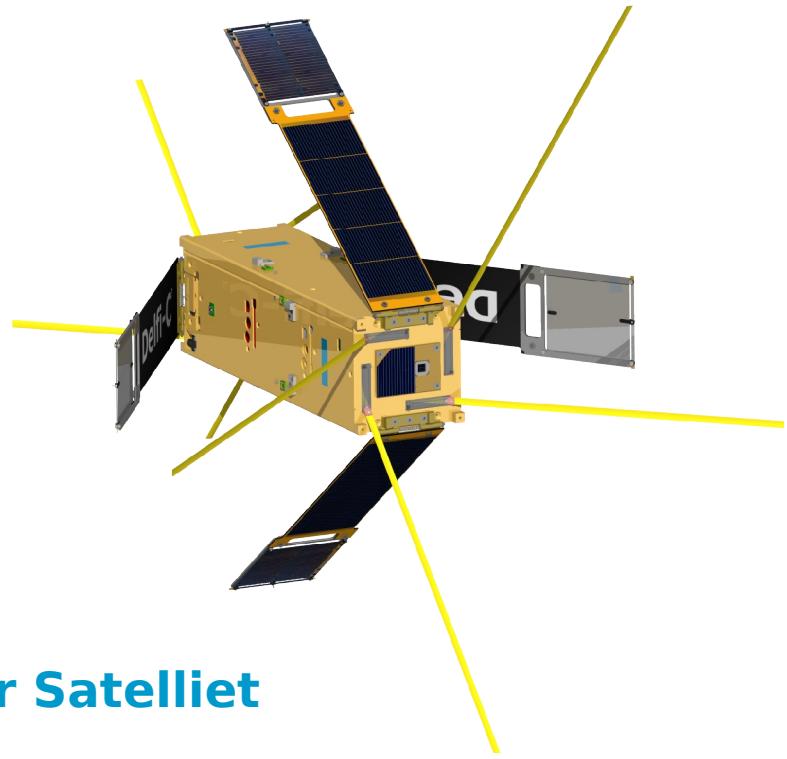
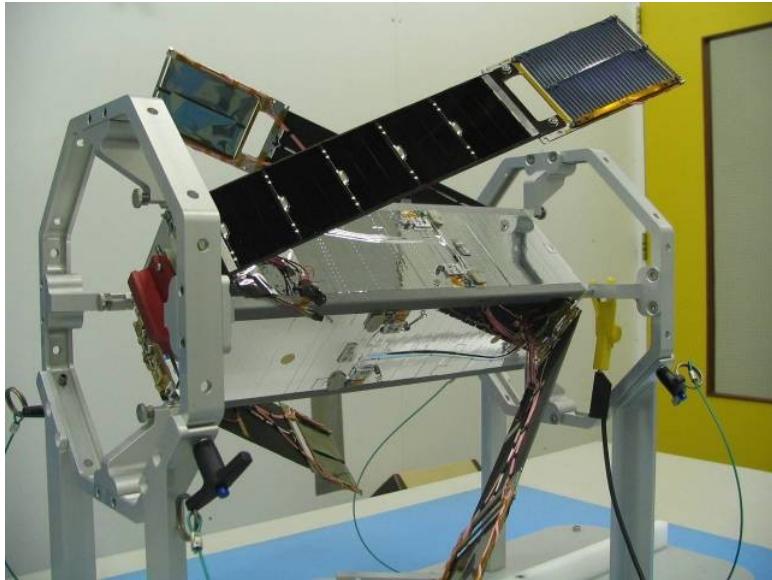


