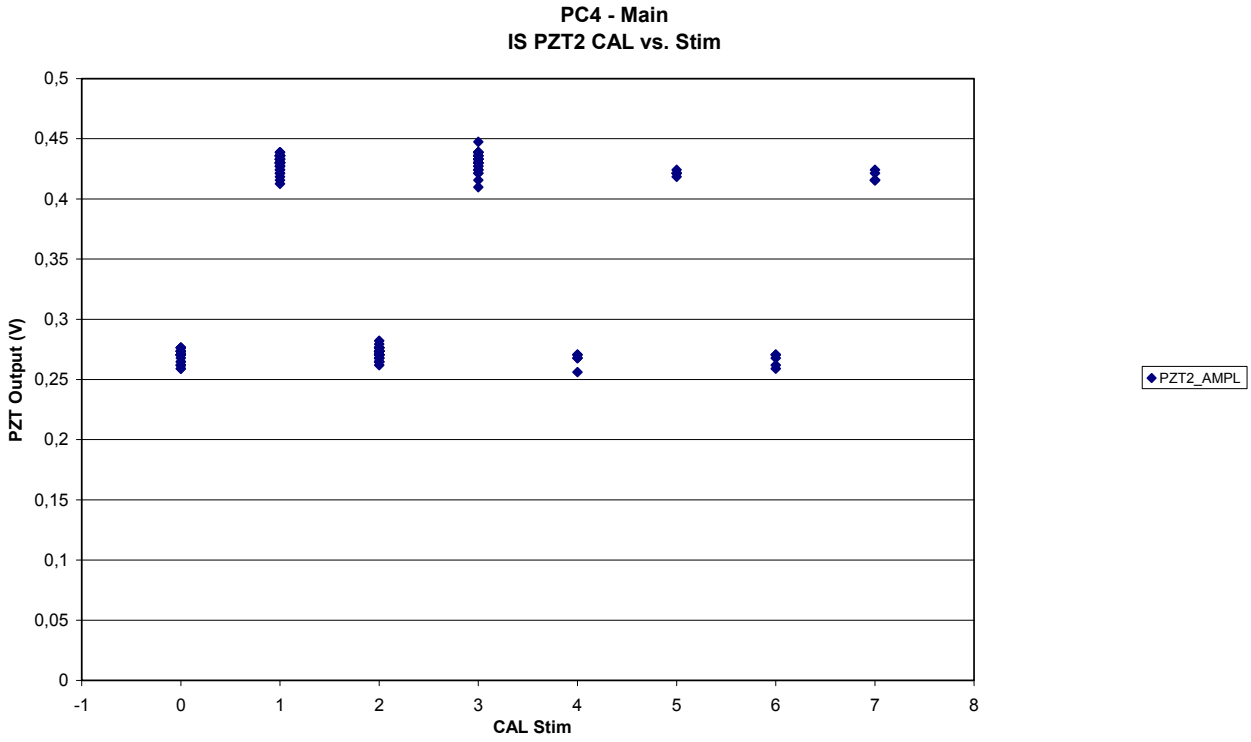


Figure 9.4-31. PZT 3 CAL Signal vs. stimulus – Main

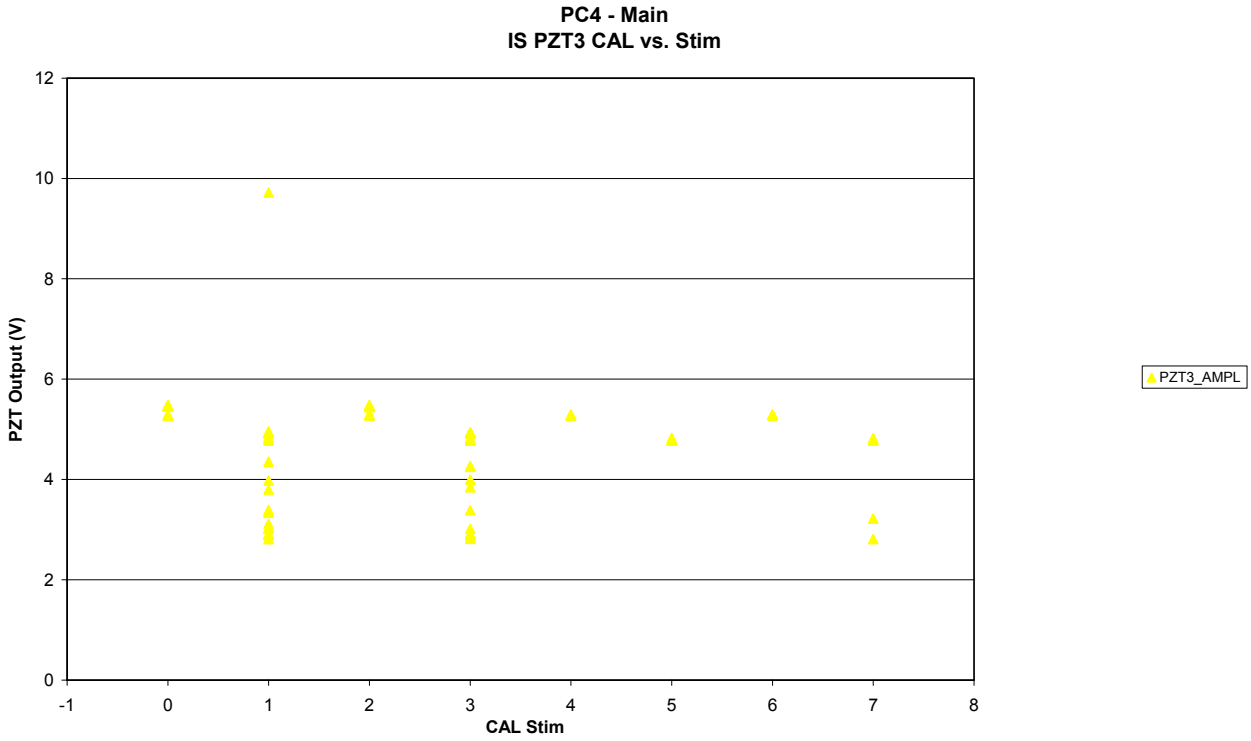


Figure 9.4-32. PZT 4 CAL Signal vs. stimulus – Main

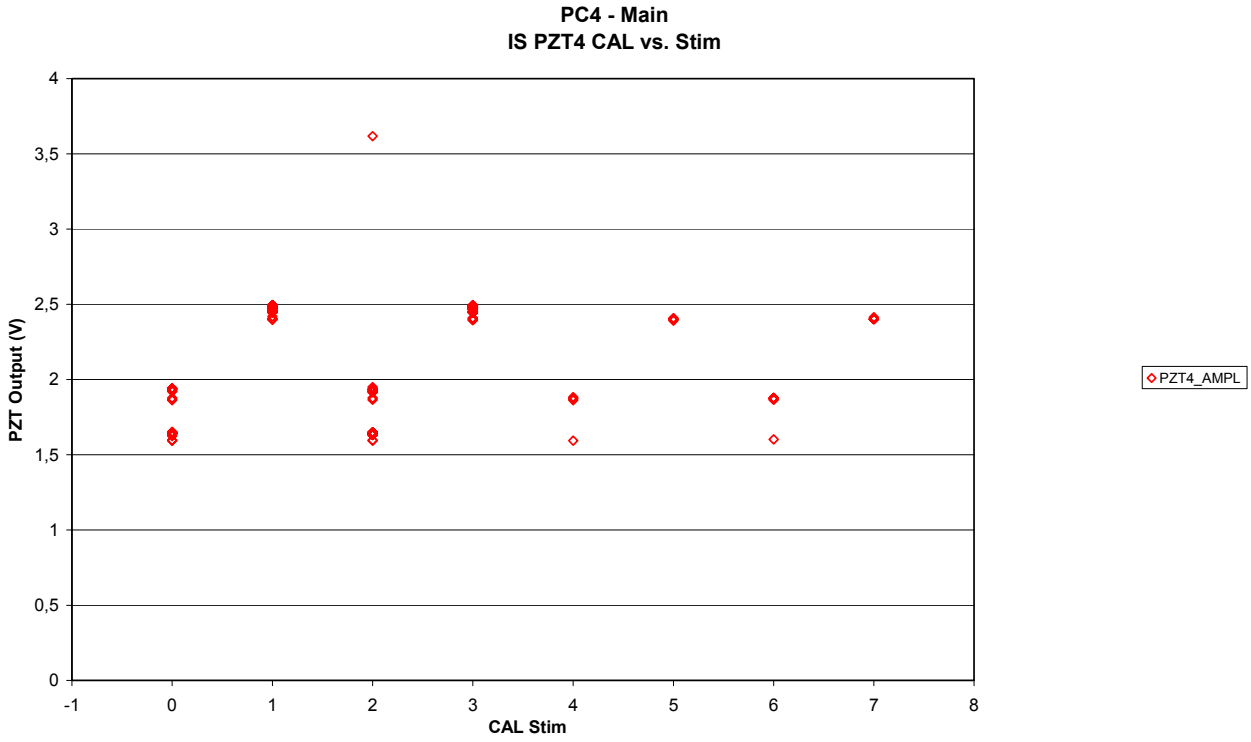


Figure 9.4-33. PZT 5 CAL Signal vs. stimulus – Main

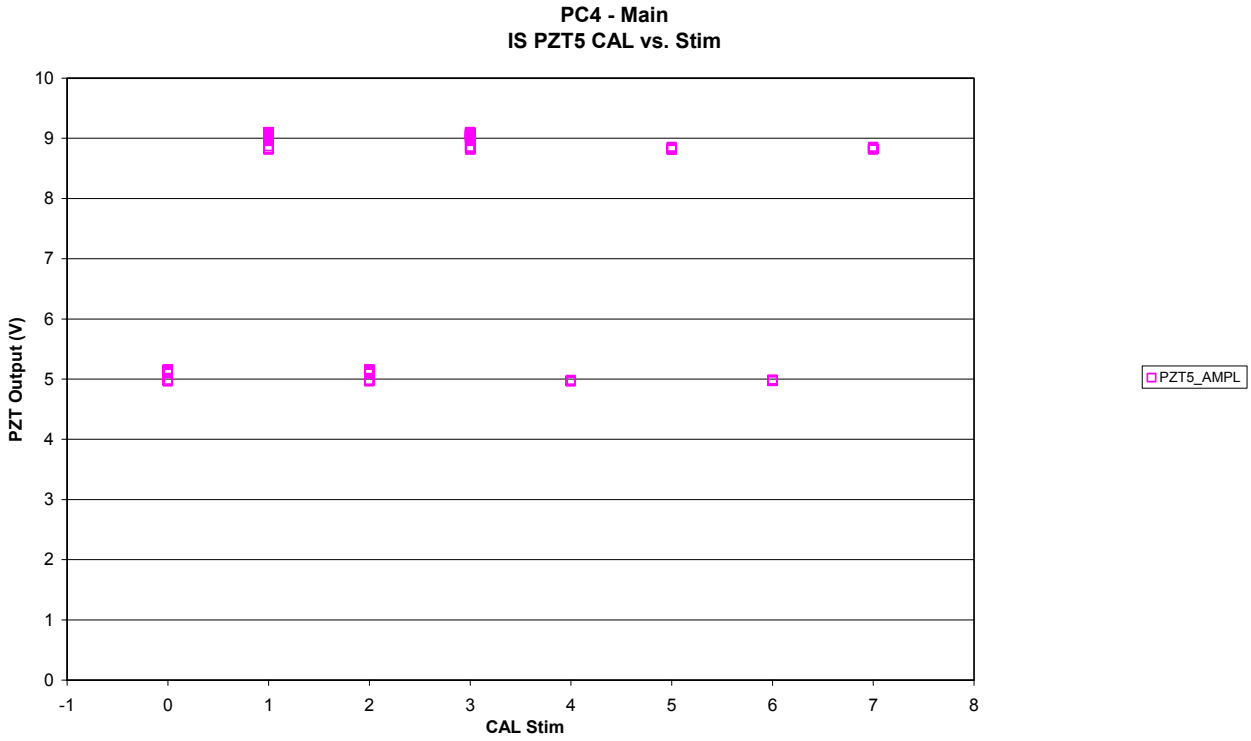


Figure 9.4-34. PZT 1 CAL Time delay vs. stimulus – Main

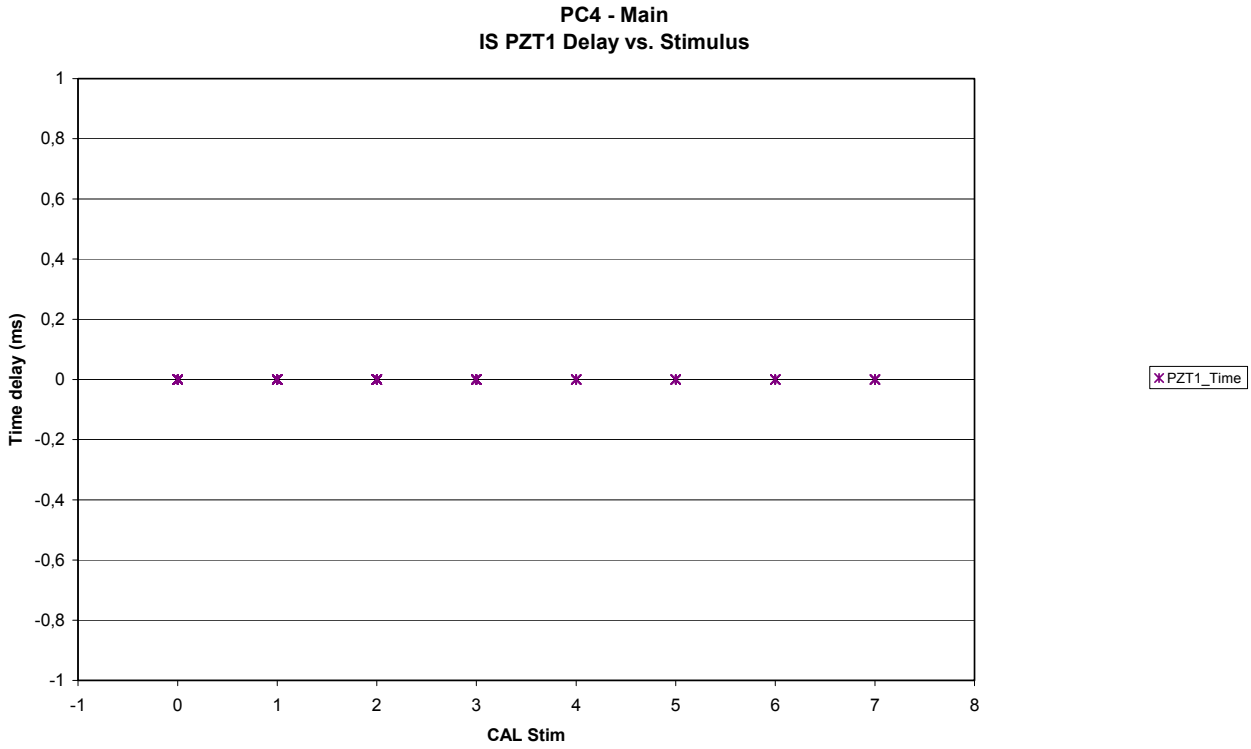


Figure 9.4-35. PZT 2 CAL Time delay vs. stimulus - Main

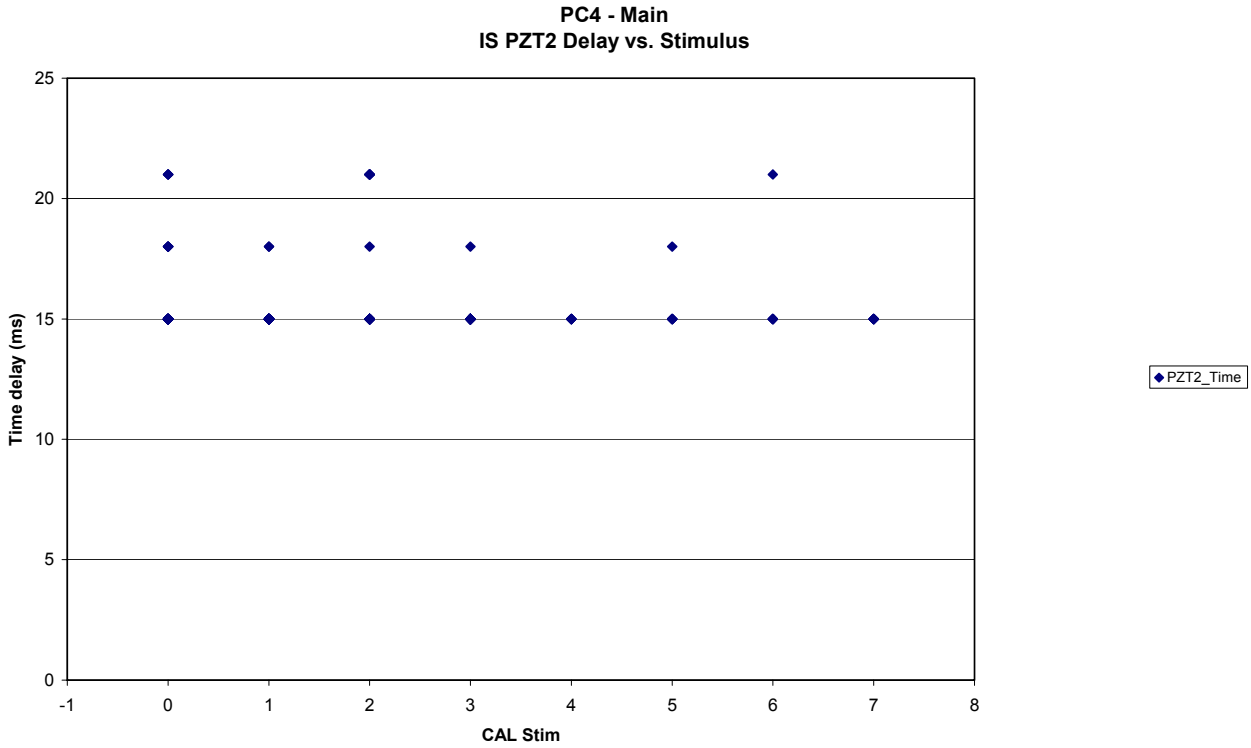


Figure 9.4-36. PZT 3 CAL Time delay vs. stimulus - Main

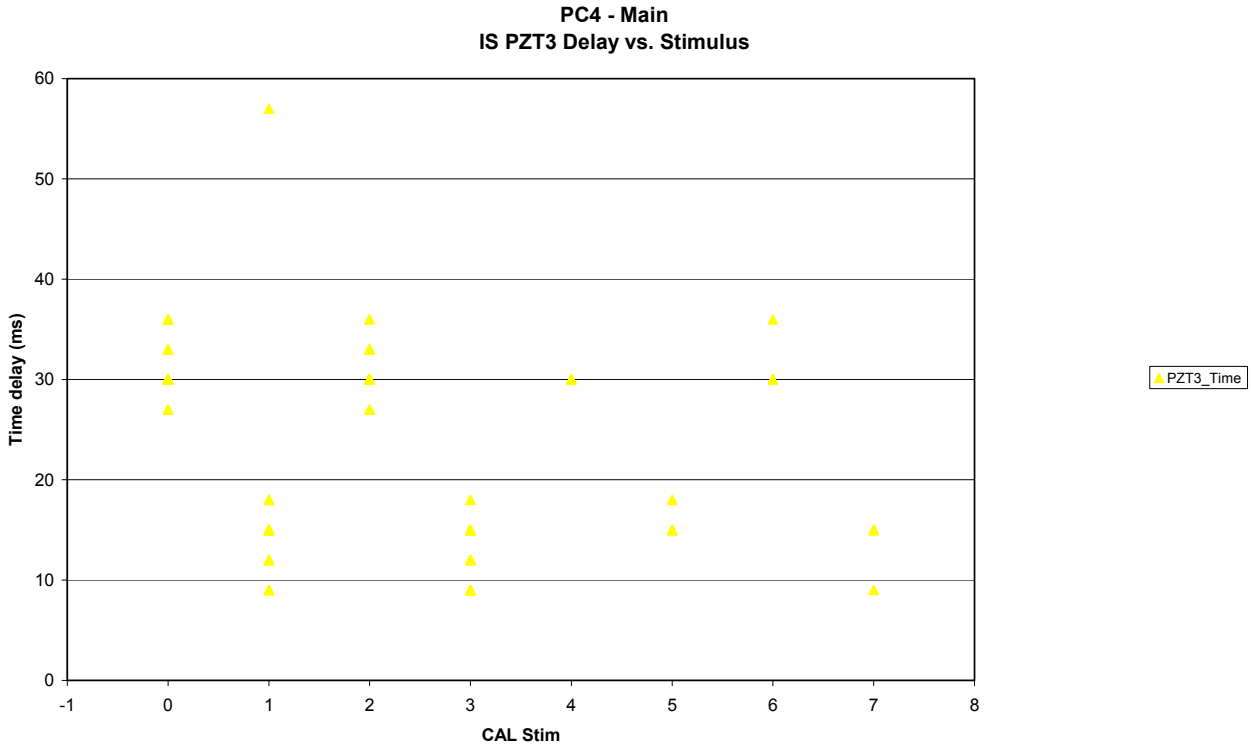


Figure 9.4-37. PZT 4 CAL Time delay vs. stimulus - Main

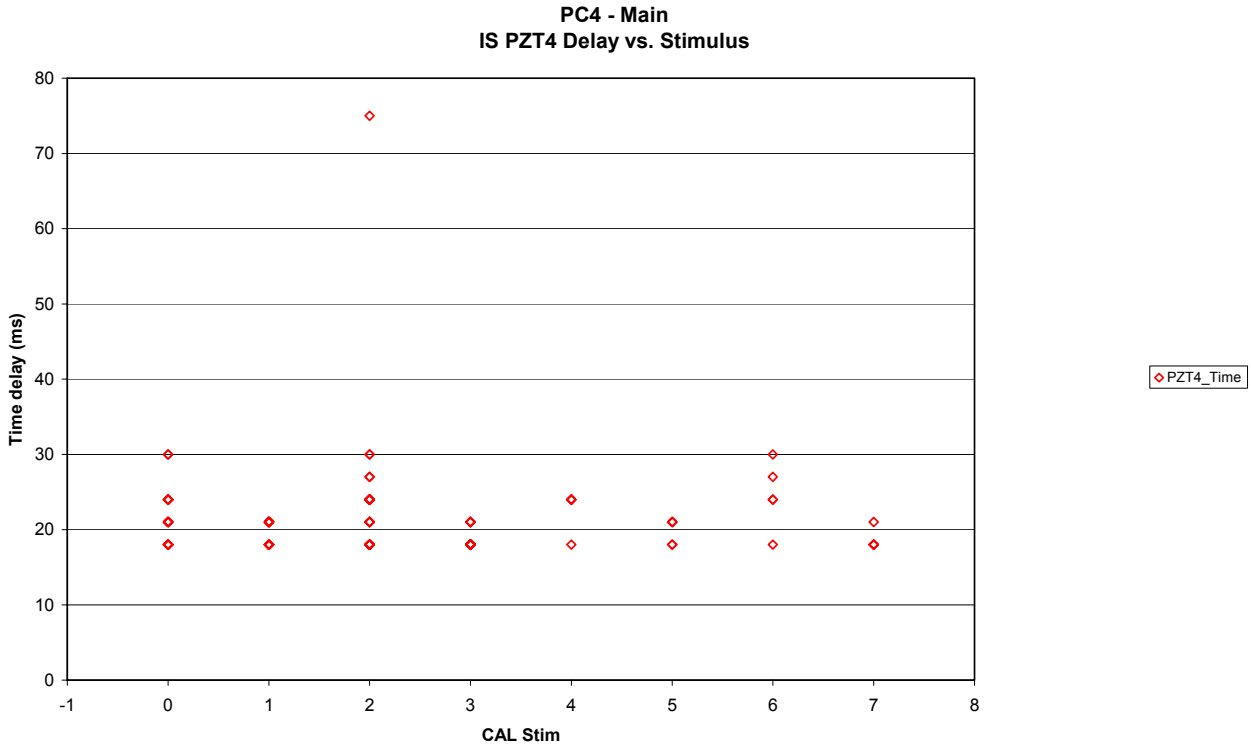
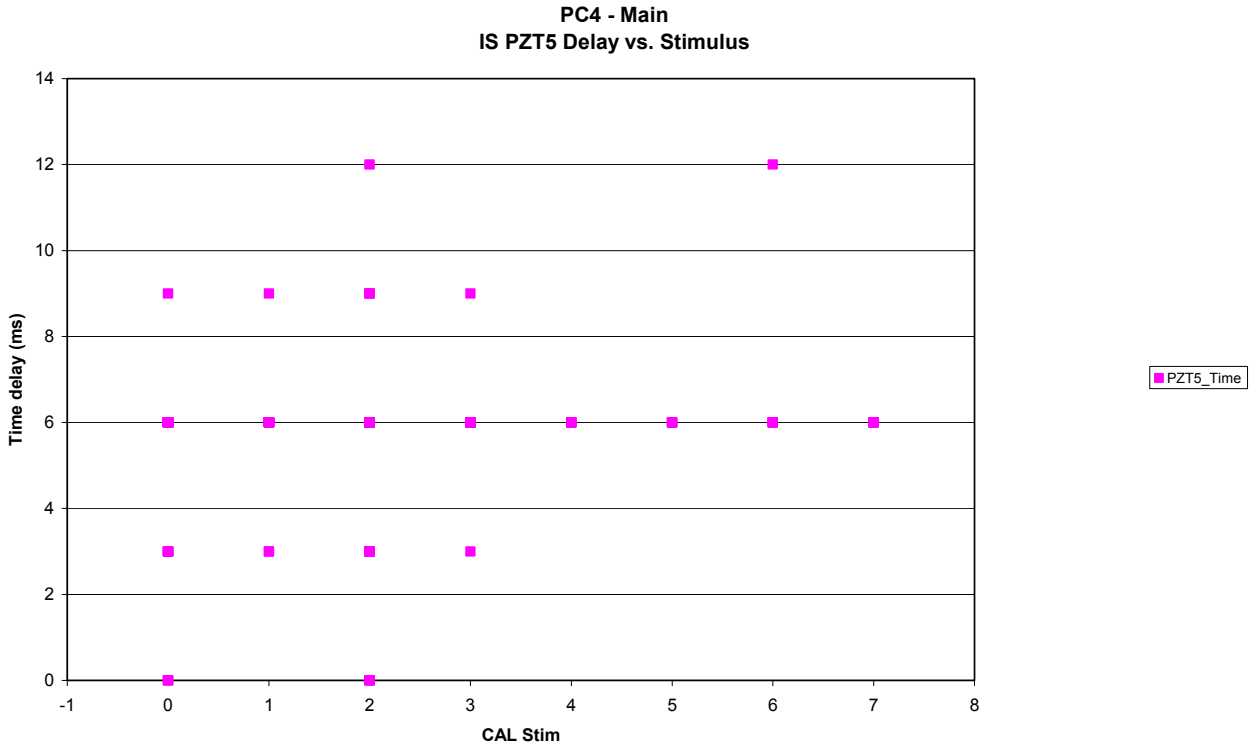