Delfi-C³

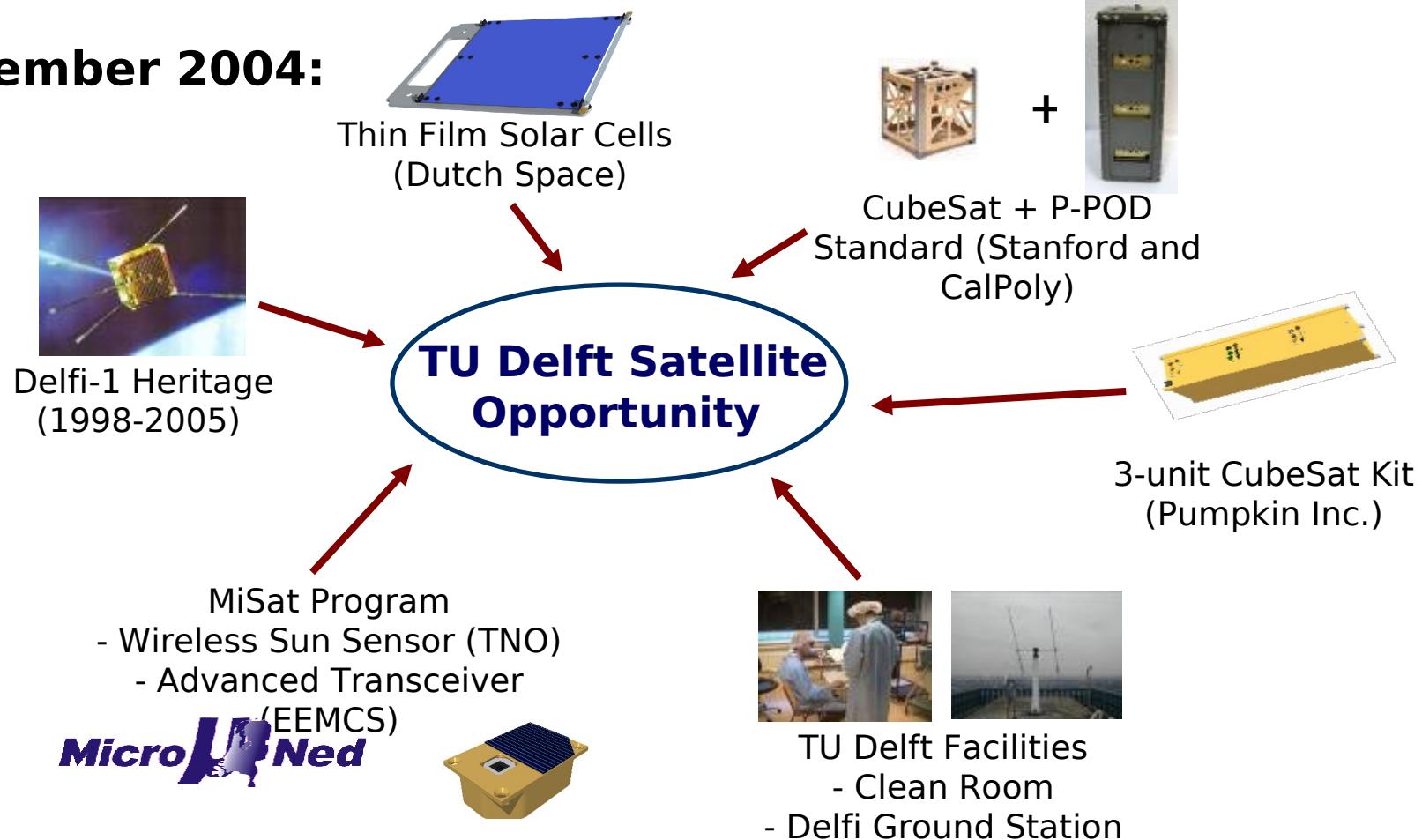


**De eerste Nederlandse Amateur Satelliet
Wouter Weggelaar PA3WEG**



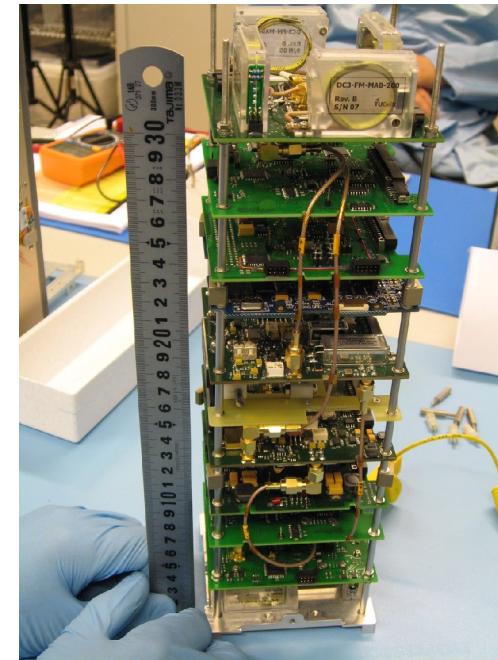
November 2004:

November 2004:



April 2008:

- Satellite ready for launch
- Over 60 students have worked on Delfi-C3 (+ 3 new HAMs!)
- Successor Delfi-N3XT



VERON Twente

CubeSats