Figure 9.4-38. PZT 5 CAL Time delay vs. stimulus - Main



9.5 MICRO BALANCE SYSTEM (MBS)

9.5.1 MBS – Status

Figure 9.5-1. MBS Operation Status vs. time - Main

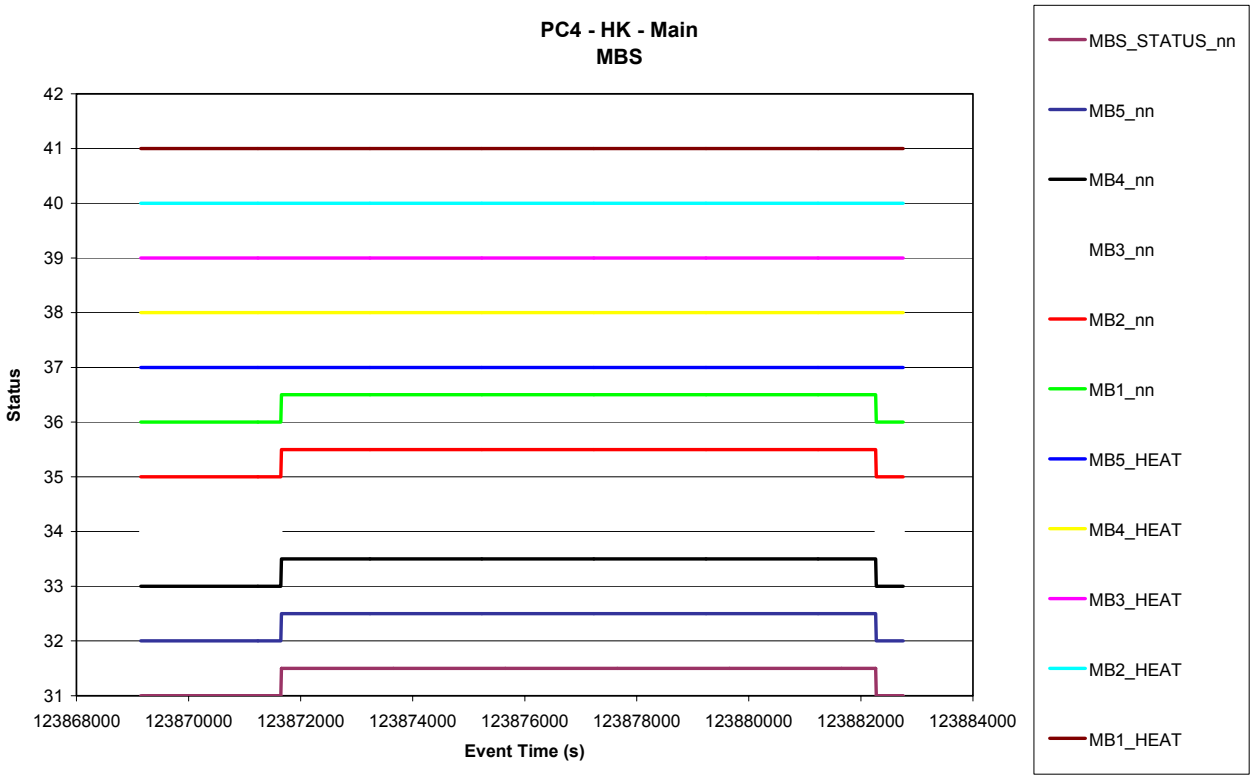


Figure 9.5-2. MBS 1 Temperature vs. time (HK, HK-SCI, SCI) – Main

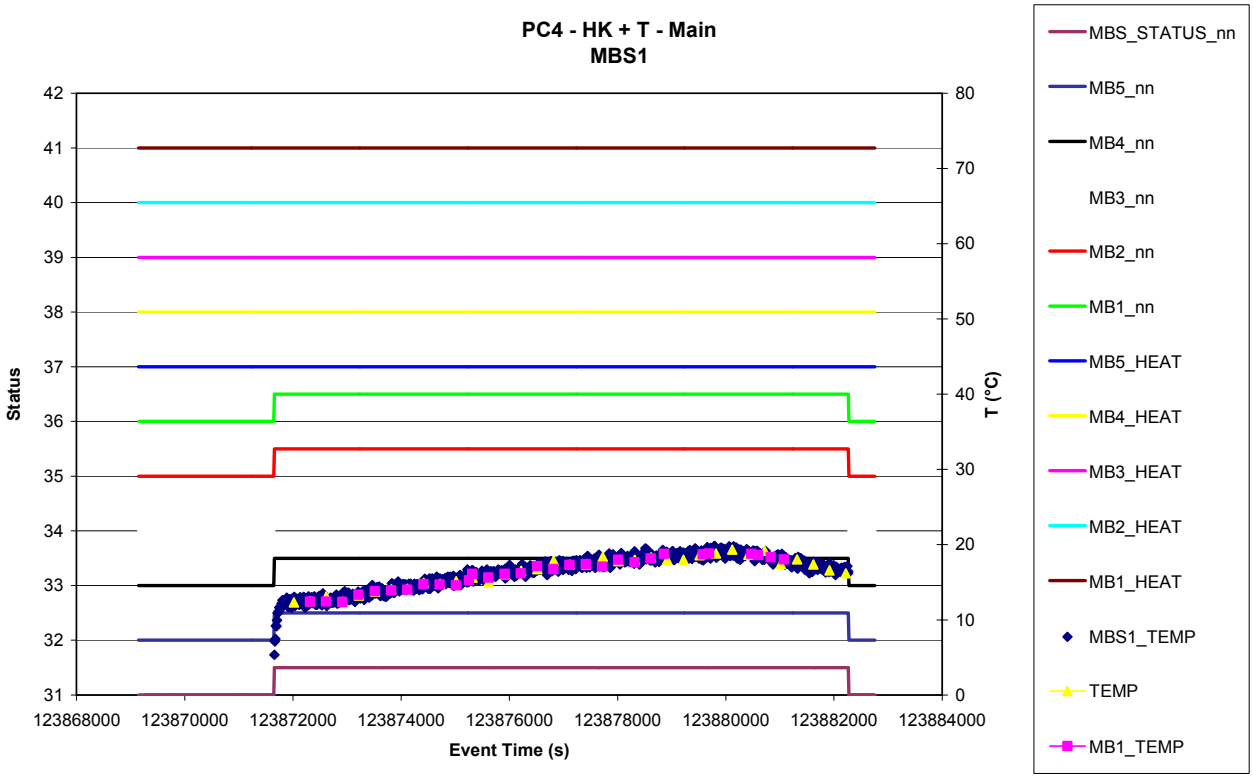


Figure 9.5-3. MBS 2 Temperature vs. time (HK, HK-SCI, SCI) - Main

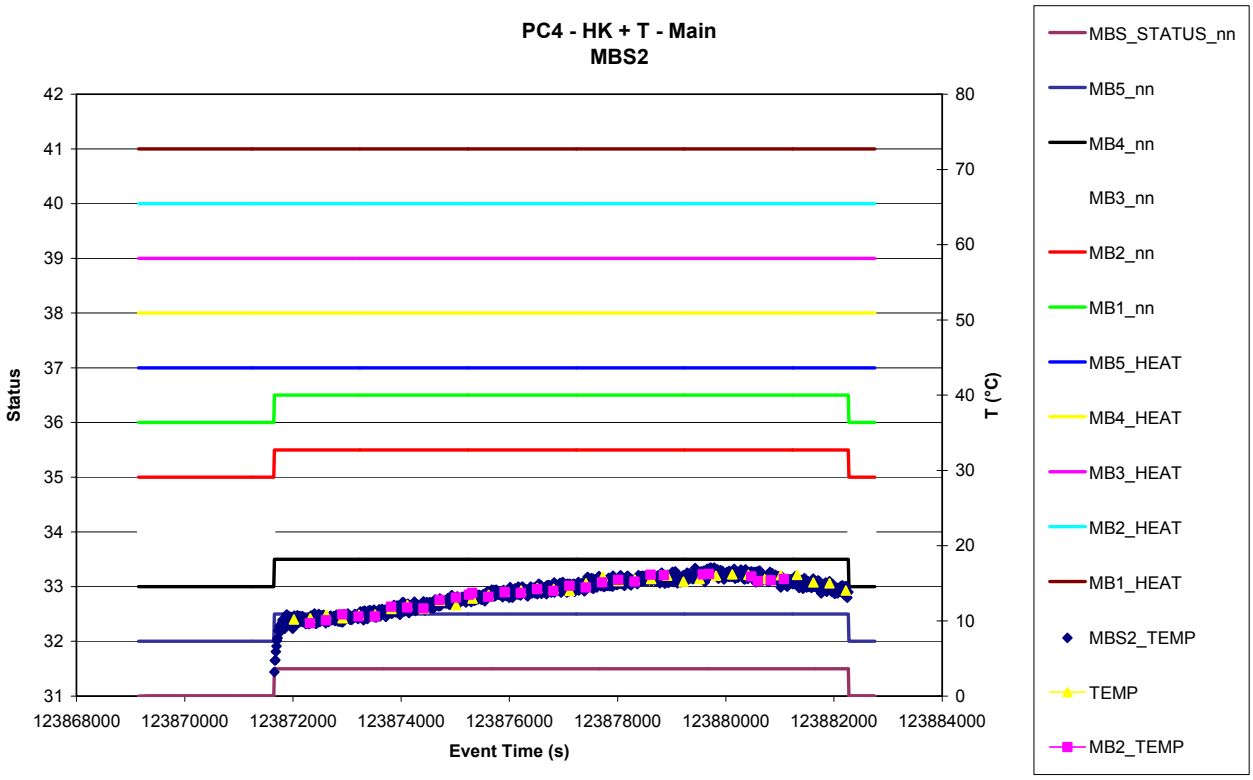


Figure 9.5-4. MBS 3 Temperature vs. time (HK, HK-SCI, SCI) - Main

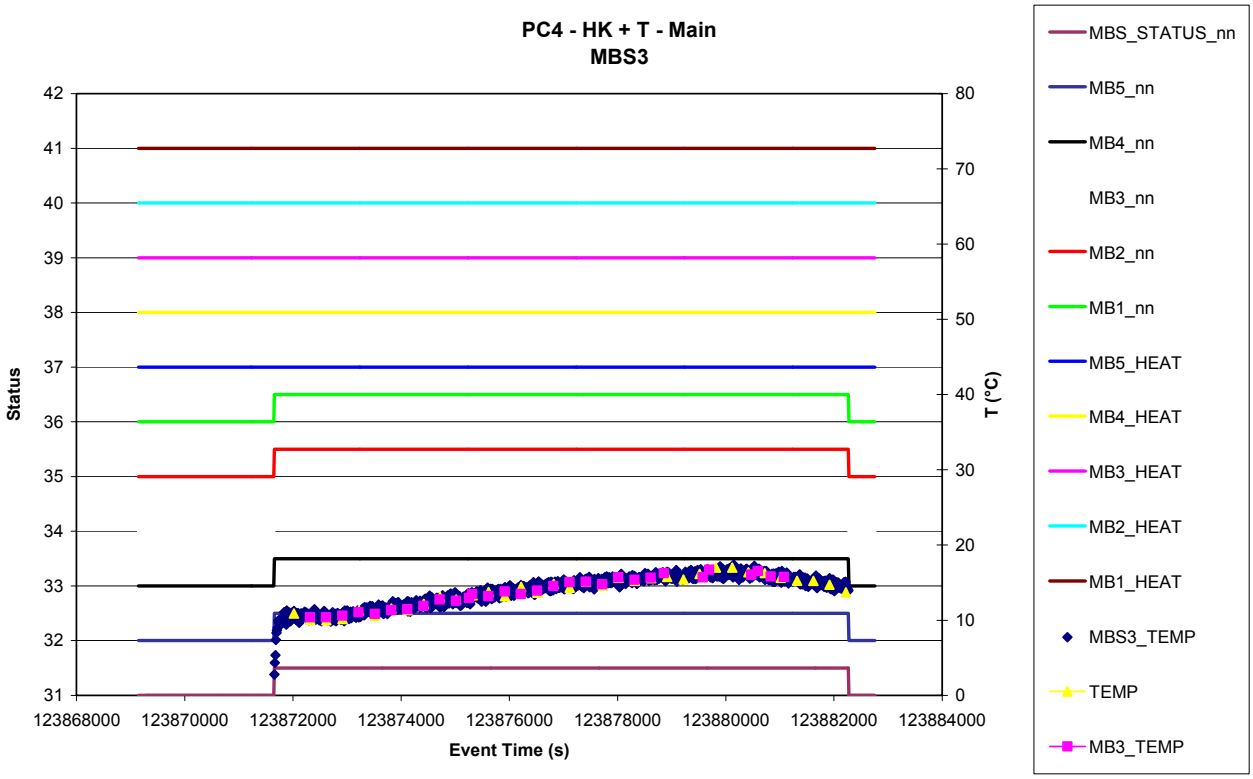


Figure 9.5-5. MBS 4 Temperature vs. time (HK, HK-SCI, SCI) - Main

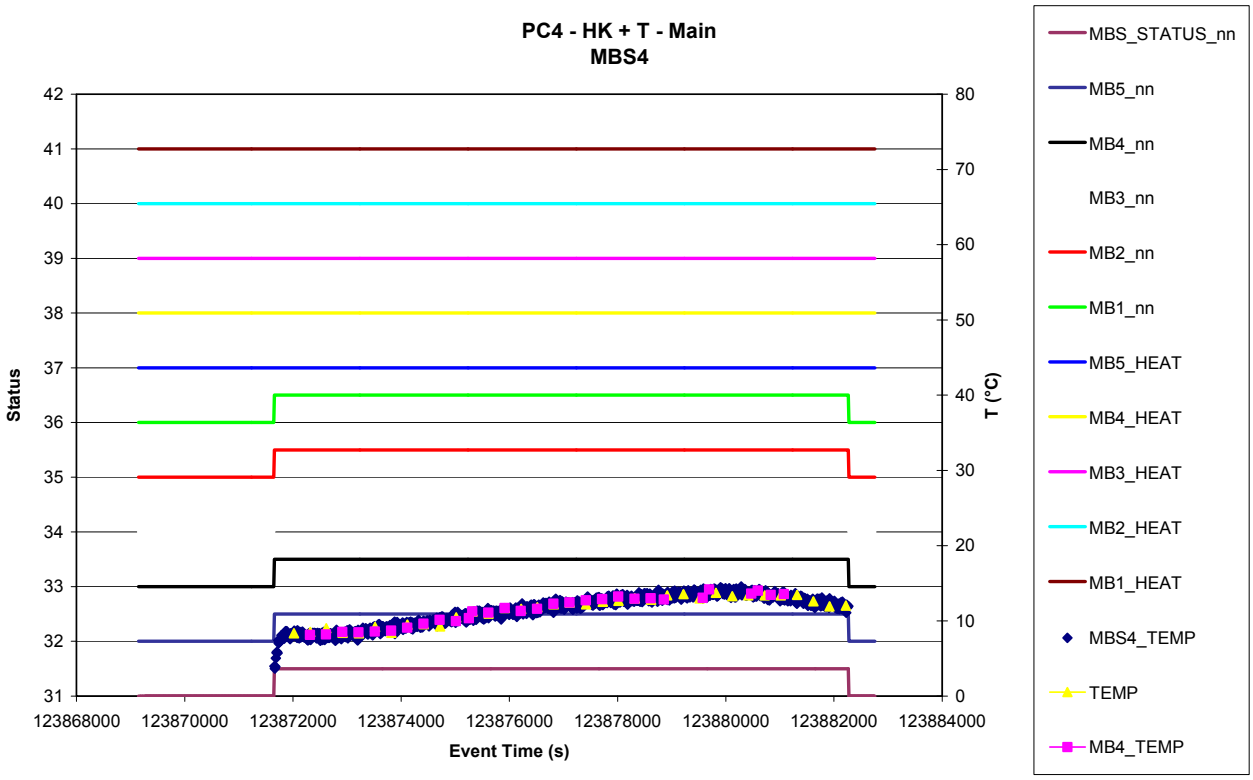
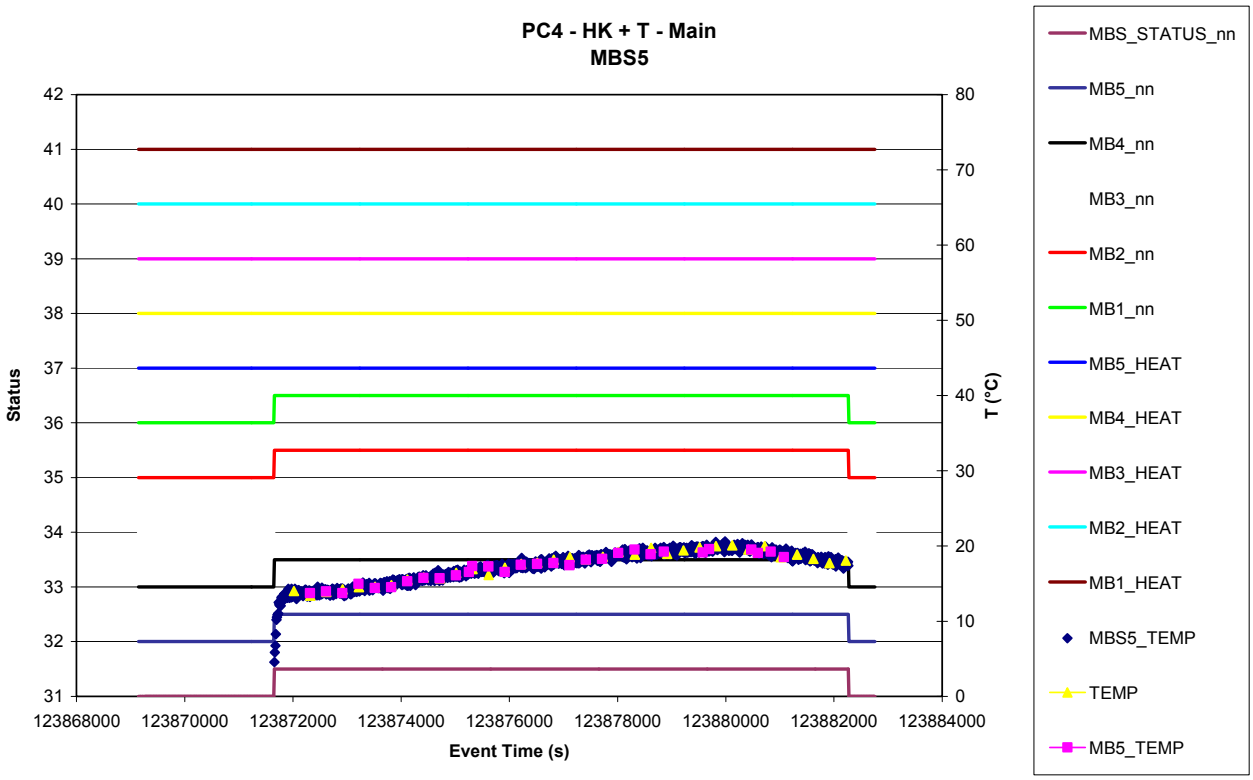