U. Of Illinois ION



Cal Poly CP1

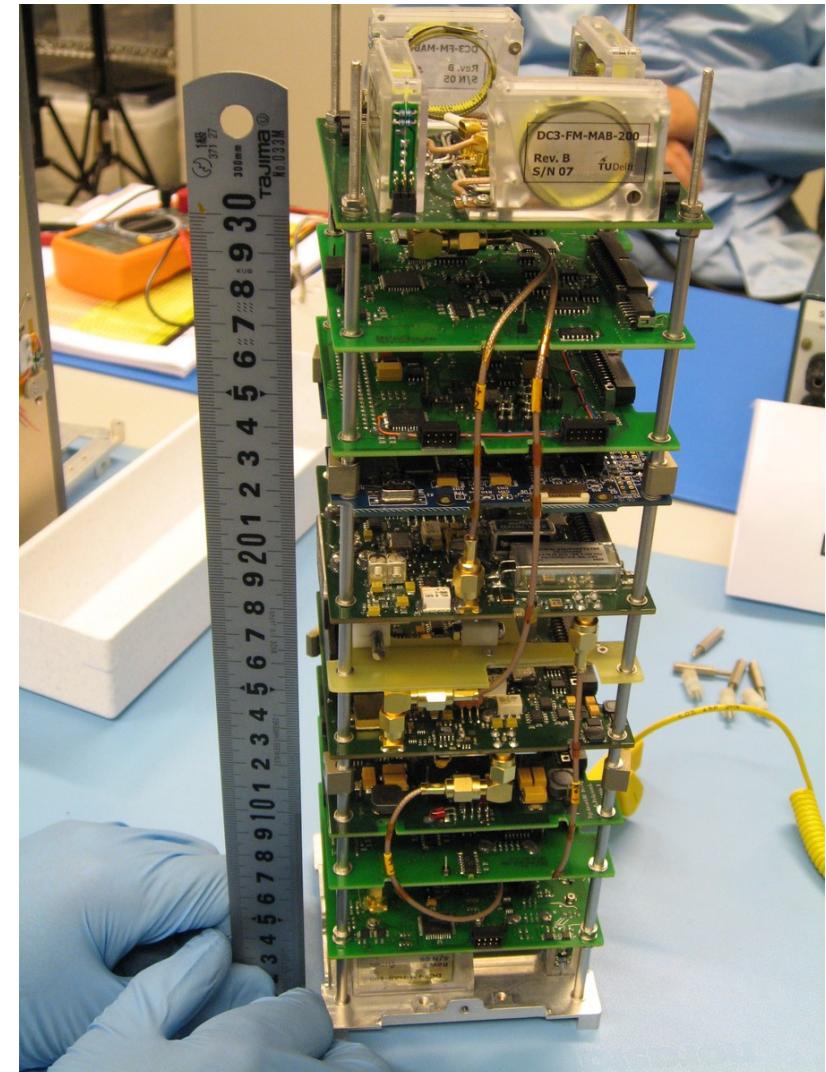


CAN-X1



Delfi-C3 - quick facts

- Fourth Dutch Satellite
- First Dutch University Satellite
- Based on 3U CubeSat
- NO Battery
- NO active attitude control
- 1200Bd BPSK VHF downlink
- Linear transponder
- Payloads:
 - Thin Film Solar Cells
 - Autonomous Wireless Sun Sensor