Figure 9.5-6. MBS 5 Temperature vs. time (HK, HK-SCI, SCI) - Main



9.5.2 MBS – Behaviour

9.5.2.1 Science Events (Normal + Heating)

Figure 9.5-7. MBS 1 Frequency and Temperature vs. time - Main

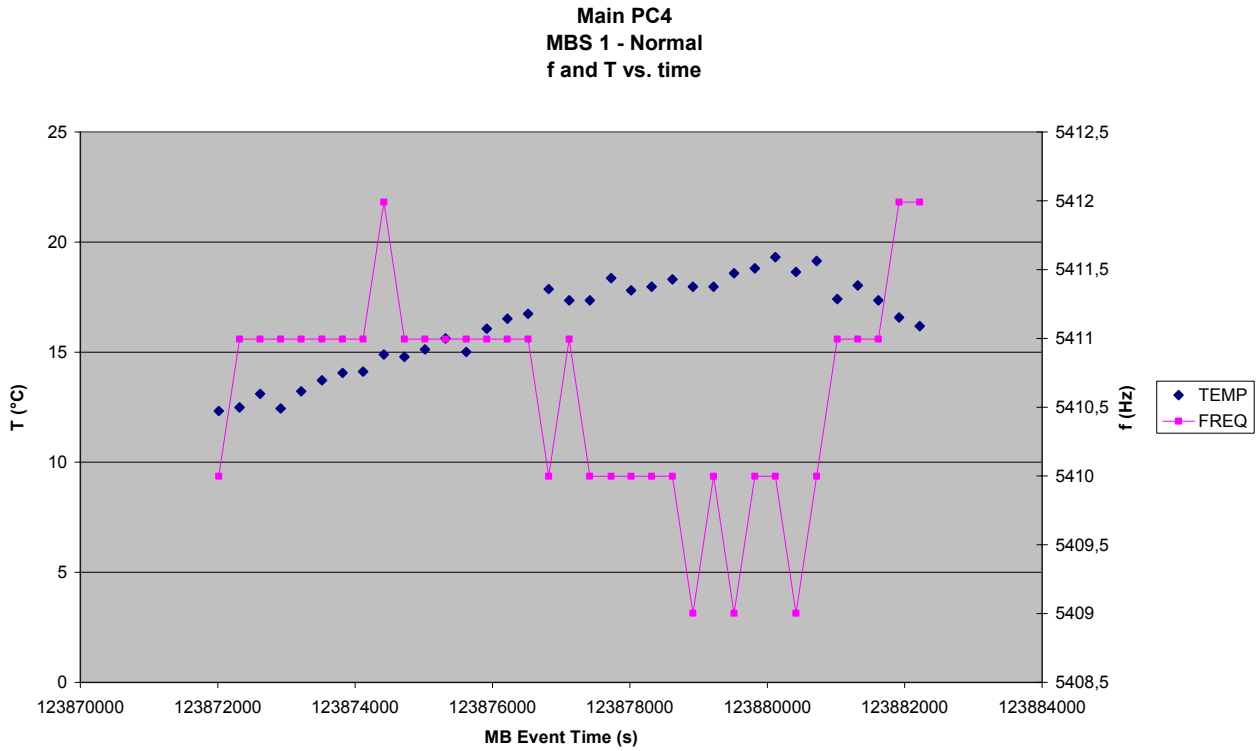


Figure 9.5-8. MBS 2 Frequency and Temperature vs. time - Main

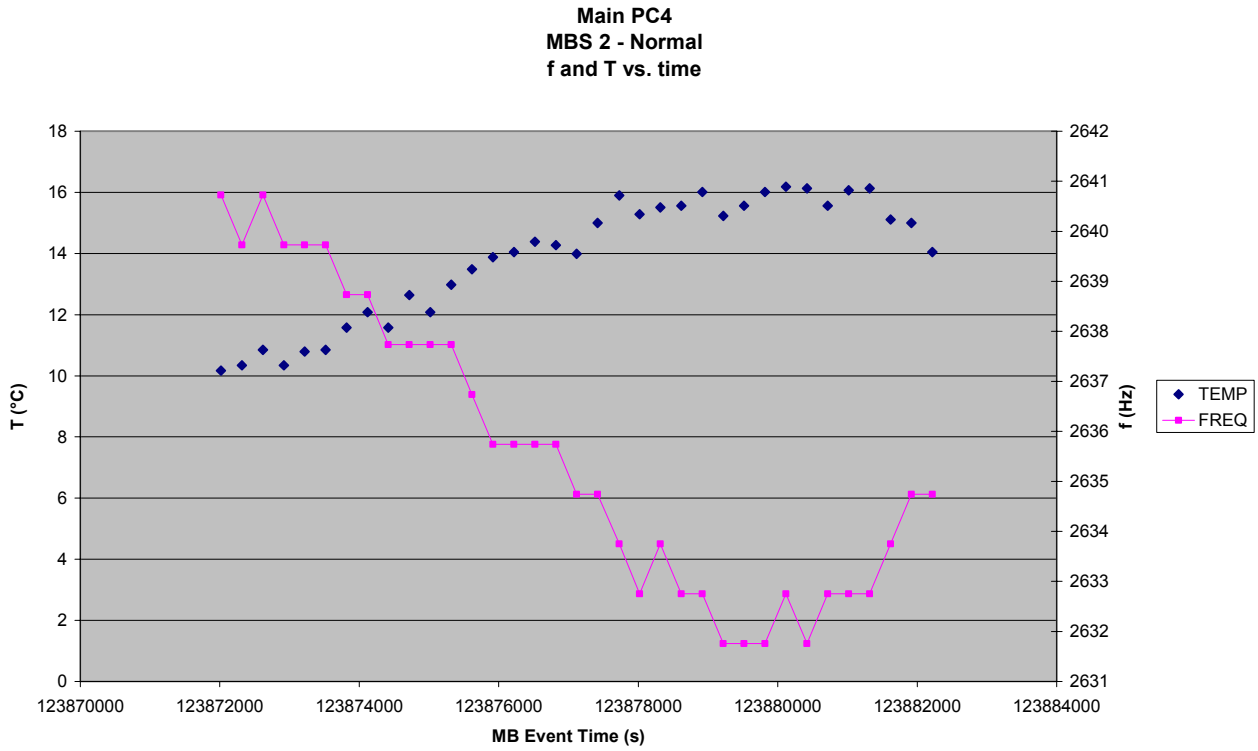


Figure 9.5-9. MBS 3 Frequency and Temperature vs. time - Main

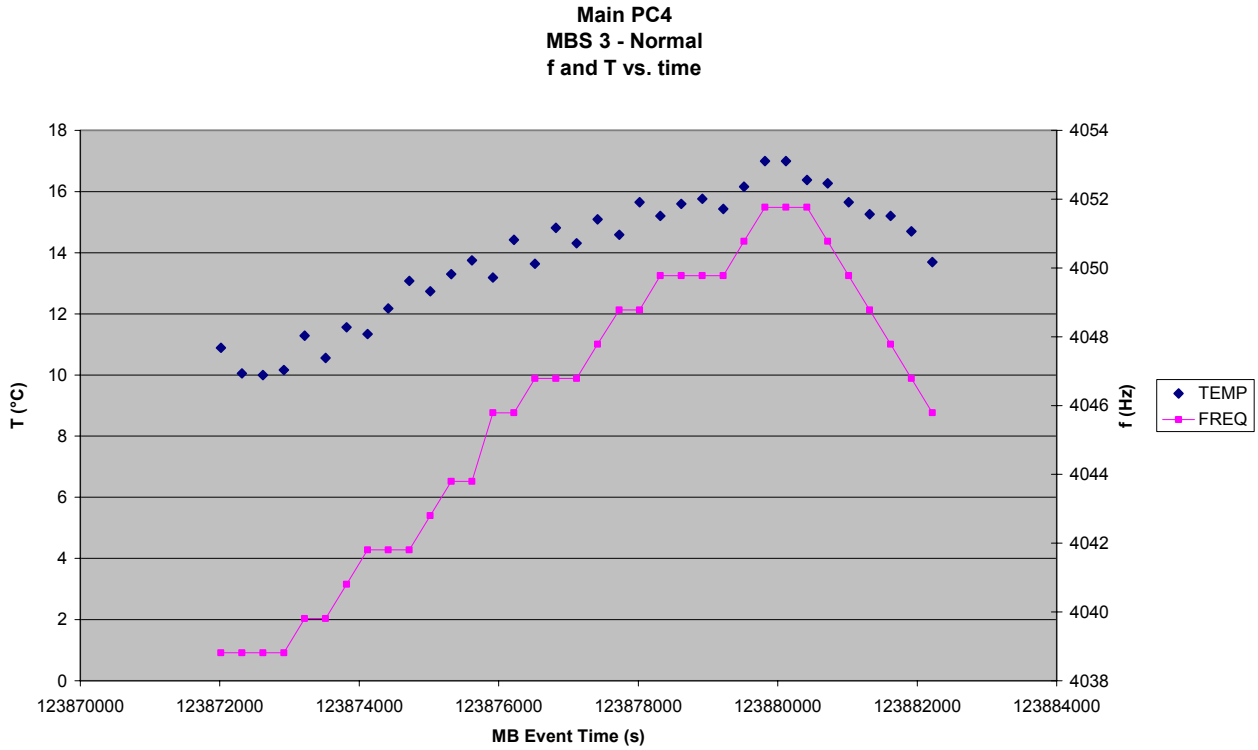


Figure 9.5-10. MBS 4 Frequency and Temperature vs. time - Main

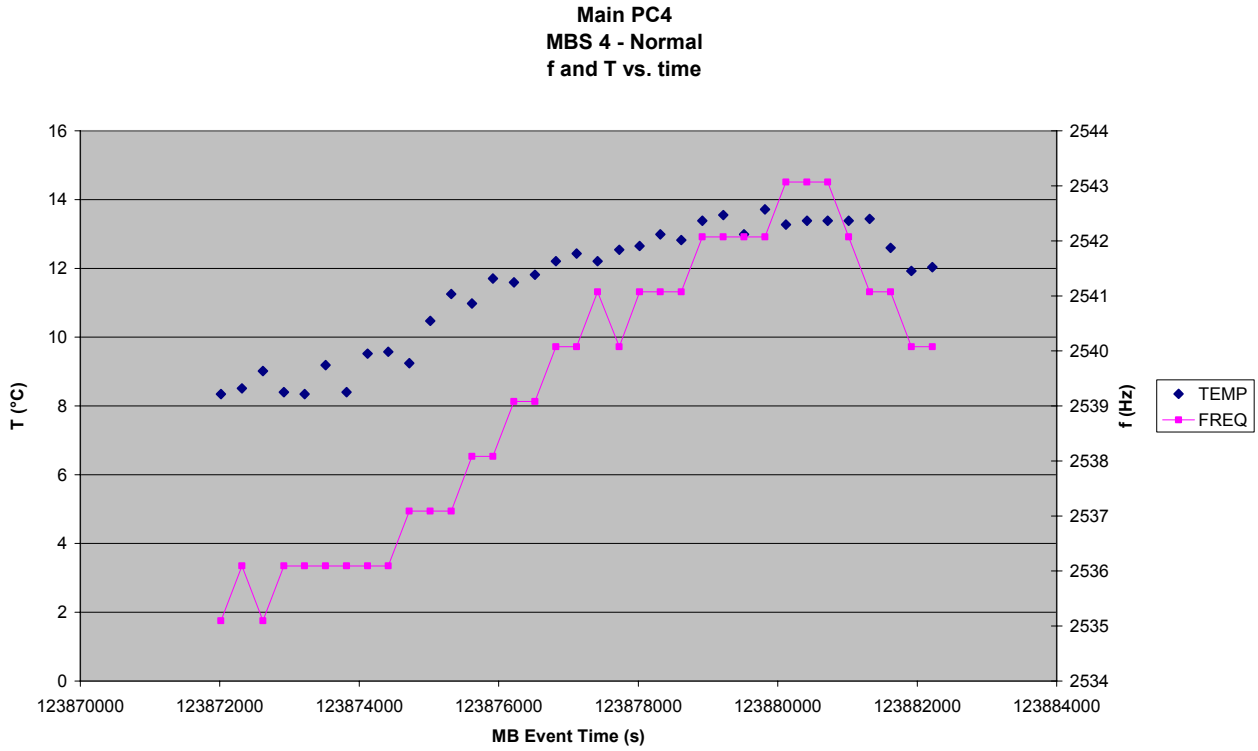
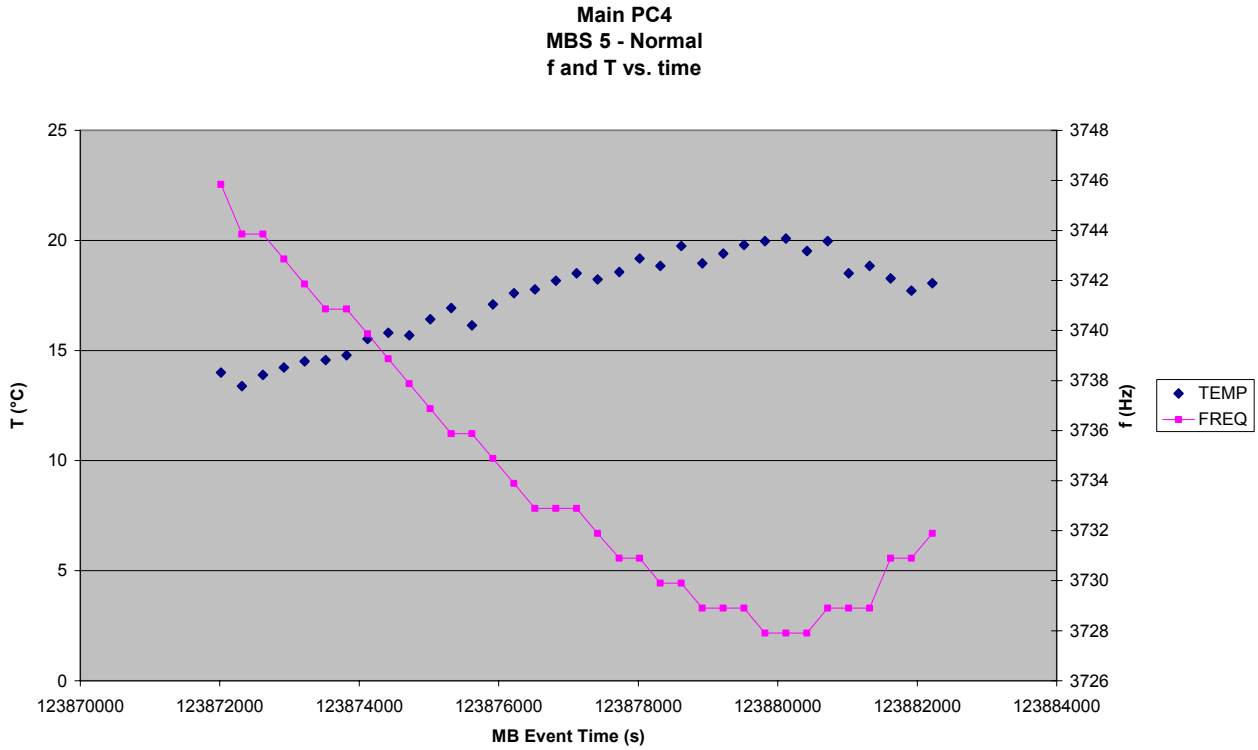


Figure 9.5-11. MBS 5 Frequency and Temperature vs. time - Main



10. COMPARISIONS WITH PREVIOUS TESTS

10.1 GRAIN DETECTION SYSTEM (GDS)

10.1.1 Laser Light Mon vs. Temperature

Figure 10.1-1. GDS Laser 1 Light Mon vs. Temperature (PC4 in green)

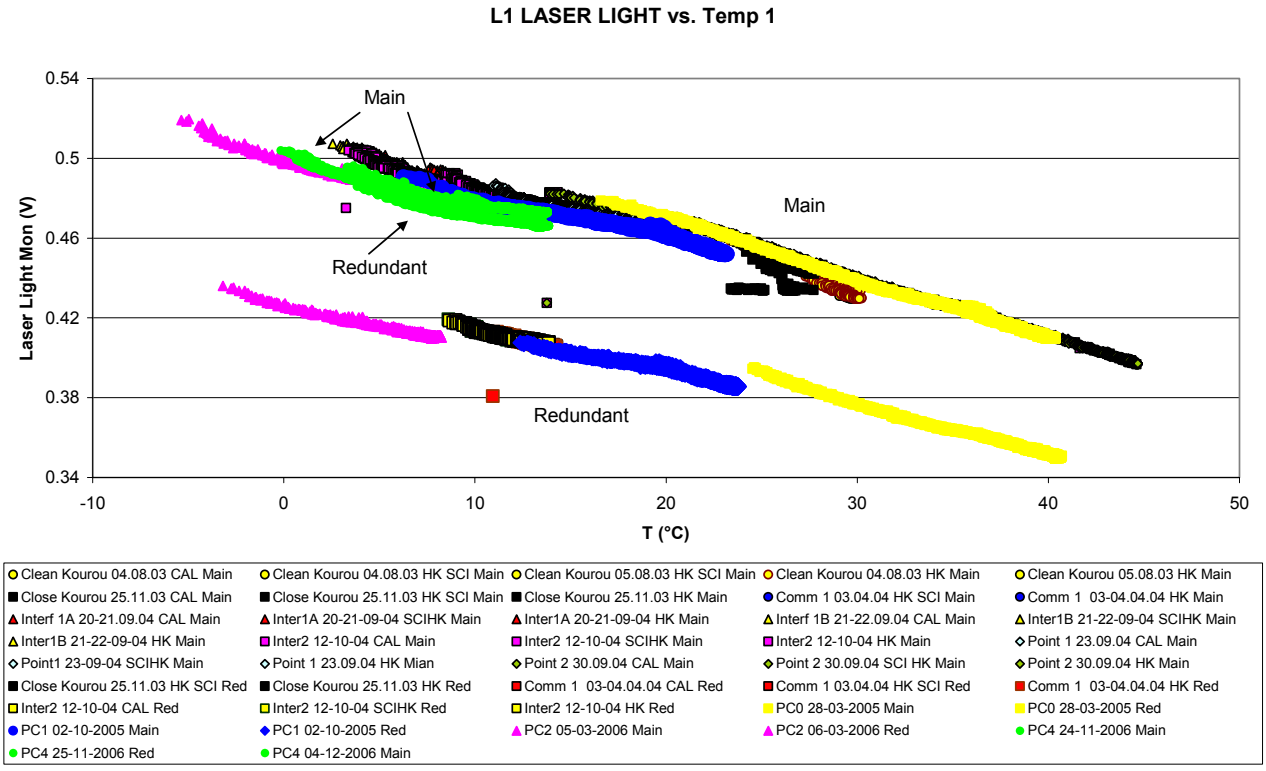


Figure 10.1-2. GDS Laser 2 Light Mon vs. Temperature (PC4 in green)

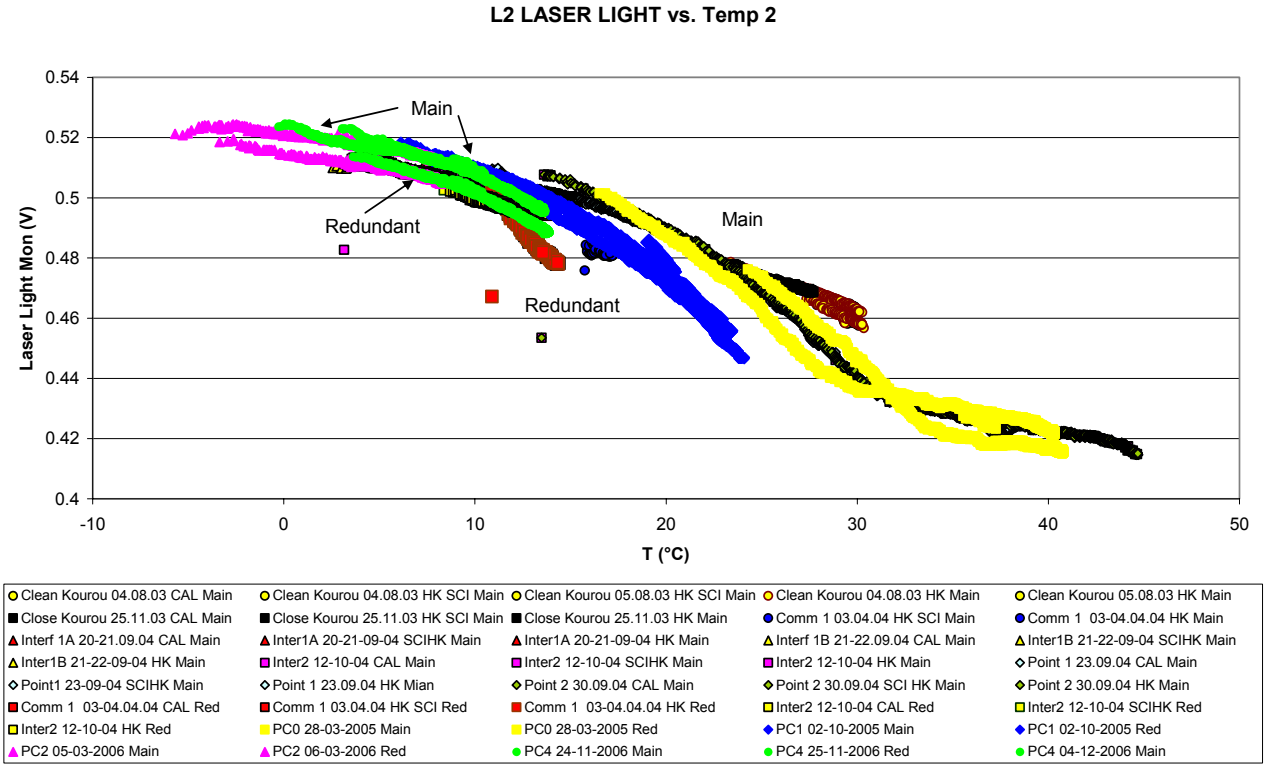


Figure 10.1-3. GDS Laser 3 Light Mon vs. Temperature (PC4 in green)

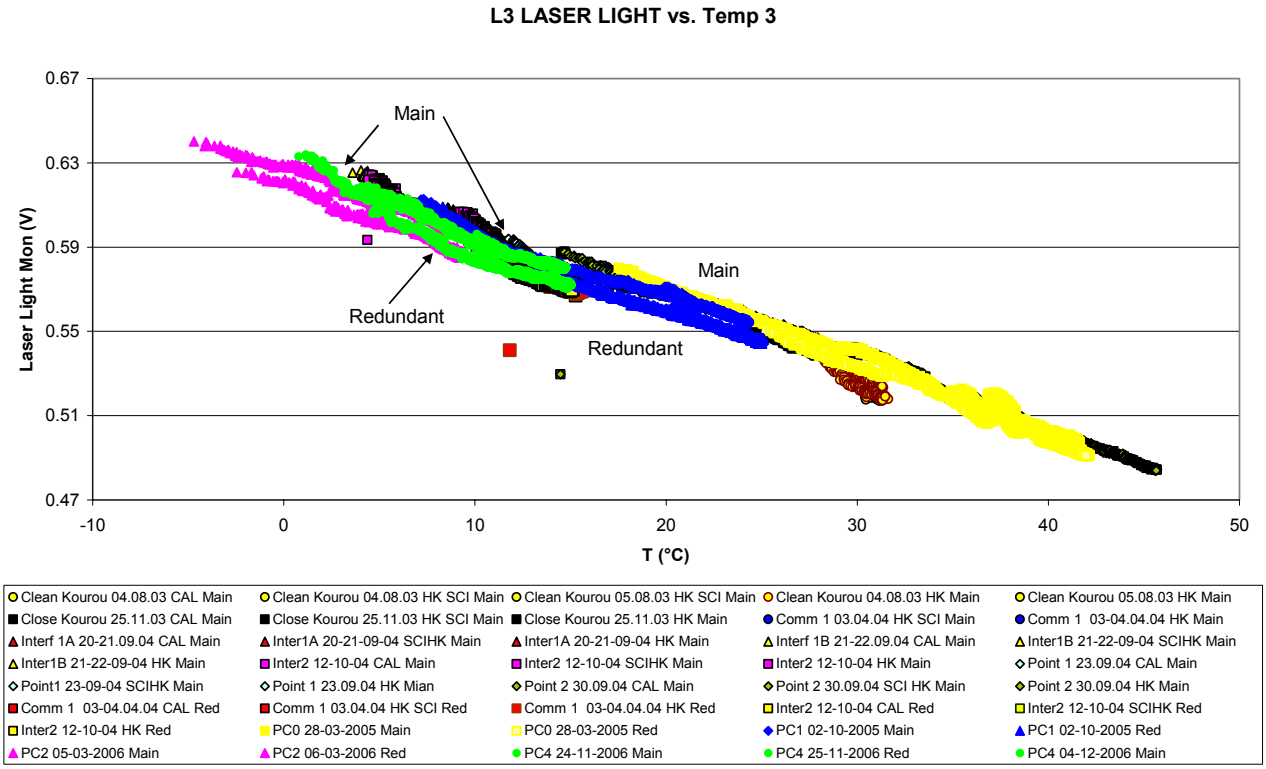
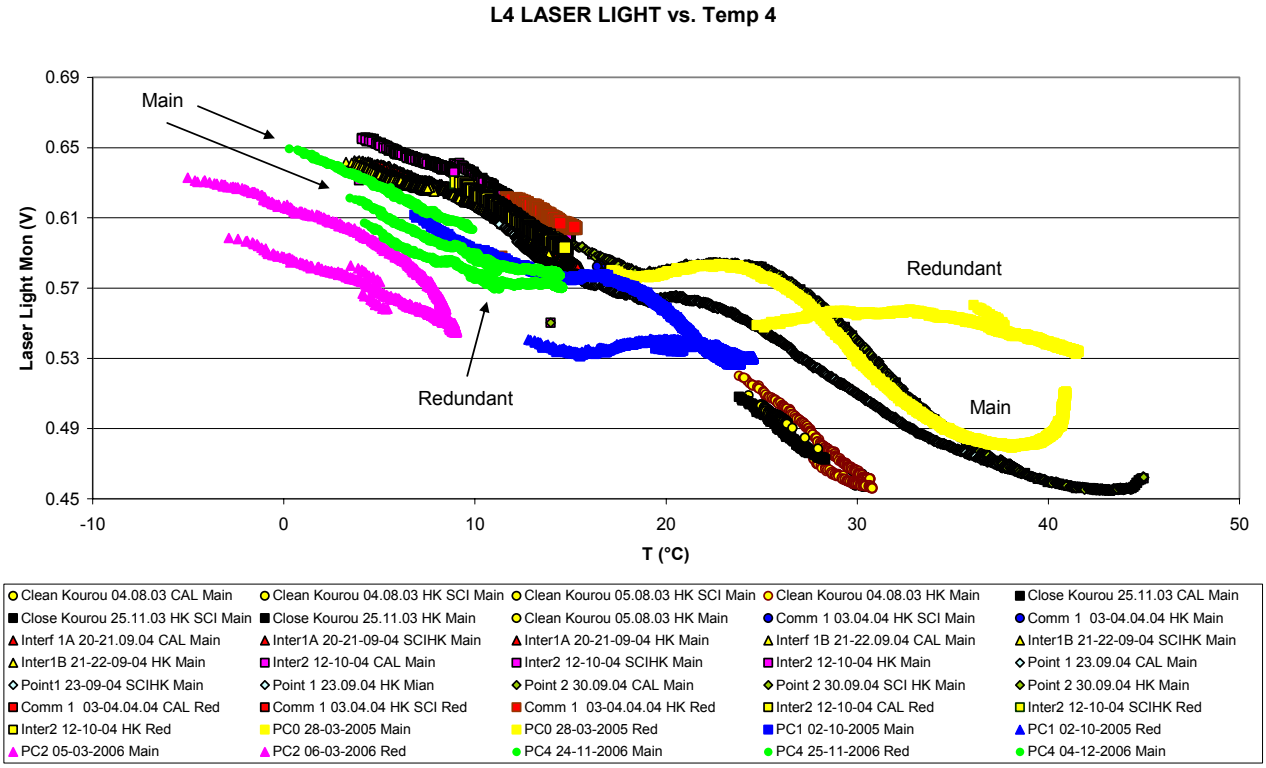


Figure 10.1-4. GDS Laser 4 Light Mon vs. Temperature (PC4 in green)



10.2 IMPACT SENSOR (IS)

10.2.1 CAL Amplitude vs. Temperature

Figure 10.2-1. IS PZT-1 CAL Amplitude vs. T – High Voltage

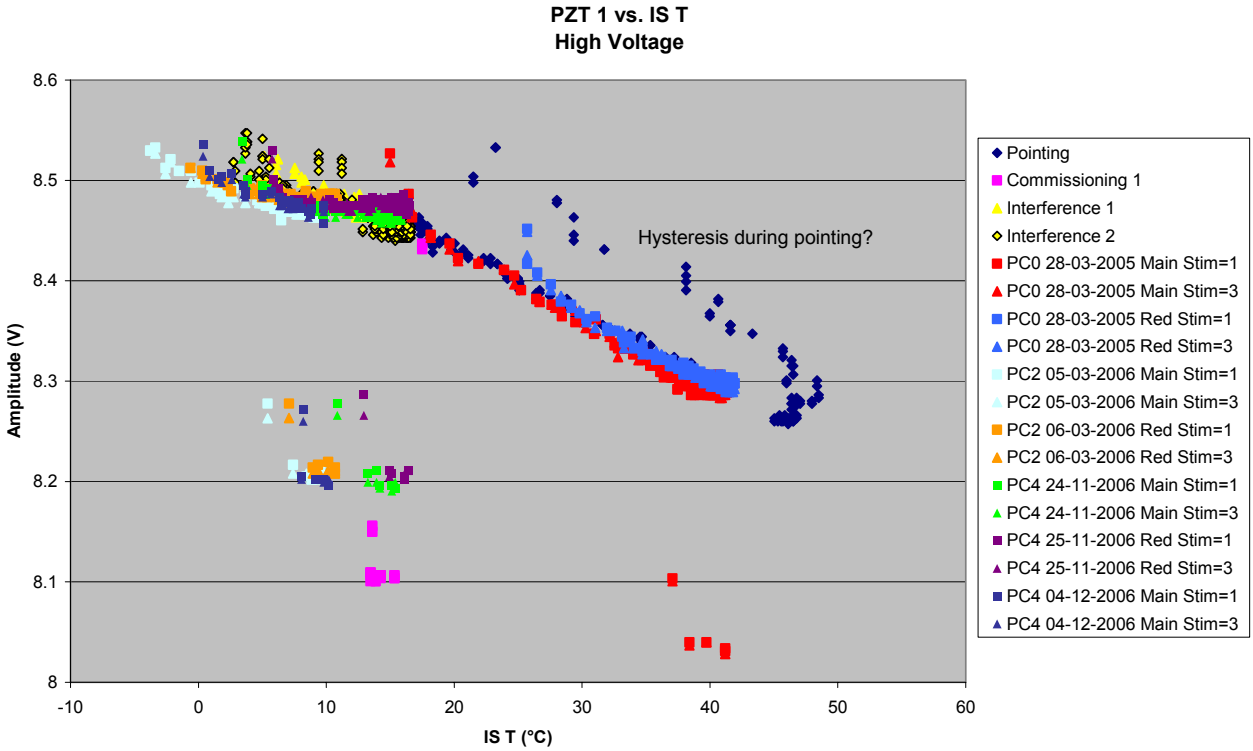
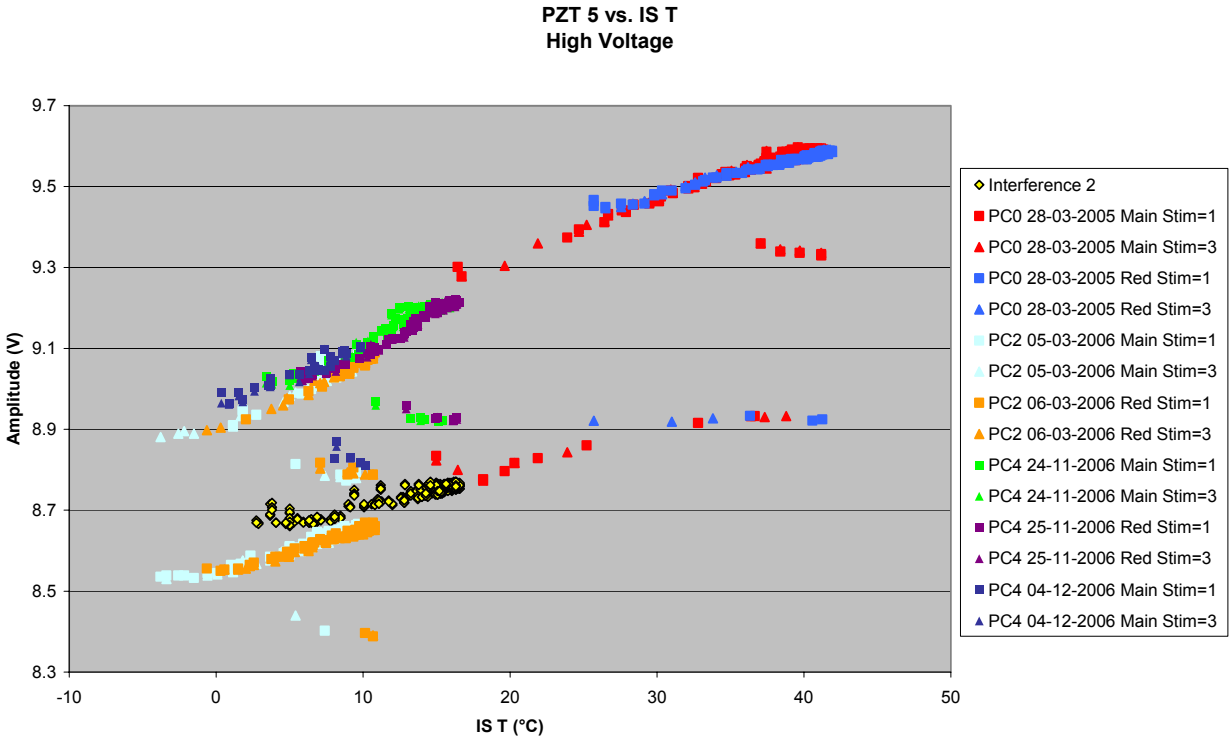