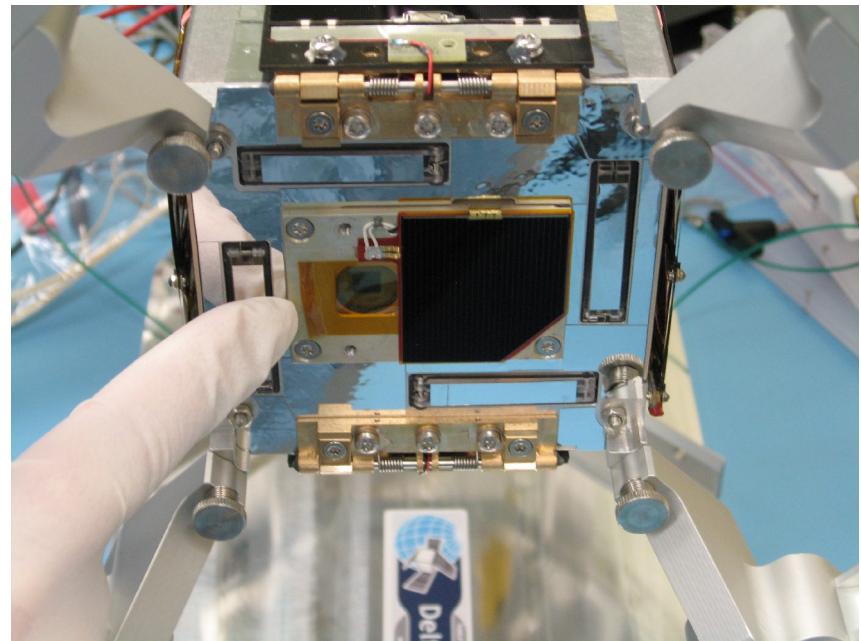
Frequencies

- Primary telemetry downlink
 - 145.870MHz, 1200Bd BPSK AX.25 approx. 100mW
- Backup telemetry downlink
 - 145.930MHz, 1200Bd BPSK AX.25 approx. 200mW
- Transponder downlink:
 - 145.880-145.920MHz linear (inverting)
 - CW telemetry 10mW at 145.870MHz (*Hi Hi de Delfi-C3 Delfi-C3*)
 - commemorative Sputnik message (10 dits)
- Transponder uplink:
 - 435.570-435.530MHz
 - 40kHz passband, 400mW PEP
 - **435.556MHz = 145.900MHz**
- Eerst horen, dan werken!