Figure 10.2-2. IS PZT-5 CAL Amplitude vs. T – High Voltage



10.3 MICRO BALANCE SYSTEM (MBS)

10.3.1 Frequency vs. Temperature

Figure 10.3-1. MBS 1 Frequency vs. Temperature

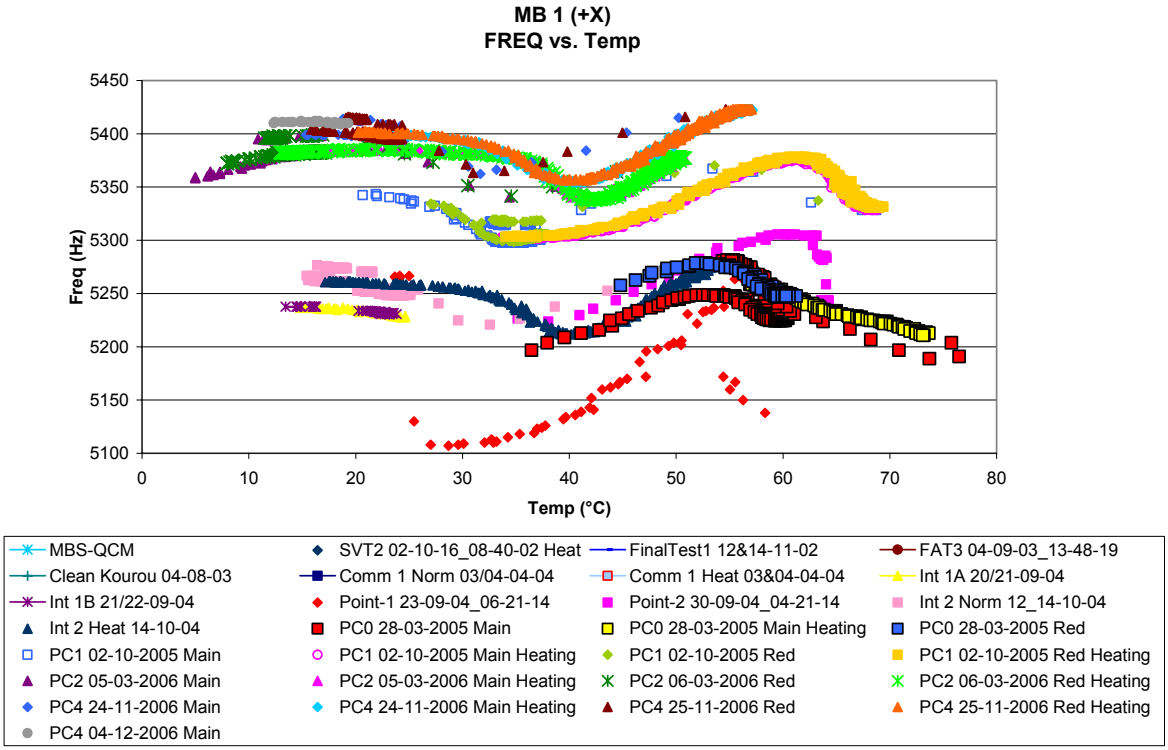


Figure 10.3-2. MBS 2 Frequency vs. Temperature

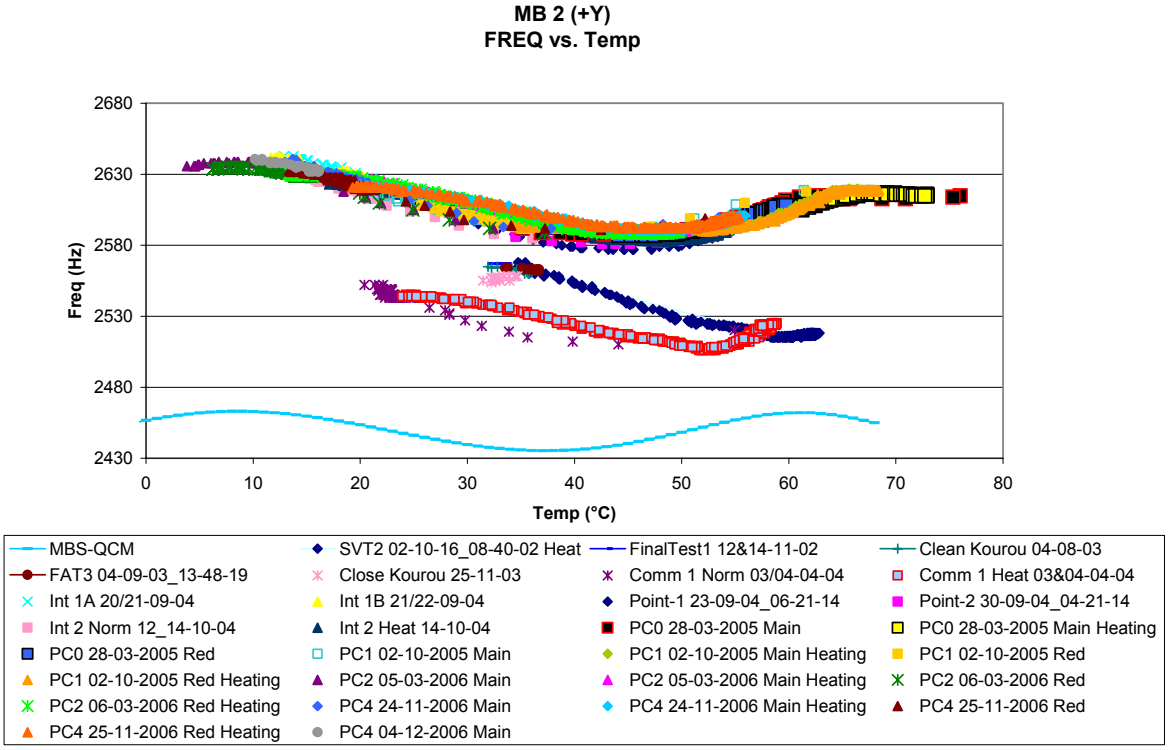


Figure 10.3-3. MBS 3 Frequency vs. Temperature

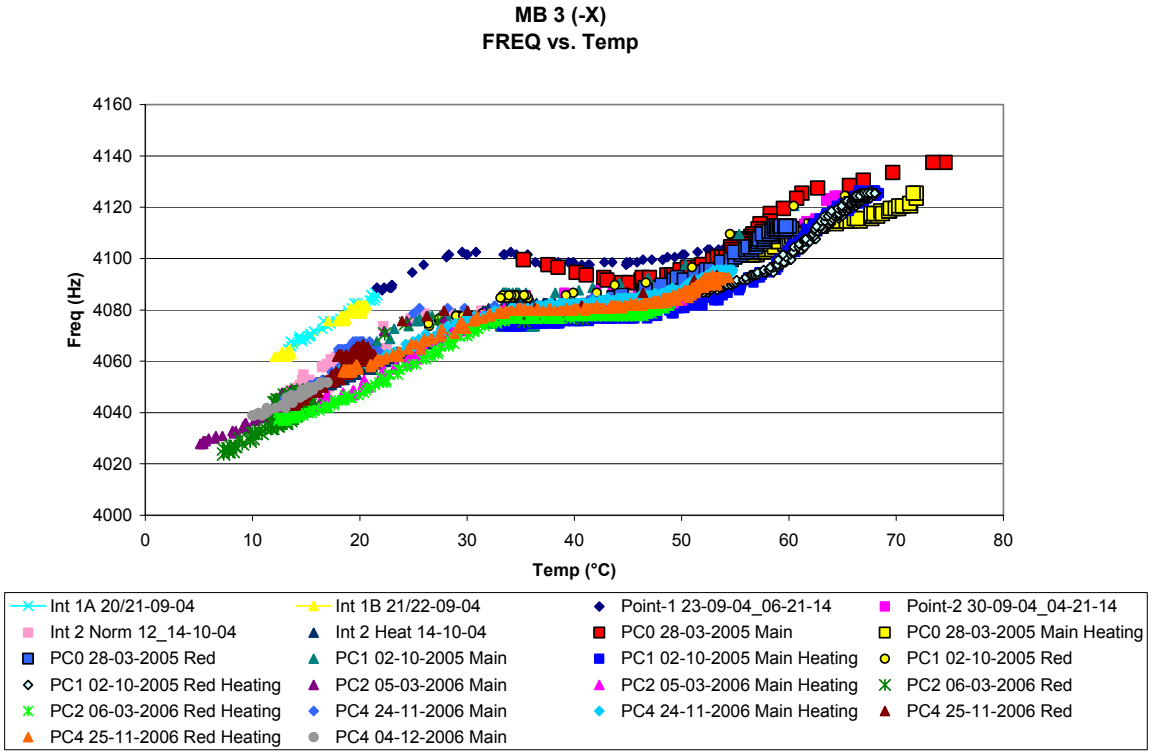


Figure 10.3-4. MBS 4 Frequency vs. Temperature

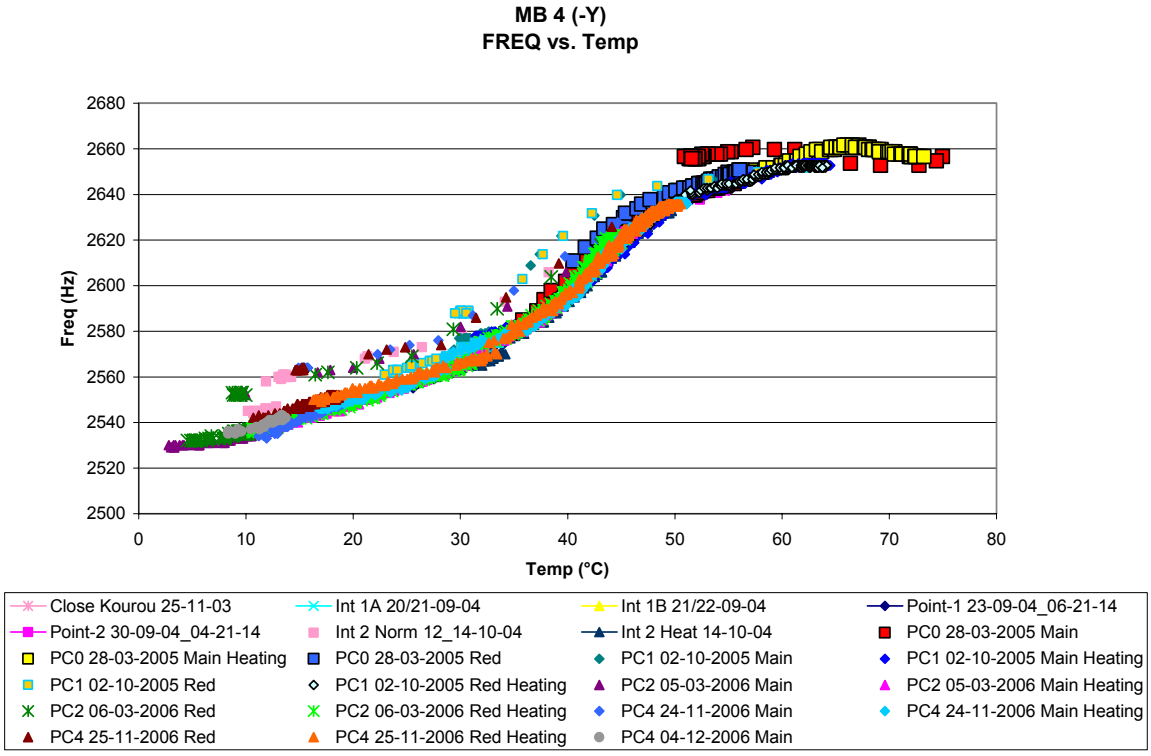
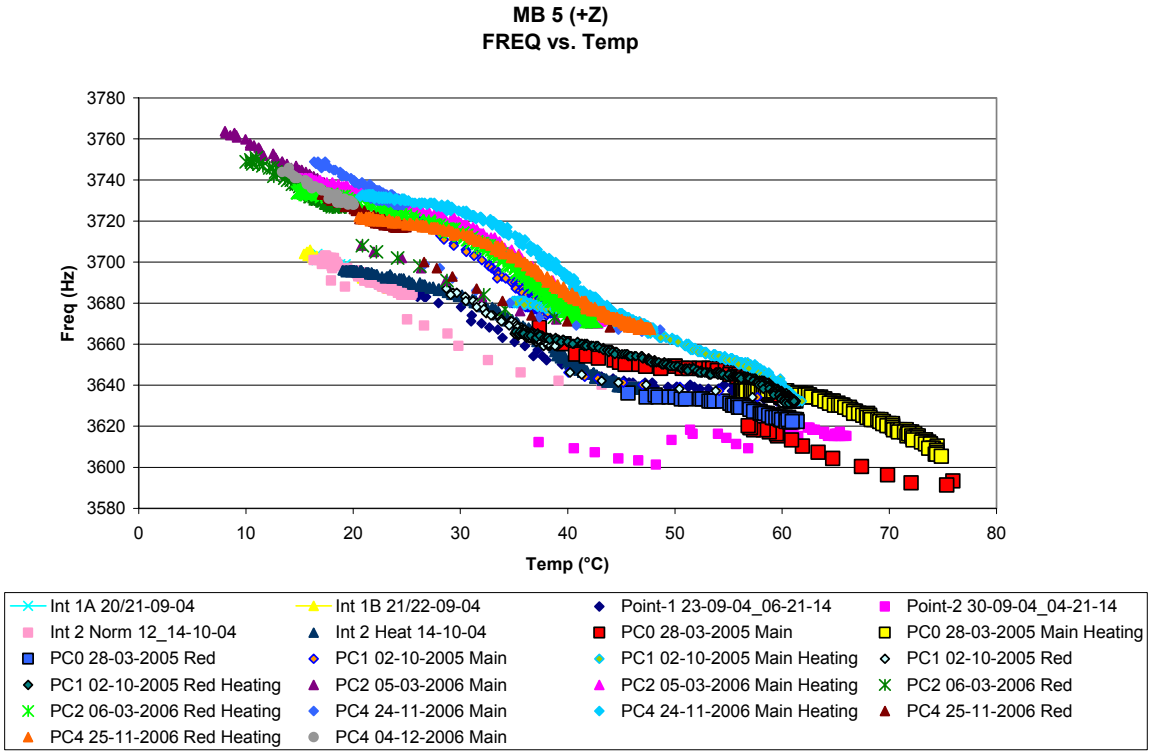


Figure 10.3-5. MBS 5 Frequency vs. Temperature



10.3.2 Frequency vs. Time

Figure 10.3-6. MBS 1 Frequency vs. Time at fixed Temperatures

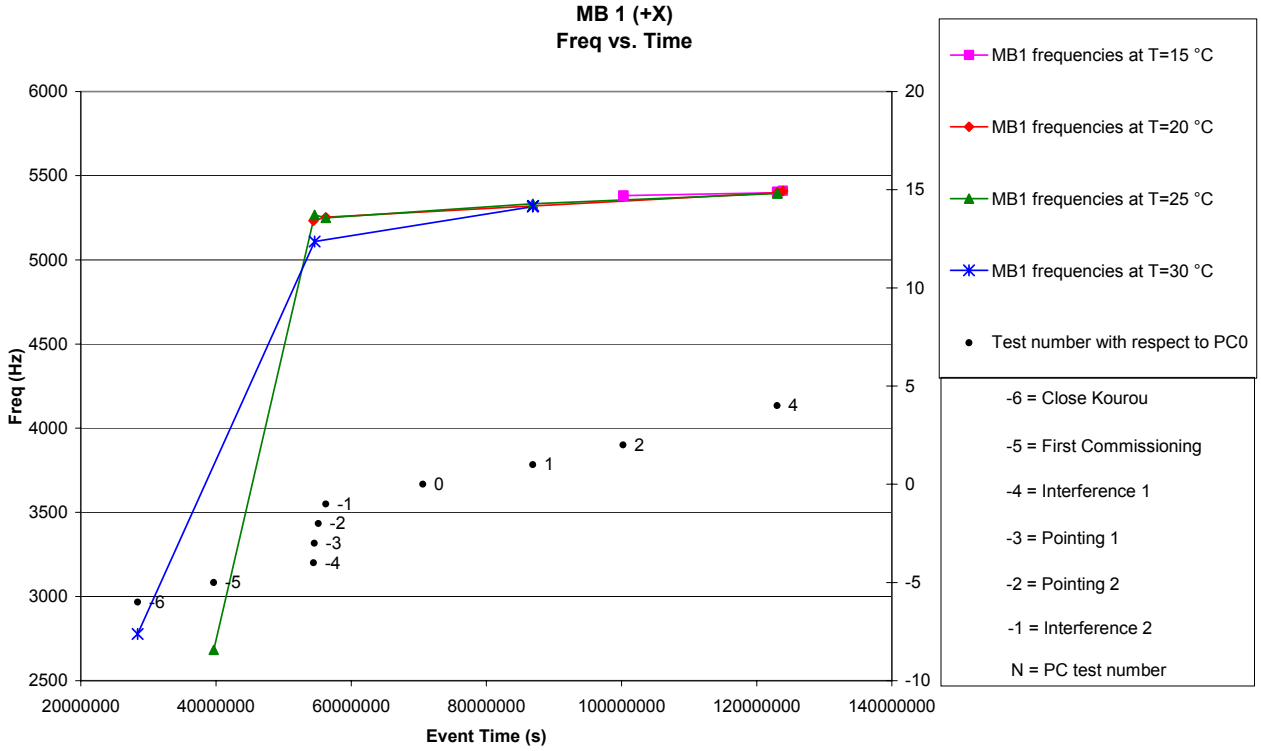


Figure 10.3-7. MBS 1 differently scaled Frequency vs. Time at fixed Temperatures

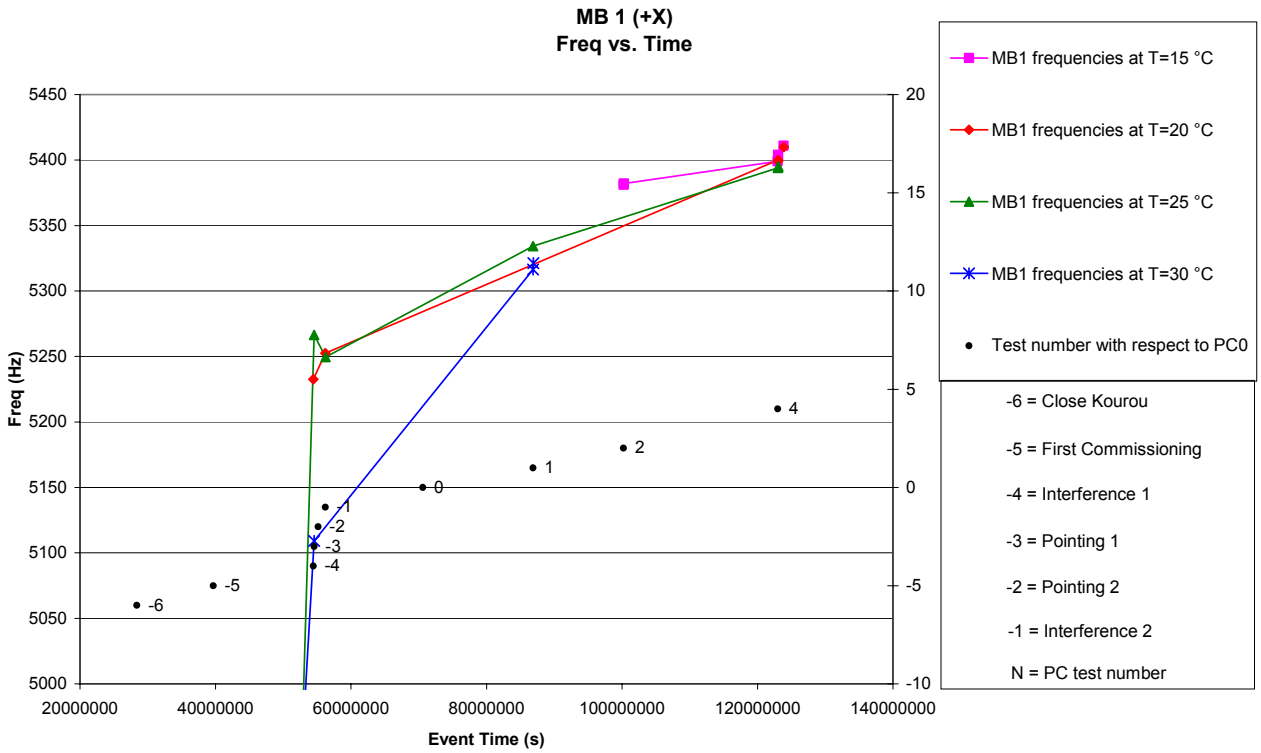


Figure 10.3-8. MBS 2 Frequency vs. Time at fixed Temperatures

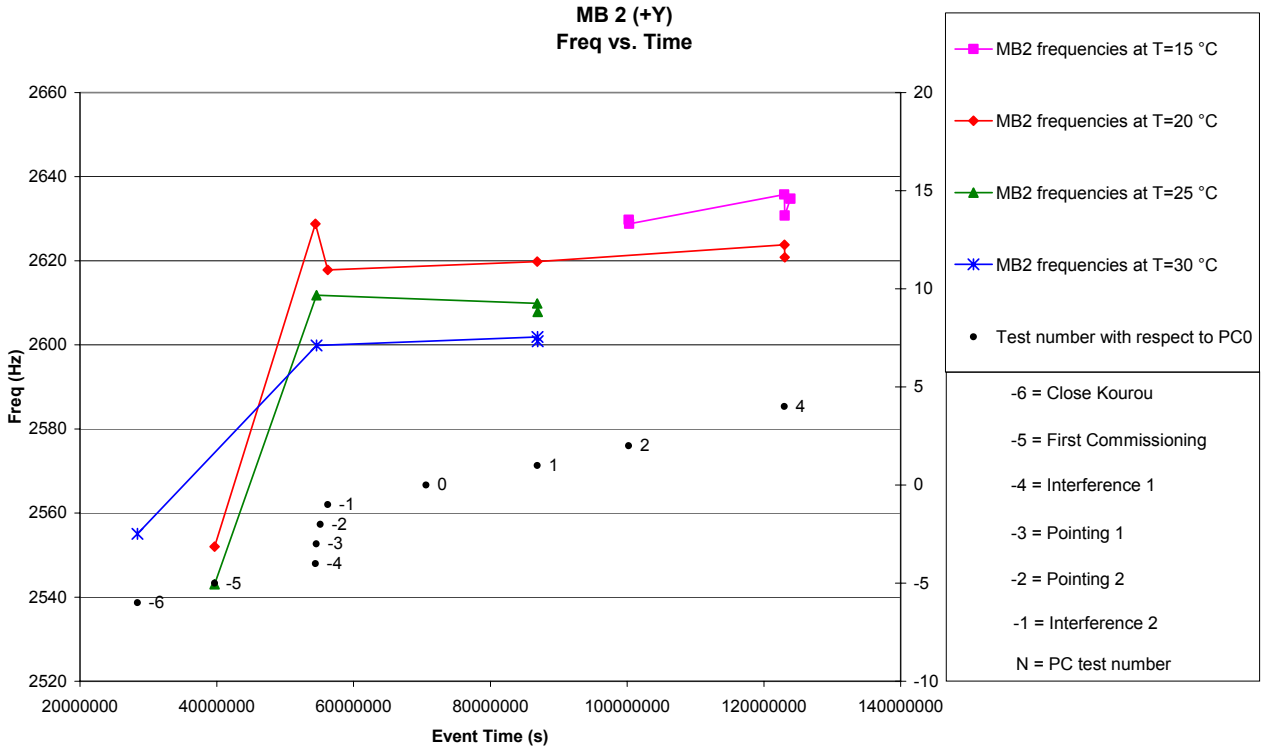


Figure 10.3-9. MBS 3 Frequency vs. Time at fixed Temperatures

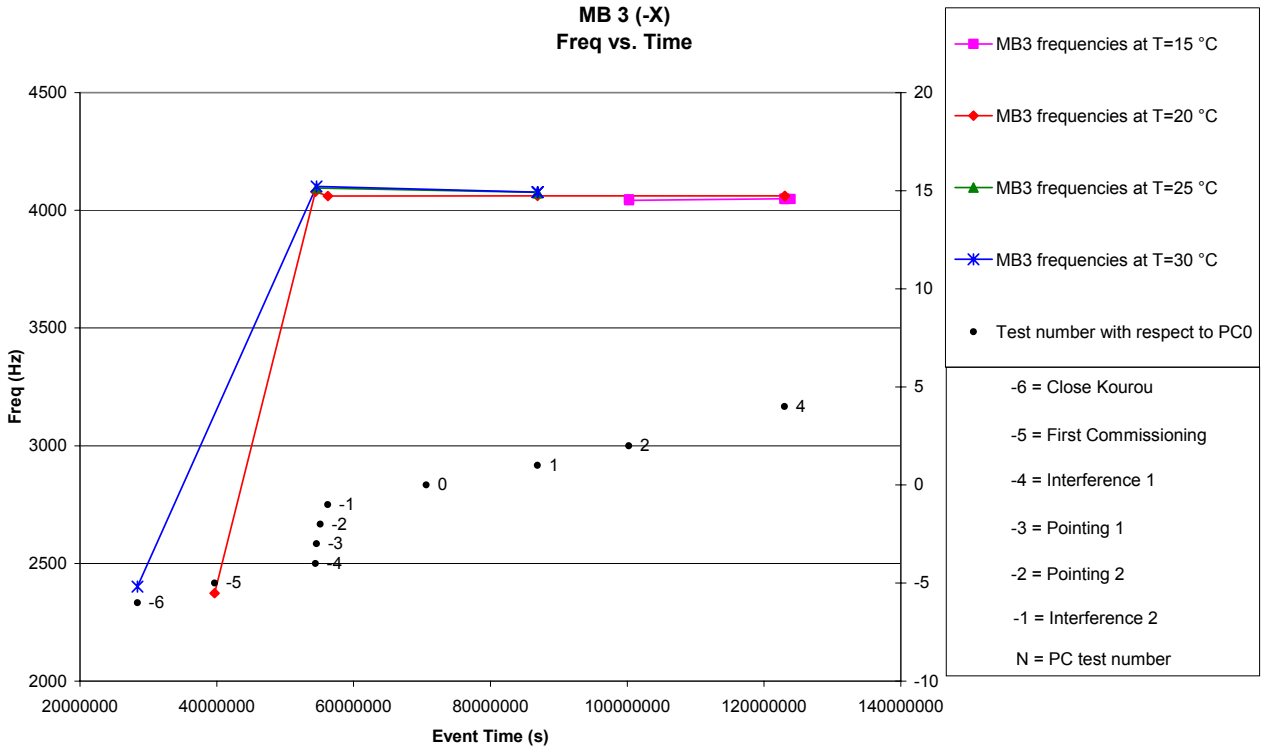


Figure 10.3-10. MBS 4 Frequency vs. Time at fixed Temperatures

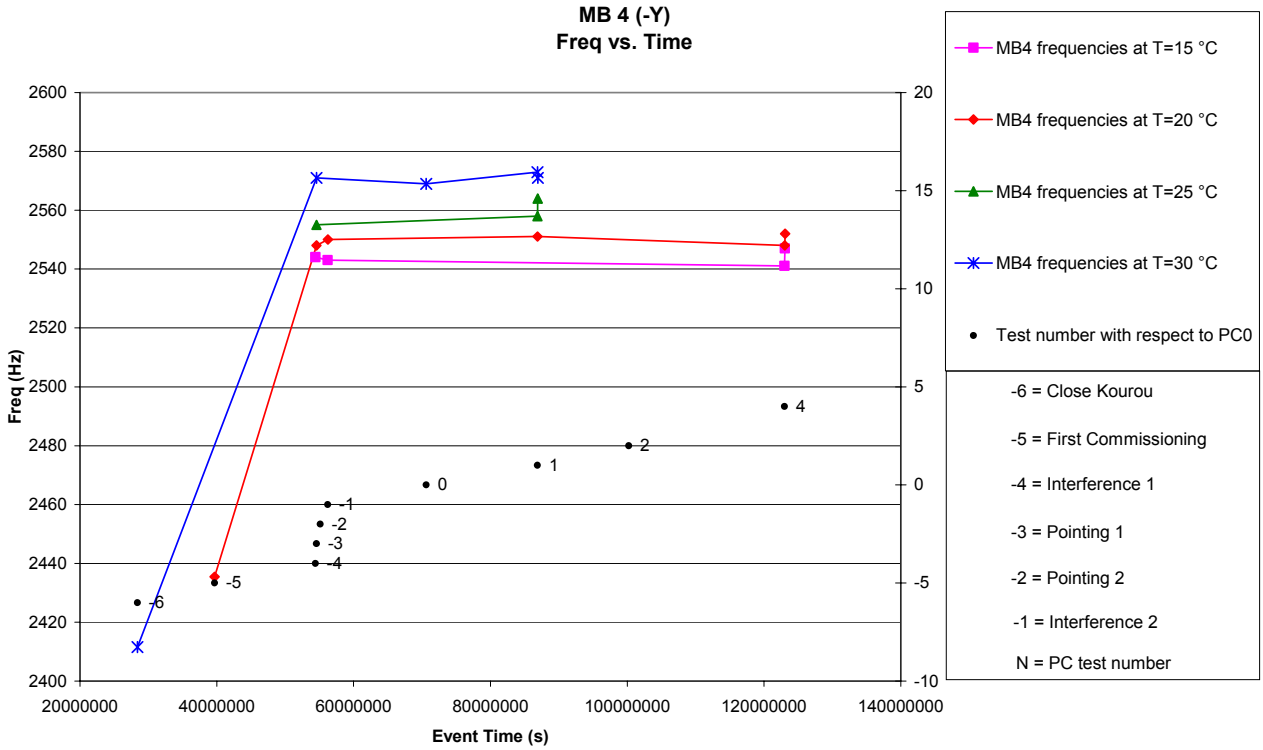


Figure 10.3-11. MBS 5 Frequency vs. Time at fixed Temperatures

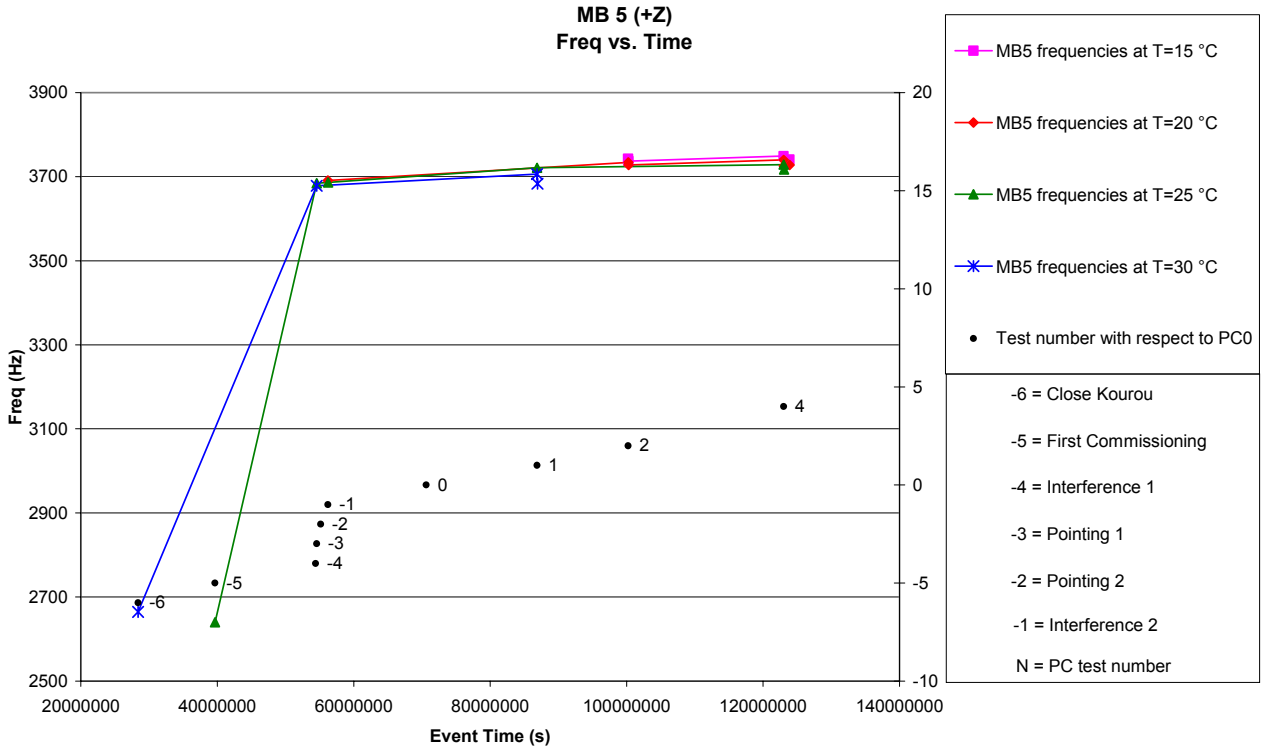
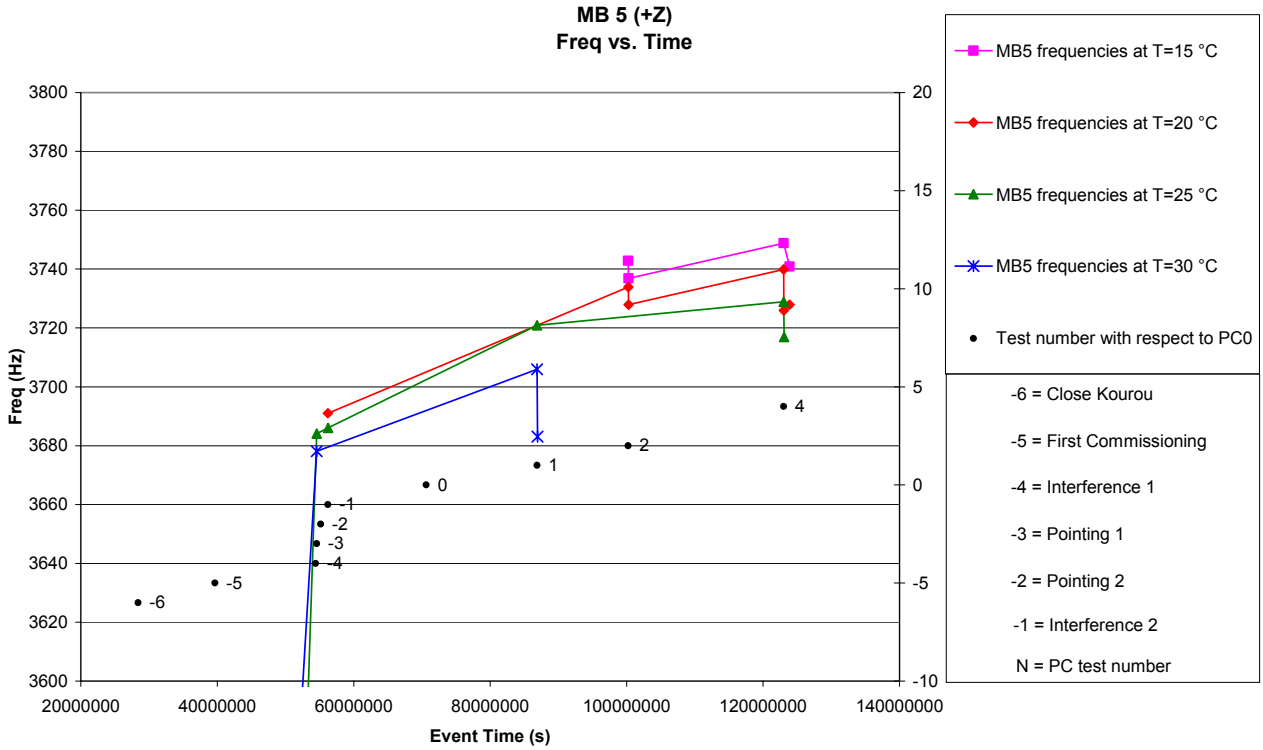


Figure 10.3-12. MBS 5 differently scaled Frequency vs. Time at fixed Temperatures



11. TIMELINES FOR GIADA PC4

11.1 TIMELINE FOR MAIN INTERFACE (GD01)

```
# $Log: OIOR_PIHRSO_D_0000_GD_PCA___.ROS,v $
#
# Revision 1.8  2006/10/07 11:22:23  GIADA
# timing changed after results of PC2; sequences updated after PC1 have internal timing
# slightly different wrt previous sequences and requires this correction in the timeline
# for future PCn. Also IS and GDS thresholds have been modified.
#
# Revision 1.7  2006/09/05 11:22:23  vdhiri
# Updated to have relative timing. Note No Generic Switch ON/OFF used. Use in PC4/Passive PCn.
#
# Revision 1.6  2006/07/13 09:03:58  vdhiri
# Updated for PC3. And use of top level itl that was necessary for use of PORG.
#
# Revision 1.5  2006/01/24 18:51:20  kwirth
# Final GD OIOR for PC2.
# Original filename: OIOR_PIHRSO_D_0000_GD_PCA3__00013.ROS.
#
# Version  1.3  2005/12/12 giada MAIN for PCn
# Passive Checkout OIOR for GD after sequences update
# RSOC Assumption MSP I1
#
#=============================================================================#
# Filename:       OIOR_PIHRSO_D_0000_GD_PCA1_300013.ROS
# Type:     Input Timeline file
#
# Description:    Passive Check-Out GD adapted to sequences updating
#
#
# Author:   PP
#
#           GIADA
#
# Date:           19 December 2005
#
#
```

```
# Proposed by GIADA team
# 19 December 2005
#
# (c) ESA/Estec
#
#-------------------------------------------------------------------------------------#
#=====================================================================================#

# EPS required, but RSOC will use CVS version
Version: 00001

Ref_date: 24-Nov-2006
Start_time: 000_00:00:00
End_time: 000_12:00:00

#=====================================================================================#
# Description: "1. | Switch on and test - main I/F"
#=====================================================================================#

+000_00:00:00     GIADA   OFF AGDS001A ( \
                                        VGD0001B = "nom. branch" [ENG] \ # GIADA on Main IF
                                        VGD0001A = "YES" [ENG]) # Context exists

+000_00:03:00     GIADA SAFE  AGDS002A # Patch CT v.flight 1

+000_00:08:00     GIADA SAFE  AGDS003A # Patch SW v.2.3

+000_00:24:00     GIADA SAFE  AGDS035A # Go to Cover Mode

+000_00:26:00     GIADA COVER AGDF090A # Open cover

+000_00:36:00     GIADA COVER AGDS065A # Go to Safe mode

+000_00:37:00     GIADA SAFE  AGDS110A # Go to Normal mode

Description: "GIADA operative in normal mode"

+000_00:39:00     GIADA NORMAL      AGDS038A( \
                                             VGDS038A = 35 \
                                             VGDS038B = 26 )   # Set GDS L and R thresholds
```

```
+000_00:39:30     GIADA NORMAL      AGDS037A(\
                                              VGDS037A = Off [ENG])   # Set IS On/Off

+000_00:40:00     GIADA NORMAL      AGDS036A ( \
                                        VGDS0031 = 0x05 \
                                        VGDS0032 = 0x05 \
                                        VGDS0033 = 0x0f \
                                        VGDS0034 = 0x05 \
                                        VGDS0035 = 0x14 \
                                        VGDS0018 = Enabled [ENG] \
                                        VGDS0019 = Enabled [ENG] \
                                        VGDS0020 = Enabled [ENG] \
                                        VGDS0021 = Enabled [ENG] \
                                        VGDS0022 = Enabled [ENG] \
                                        VGDS0023 = Low [ENG] \
                                        VGDS0025 = High [ENG] \
                                        VGDS0026 = High [ENG] \
                                        VGDS0027 = High [ENG] \
                                        VGDS0028 = High [ENG] \
                                        VGDS0029 = High [ENG])  # Set IS status and thresholds

+000_00:40:30     GIADA NORMAL      AGDS037A(\
                                              VGDS037A = On [ENG])    # Set IS On/Off

+000_00:45:00     GIADA NORMAL      AGDS120A ( \
                                        VGDS0010 = 0xF8 \
                                        VGDS0011 = 0x04 \ # Calibrate IS, GDS, MBS
                                        REPEAT = 105 \
                                        SEPARATION = 00:05:00 )

Description: "change GIADA setting and check effects"

+000_09:30:00     GIADA NORMAL      AGDF100A # Self-interference test