TFSC

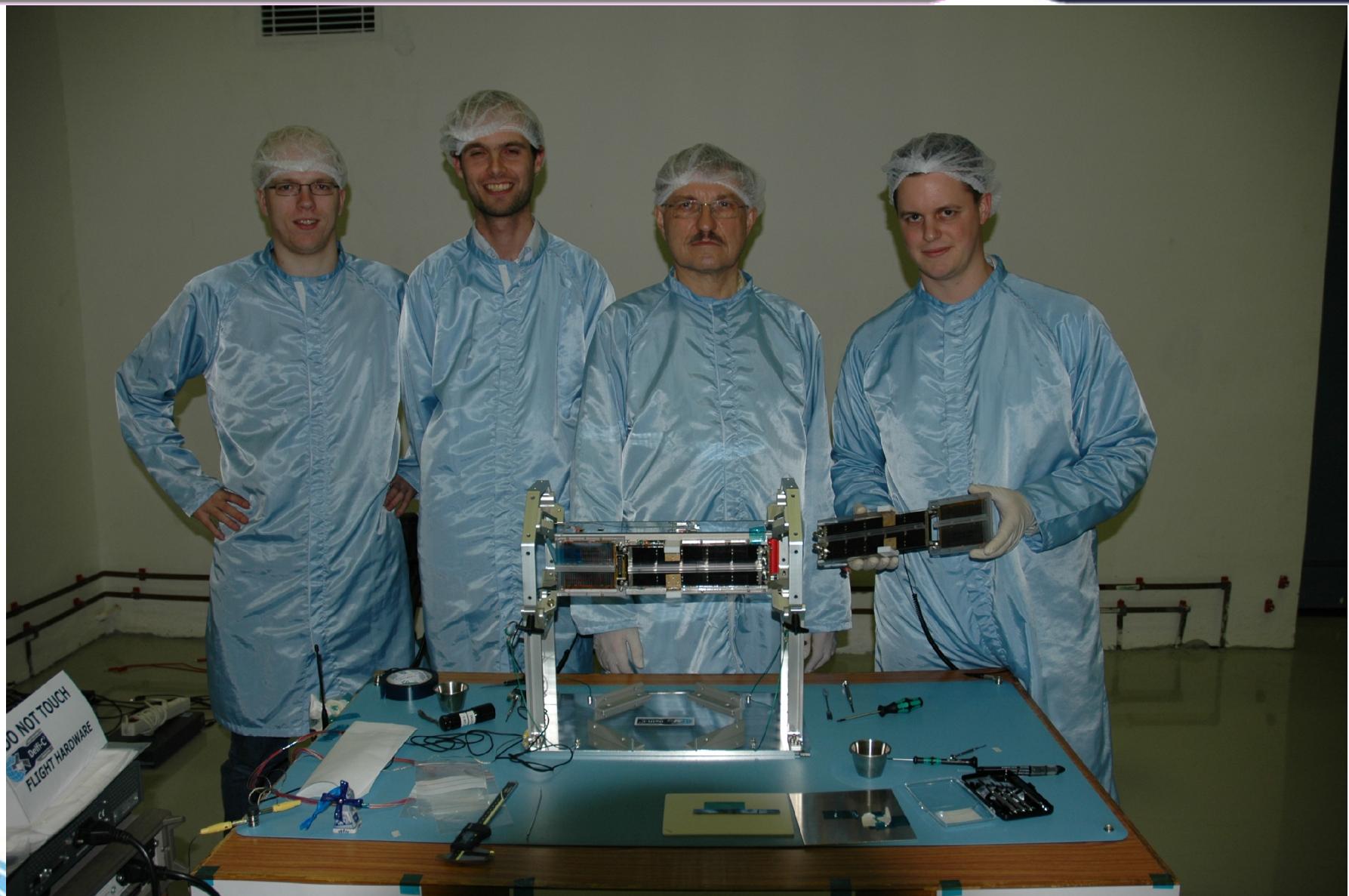


AWSS