+000_10:30:00     GIADA NORMAL      AGDF055A # MBS heating

#============================================================================================#
# Description: "2. | Shut down"
#============================================================================================#
```

```
+000_11:30:00     GIADA NORMAL      AGDF060A # go to safe mode & off

#=======================================END=============================================#
```

11.2 TIMELINE FOR REDUNDANT INTERFACE (GD01)

```
# $Log: OIOR_PIHRSO_D_0000_GD_PCB___.ROS,v $
#
# Revision 1.8  2006/10/07 11:22:23  GIADA
# timing changed after results of PC2; sequences updated after PC1 have internal timing
# slightly different wrt previous sequences and requires this correction in the timeline
# for future PCn. Also IS and GDS thresholds have been modified.
#
# Revision 1.7  2006/09/05 11:22:23  vdhiri
# Updated to have relative timing. Note No Generic Switch ON/OFF used. Use in PC4/Passive PCn.
#
# Revision 1.6  2006/07/13 09:03:58  vdhiri
# Updated for PC3. And use of top level itl that was necessary for use of PORG.
#
# Revision 1.5  2006/01/24 18:51:46  kwirth
# Final GD OIOR for PC2.
# Original filename: OIOR_PIHRSO_D_0000_GD_PCB3__00014.ROS.
#
# Version  1.3  2005/12/12 giada REDUNDANT for PCn
# Passive Checkout OIOR for GD after sequences update
# RSOC Assumption MSP I1
#
#=============================================================================================#
# Filename:       OIOR_PIHRSO_D_0000_GD_PCB1_300014.ROS
# Type:     Input Timeline file
#
# Description:    Passive Check-Out GD adapted to sequences updating
#
#
# Author:   PP
#
#           GIADA
#
# Date:           19 December 2005
#
#
# Proposed by GIADA team
# 19 December 2005
#
```

```
# (c) ESA/Estec
#
#-------------------------------------------------------------------------------#
#===============================================================================#

# EPS required, but RSOC will use CVS version
Version: 00001

Ref_date: 24-Nov-2006
Start_time: 000_00:00:00
End_time: 001_00:00:00

#===============================================================================#
# Description: "1. | Switch on and test - redundant I/F"
#===============================================================================#

+000_12:00:00     GIADA   OFF AGDS001A ( \
                                        VGD0001B = "red. branch" [ENG] \ # GIADA on Red IF
                                        VGD0001A = "YES" [ENG]) # Context exists

+000_12:03:00     GIADA SAFE  AGDS002A # Patch CT v.flight 1

+000_12:08:00     GIADA SAFE  AGDS003A # Patch SW v.2.3

+000_12:24:00     GIADA SAFE  AGDS035A # Go to Cover Mode

+000_12:26:00     GIADA COVER AGDF090A # Open cover

+000_12:36:00     GIADA COVER AGDS065A # Go to Safe mode

+000_12:37:00     GIADA SAFE  AGDS110A # Go to Normal mode

Description: "GIADA operative in normal mode"

+000_12:39:00     GIADA NORMAL      AGDS038A( \
                                              VGDS038A = 35 \
                                              VGDS038B = 26 )   # Set GDS L and R thresholds

+000_12:39:30     GIADA NORMAL      AGDS037A(\
                                              VGDS037A = Off [ENG])   # Set IS On/Off
```

```
+000_12:40:00     GIADA NORMAL      AGDS036A ( \
                                          VGDS0031 = 0x05 \
                                          VGDS0032 = 0x05 \
                                          VGDS0033 = 0x0f \
                                          VGDS0034 = 0x05 \
                                          VGDS0035 = 0x14 \
                                          VGDS0018 = Enabled [ENG] \
                                          VGDS0019 = Enabled [ENG] \
                                          VGDS0020 = Enabled [ENG] \
                                          VGDS0021 = Enabled [ENG] \
                                          VGDS0022 = Enabled [ENG] \
                                          VGDS0023 = Low [ENG] \
                                          VGDS0025 = High [ENG] \
                                          VGDS0026 = High [ENG] \
                                          VGDS0027 = High [ENG] \
                                          VGDS0028 = High [ENG] \
                                          VGDS0029 = High [ENG])  # Set IS status and thresholds

+000_12:40:30     GIADA NORMAL      AGDS037A(\
                                               VGDS037A = On [ENG])    # Set IS On/Off

+000_12:45:00     GIADA NORMAL      AGDS120A ( \
                                          VGDS0010 = 0xF8 \
                                          VGDS0011 = 0x04 \ # Calibrate IS, GDS, MBS
                                          REPEAT = 105 \
                                          SEPARATION = 00:05:00 )

Description: "change GIADA setting and check effects"

+000_21:30:00     GIADA NORMAL      AGDF100A # Self-interference test

+000_22:30:00     GIADA NORMAL      AGDF055A # MBS heating

#=============================================================================#
# Description: "2. | Shut down"
#=============================================================================#
+000_23:30:00     GIADA NORMAL      AGDF060A # go to safe mode & off

#=====================================END=====================================#
```

11.3 TIMELINE FOR MAIN INTERFACE (GD02)

```
# # $Log: OIOR_PIHRSO_D_0006_GD_02____.ITL,v $
# Revision 1.5  2006/10/17 09:40:21  rlaureij
# Modified according to GIADA delivery to ORFA, original filename:
# OIOR_PIHRSO_D_0006_GD_PC42__00017.ROS.
#
# Revision 1.4  2006/10/07 11:22:23  GIADA
# timing changed after results of PC2; sequences updated after PC1 have internal timing
# slightly different wrt previous sequences and requires this correction in the timeline
# for future PCn. Also IS and GDS thresholds have been modified.
#
# Revision 1.3  2006/09/26 15:09:40  vdhiri
# RSOC: Added parameter vallues to be able to run in scenario.
#
# Revision 1.2  2006/08/25 12:44:53  rlaureij
# ITLs made consistent in names and times by RSOC
#
# Revision 1.1  2006/08/24 11:45:05  rlaureij
# GD modified name by RSOC
#
#=============================================================================================#
# Filename:     OIOR_PIHRSO_D_0006_GD_02____.ROS
# Type:     Input Timeline file
#
# Description:    Active Check-Out GD number 4
#
#
# Author:   PP
#
#           GIADA
#
# Date:           28 July 2006
#
#
# Proposed by GIADA team
# 28 July 2006
#
# (c) ESA/Estec
#
```

```
#-------------------------------------------------------------------------------------#
#=====================================================================================#

# EPS required, but RSOC will use CVS version
Version: 00002

Ref_date:   24-Nov-2006
Start_time: 000_00:00:00
End_time:   000_04:00:00

# Angle between sun direction and Z-axis > 90 deg

#=====================================================================================#
# Description: "5. | Switch on and test setting TC on main I/F" GD02
#=====================================================================================#

000_00:00:00      GIADA   OFF AGDS001A ( \
                                        VGD0001B = "nom. branch" [ENG] \ # GIADA on Main IF
                                        VGD0001A = "YES" [ENG]) # Context exists

000_00:03:00      GIADA SAFE  AGDS002A # Patch CT v.flight 1

000_00:08:00      GIADA SAFE  AGDS003A # Patch SW v.2.3

000_00:24:00      GIADA SAFE  AGDS035A # Go to Cover Mode

000_00:26:00      GIADA COVER AGDF090A # Open cover

000_00:36:00      GIADA COVER AGDS065A # Go to Safe mode

#=====================================================================================#
# Description: "6. | GD Patch CT in RAM" GD02
#=====================================================================================#

000_00:37:00    GIADA   SAFE    AGDS004A ( \ # GD Patch CT in RAM
                                            VGDX0001 = 0x0000 \  # CF spare 1
                                            VGDX0002 = 0x1E00 \  # CF CovFra heat on time
                                            VGDX0003 = 0x0000 \  # CF CovMot heat on time
                                            VGDX0004 = 0xA105 \  # CF FB safety temp
                                            VGDX0005 = 0xA105 \  # CF FB test temp
```

```
VGDX0006 = 0x1E00 \  # CF FB test timeout 1
VGDX0007 = 0x0000 \  # CF FB test timeout 2
VGDX0008 = 0x6406 \  # CF FB working temp
VGDX0009 = 0x5802 \  # CF FB op timeout 1
VGDX0010 = 0x0000 \  # CF FB op timeout 2
VGDX0011 = 0x3200 \  # CF velocity
VGDX0012 = 0xAB00 \  # CF steps to open
VGDX0013 = 0xAB00 \  # CF steps to close
VGDX0014 = 0x7800 \  # CF opening timeout 1
VGDX0015 = 0x0000 \  # CF opening timeout 2
VGDX0016 = 0x7800 \  # CF closing timeout 1
VGDX0017 = 0x0000 \  # CF closing timeout 2
VGDX0018 = 0x03AF \  # CF GDS status
VGDX0019 = 0x1416 \  # CF GDS thresholds
VGDX0020 = 0xAFF5 \  # CF laser max temp
VGDX0021 = 0xDDFD \  # CF laser min temp
VGDX0022 = 0x0000 \  # CF spare 2
VGDX0023 = 0x0000 \  # CF spare 3
VGDX0024 = 0x100E \  # CF GDS time bet cal 1
VGDX0025 = 0x0000 \  # CF GDS time bet cal 2
VGDX0026 = 0x0F9F \  # CF IS status
VGDX0027 = 0xB81A \  # CF IS maxop temp
VGDX0028 = 0x0000 \  # CF spare 4
VGDX0029 = 0x3500 \  # CF IS hyst temp
VGDX0030 = 0x0500 \  # CF IS thresholds 1
VGDX0031 = 0x0505 \  # CF IS thresholds 2
VGDX0032 = 0x0505 \  # CF IS thresholds 3
VGDX0033 = 0x100E \  # CF IS time bet cal 1
VGDX0034 = 0x0000 \  # CF IS time bet cal 2
VGDX0035 = 0x04F8 \  # CF IS cal config
VGDX0036 = 0x009F \  # CF MBS status
VGDX0037 = 0x4B0A \  # CF MBS max temp
VGDX0038 = 0x00F8 \  # CF MBS temp checking
VGDX0039 = 0x2C01 \  # CF MBS time interval 1
VGDX0040 = 0x0000 \  # CF MBS time interval 2
VGDX0041 = 0xF309 \  # CF MBS max heat temp
VGDX0042 = 0x6801 \  # CF heating timeout 1
VGDX0043 = 0x0000 \  # CF heating timeout 2
VGDX0044 = 0x100E \  # CF MBS time bet cal 1
VGDX0045 = 0x0000 \  # CF MBS time bet cal 2
```

```
                                        VGDX0046 = 0x6D1A \  # CF IS maxnonop temp
                                        VGDX0047 = 0xCE1D \  # CF IS min temp
                                        VGDX0048 = 0xC719 \  # CF ME maxop temp
                                        VGDX0049 = 0x0000 \  # CF spare 5
                                        VGDX0050 = 0x0000 \  # CF spare 6
                                        VGDX0051 = 0x0000 \  # CF spare 7
                                        VGDX0052 = 0x0000 \  # CF spare 8
                                        VGDX0053 = 0x3C00 \  # CF timeout sci pkt 1
                                        VGDX0054 = 0x0000 \  # CF timeout sci pkt 2
                                        VGDX0055 = 0x0A00 \  # CF time HK pkt 1
                                        VGDX0056 = 0x0000 \  # CF time HK pkt 2
                                        VGDX0057 = 0x2800 \  # CF arm TC timeout 1
                                        VGDX0058 = 0x0000 \  # CF arm TC timeout 2
                                        VGDX0059 = 0x0000 \  # CF patches status 1
                                        VGDX0060 = 0x0000 \  # CF patches status 2
                                        VGDX0061 = 0x0000 \  # CF patches status 3
                                        VGDX0062 = 0x0000 \  # CF patches status 4
                                        VGDX0063 = 0x2800 \  # CF max GDS events sec
                                        VGDX0064 = 0x2800 \  # CF max IS events sec
                                        VGDX0065 = 0x0000 \  # CF PAD 1
                                        VGDX0066 = 0x0000 \  # CF PAD 2
                                        VGDX0067 = 0x0000 \  # CF PAD 3
                                        VGDX0068 = 0x0000 \  # CF PAD 4
                                        VGDX0069 = 0xDFC6  ) # CF CRC

000_00:40:00     GIADA SAFE  AGDS006A ( \ # GD Patch CT in NVRAM
                                        VGDX0001 = 0x0000 \  # CF spare 1
                                        VGDX0002 = 0x1E00 \  # CF CovFra heat on time
                                        VGDX0003 = 0x0000 \  # CF CovMot heat on time
                                        VGDX0004 = 0xA105 \  # CF FB safety temp
                                        VGDX0005 = 0xA105 \  # CF FB test temp
                                        VGDX0006 = 0x1E00 \  # CF FB test timeout 1
                                        VGDX0007 = 0x0000 \  # CF FB test timeout 2
                                        VGDX0008 = 0x6406 \  # CF FB working temp
                                        VGDX0009 = 0x5802 \  # CF FB op timeout 1
                                        VGDX0010 = 0x0000 \  # CF FB op timeout 2
                                        VGDX0011 = 0x3200 \  # CF velocity
                                        VGDX0012 = 0xAB00 \  # CF steps to open
                                        VGDX0013 = 0xAB00 \  # CF steps to close
                                        VGDX0014 = 0x7800 \  # CF opening timeout 1
```

```
VGDX0015 = 0x0000 \  # CF opening timeout 2
VGDX0016 = 0x7800 \  # CF closing timeout 1
VGDX0017 = 0x0000 \  # CF closing timeout 2
VGDX0018 = 0x03AF \  # CF GDS status
VGDX0019 = 0x1416 \  # CF GDS thresholds
VGDX0020 = 0xAFF5 \  # CF laser max temp
VGDX0021 = 0xDDFD \  # CF laser min temp
VGDX0022 = 0x0000 \  # CF spare 2
VGDX0023 = 0x0000 \  # CF spare 3
VGDX0024 = 0x100E \  # CF GDS time bet cal 1
VGDX0025 = 0x0000 \  # CF GDS time bet cal 2
VGDX0026 = 0x0F9F \  # CF IS status
VGDX0027 = 0xB81A \  # CF IS maxop temp
VGDX0028 = 0x0000 \  # CF spare 4
VGDX0029 = 0x3500 \  # CF IS hyst temp
VGDX0030 = 0x0500 \  # CF IS thresholds 1
VGDX0031 = 0x0505 \  # CF IS thresholds 2
VGDX0032 = 0x0505 \  # CF IS thresholds 3
VGDX0033 = 0x100E \  # CF IS time bet cal 1
VGDX0034 = 0x0000 \  # CF IS time bet cal 2
VGDX0035 = 0x04F8 \  # CF IS cal config
VGDX0036 = 0x009F \  # CF MBS status
VGDX0037 = 0x4B0A \  # CF MBS max temp
VGDX0038 = 0x00F8 \  # CF MBS temp checking
VGDX0039 = 0x2C01 \  # CF MBS time interval 1
VGDX0040 = 0x0000 \  # CF MBS time interval 2
VGDX0041 = 0xF309 \  # CF MBS max heat temp
VGDX0042 = 0x6801 \  # CF heating timeout 1
VGDX0043 = 0x0000 \  # CF heating timeout 2
VGDX0044 = 0x100E \  # CF MBS time bet cal 1
VGDX0045 = 0x0000 \  # CF MBS time bet cal 2
VGDX0046 = 0x6D1A \  # CF IS maxnonop temp
VGDX0047 = 0xCE1D \  # CF IS min temp
VGDX0048 = 0xC719 \  # CF ME maxop temp
VGDX0049 = 0x0000 \  # CF spare 5
VGDX0050 = 0x0000 \  # CF spare 6
VGDX0051 = 0x0000 \  # CF spare 7
VGDX0052 = 0x0000 \  # CF spare 8
VGDX0053 = 0x3C00 \  # CF timeout sci pkt 1
VGDX0054 = 0x0000 \  # CF timeout sci pkt 2
```

```
                                        VGDX0055 = 0x0A00 \  # CF time HK pkt 1
                                        VGDX0056 = 0x0000 \  # CF time HK pkt 2
                                        VGDX0057 = 0x2800 \  # CF arm TC timeout 1
                                        VGDX0058 = 0x0000 \  # CF arm TC timeout 2
                                        VGDX0059 = 0x0000 \  # CF patches status 1
                                        VGDX0060 = 0x0000 \  # CF patches status 2
                                        VGDX0061 = 0x0000 \  # CF patches status 3
                                        VGDX0062 = 0x0000 \  # CF patches status 4
                                        VGDX0063 = 0x2800 \  # CF max GDS events sec
                                        VGDX0064 = 0x2800 \  # CF max IS events sec
                                        VGDX0065 = 0x0000 \  # CF PAD 1
                                        VGDX0066 = 0x0000 \  # CF PAD 2
                                        VGDX0067 = 0x0000 \  # CF PAD 3
                                        VGDX0068 = 0x0000 \  # CF PAD 4
                                        VGDX0069 = 0xDFC6  ) # CF CRC

000_00:43:00     GIADA SAFE  AGDS110A # Go to Normal mode

Description: "GIADA operative in normal mode"

+000_00:45:00     GIADA NORMAL      AGDS038A( \
                                        VGDS038A = 35 \
                                        VGDS038B = 26 )   # Set GDS L and R thresholds

+000_00:45:30     GIADA NORMAL      AGDS037A(\
                                        VGDS037A = Off [ENG])   # Set IS On/Off

+000_00:46:00     GIADA NORMAL      AGDS036A ( \
                                      VGDS0031 = 0x05 \
                                      VGDS0032 = 0x05 \
                                      VGDS0033 = 0x0f \
                                      VGDS0034 = 0x05 \
                                      VGDS0035 = 0x14 \
                                      VGDS0018 = Enabled [ENG] \
                                      VGDS0019 = Enabled [ENG] \
                                      VGDS0020 = Enabled [ENG] \
                                      VGDS0021 = Enabled [ENG] \
                                      VGDS0022 = Enabled [ENG] \
                                      VGDS0023 = Low [ENG] \
                                      VGDS0025 = High [ENG] \
```

```
                                        VGDS0026 = High [ENG] \
                                        VGDS0027 = High [ENG] \
                                        VGDS0028 = High [ENG] \
                                        VGDS0029 = High [ENG])  # Set IS status and thresholds

+000_00:46:30     GIADA NORMAL      AGDS037A(\
                                              VGDS037A = On [ENG])    # Set IS On/Off

000_00:50:00      GIADA NORMAL      AGDS120A ( \
                                        VGDS0010 = 0xF8 \
                                        VGDS0011 = 0x04 \ # Calibrate IS, GDS, MBS
                                        REPEAT = 22 \
                                        SEPARATION = 00:05:00 )

000_02:40:00      GIADA NORMAL      AGDF100A # Self-interference test


#=============================================================================#
# Description: "5. | Shut down" GD02
#=============================================================================#

000_03:40:00      GIADA NORMAL      AGDF060A # go to safe mode & off

#=============================================================================##
```

11.4 TIMELINE FOR MAIN INTERFACE (GD03)

```
# $Log: OIOR_PIHRSO_D_0006_GD_03____.ITL,v $
# Revision 1.4  2006/10/17 09:43:07  rlaureij
# Modified according to GIADA delivery to ORFA, original filename:
# OIOR_PIHRSO_D_0006_GD_PC43__00018.ROS
# Increased the version to 00002
#
# Revision 1.3  2006/10/07 11:22:23  GIADA
# timing changed after results of PC2; sequences updated after PC1 have internal timing
# slightly different wrt previous sequences and requires this correction in the timeline
# for future PCn. Also IS and GDS thresholds have been modified.
#
# Revision 1.2  2006/08/25 12:44:53  rlaureij
# ITLs made consistent in names and times by RSOC
#
# Revision 1.1  2006/08/24 11:45:05  rlaureij
# GD modified name by RSOC
#
# Revision 1.1  2006/08/02 15:02:28  vdhiri
# Preliminary Inputs modified by RSOC to fit planning philosophy
#
#=============================================================================================#
# Filename:     OIOR_PIHRSO_D_0006_GD_03____.ROS
# Type:     Input Timeline file
#
# Description:    Active Check-Out GD number 4
#
#
# Author:   PP
#
#           GIADA
#
# Date:           28 July 2006
#
#
# Proposed by GIADA team
# 28 July 2006
#
# (c) ESA/Estec
```

```
#
#-------------------------------------------------------------------------------------#
#=====================================================================================#

# EPS required, but RSOC will use CVS version
Version: 00002

Ref_date: 24-Nov-2006
Start_time: 000_00:00:00
End_time: 001_04:00:00

# Angle between sun direction and Z-axis > 90 deg

#=====================================================================================#
# Description: "6. | Switch on and test - main I/F" GD03 - optional !!
#=====================================================================================#

000_00:00:00      GIADA   OFF AGDS001A ( \
                                        VGD0001B = "nom. branch" [ENG] \ # GIADA on Main IF
                                        VGD0001A = "YES" [ENG]) # Context exists

000_00:08:00      GIADA SAFE  AGDS003A # Patch SW v.2.3

000_00:24:00      GIADA SAFE  AGDS035A # Go to Cover Mode

000_00:26:00      GIADA COVER AGDF090A # Open cover

000_00:36:00      GIADA COVER AGDS065A # Go to Safe mode

000_00:37:00      GIADA SAFE  AGDS110A # Go to Normal mode

Description: "GIADA operative in normal mode"

+000_00:39:00     GIADA NORMAL      AGDS038A( \
                                              VGDS038A = 35 \
                                              VGDS038B = 26 )   # Set GDS L and R thresholds

+000_00:39:30     GIADA NORMAL      AGDS037A(\
                                              VGDS037A = Off [ENG])   # Set IS On/Off
```

```
+000_00:40:00     GIADA NORMAL      AGDS036A ( \
                                          VGDS0031 = 0x05 \
                                          VGDS0032 = 0x05 \
                                          VGDS0033 = 0x0f \
                                          VGDS0034 = 0x05 \
                                          VGDS0035 = 0x14 \
                                          VGDS0018 = Enabled [ENG] \
                                          VGDS0019 = Enabled [ENG] \
                                          VGDS0020 = Enabled [ENG] \
                                          VGDS0021 = Enabled [ENG] \
                                          VGDS0022 = Enabled [ENG] \
                                          VGDS0023 = Low [ENG] \
                                          VGDS0025 = High [ENG] \
                                          VGDS0026 = High [ENG] \
                                          VGDS0027 = High [ENG] \
                                          VGDS0028 = High [ENG] \
                                          VGDS0029 = High [ENG])  # Set IS status and thresholds

+000_00:40:30     GIADA NORMAL      AGDS037A(\
                                                VGDS037A = On [ENG])    # Set IS On/Off

+000_00:45:00     GIADA NORMAL      AGDS120A ( \
                                          VGDS0010 = 0xF8 \
                                          VGDS0011 = 0x04 \ # Calibrate IS, GDS, MBS
                                          REPEAT = 23 \
                                          SEPARATION = 00:05:00 )

000_02:40:00      GIADA NORMAL      AGDF100A # Self-interference test

#=============================================================================================#
# Description: "7. | Shut down" GD03
#=============================================================================================#

000_03:40:00      GIADA NORMAL      AGDF060A # go to safe mode & off

#==================================END=========================================================#
```