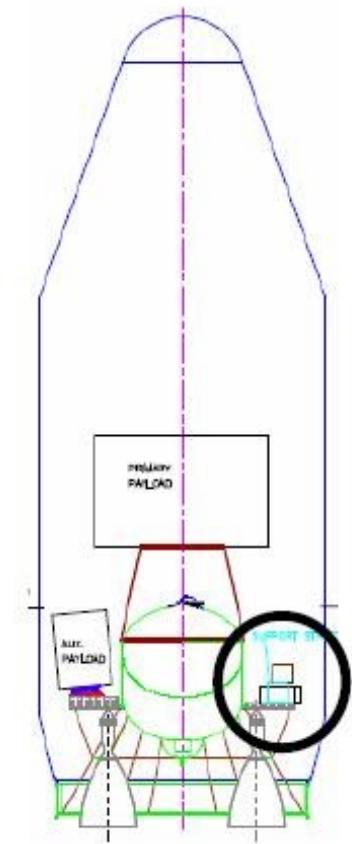
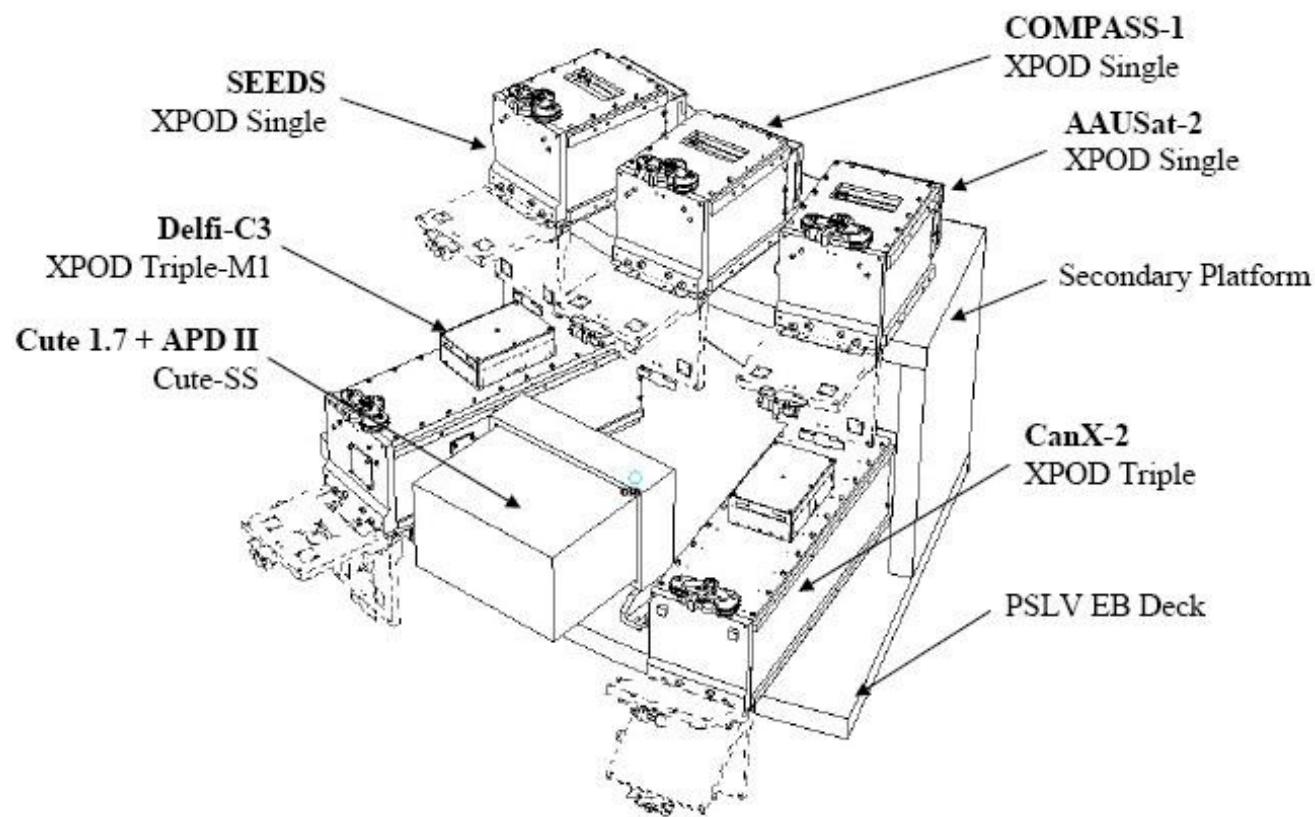
VERON Twente

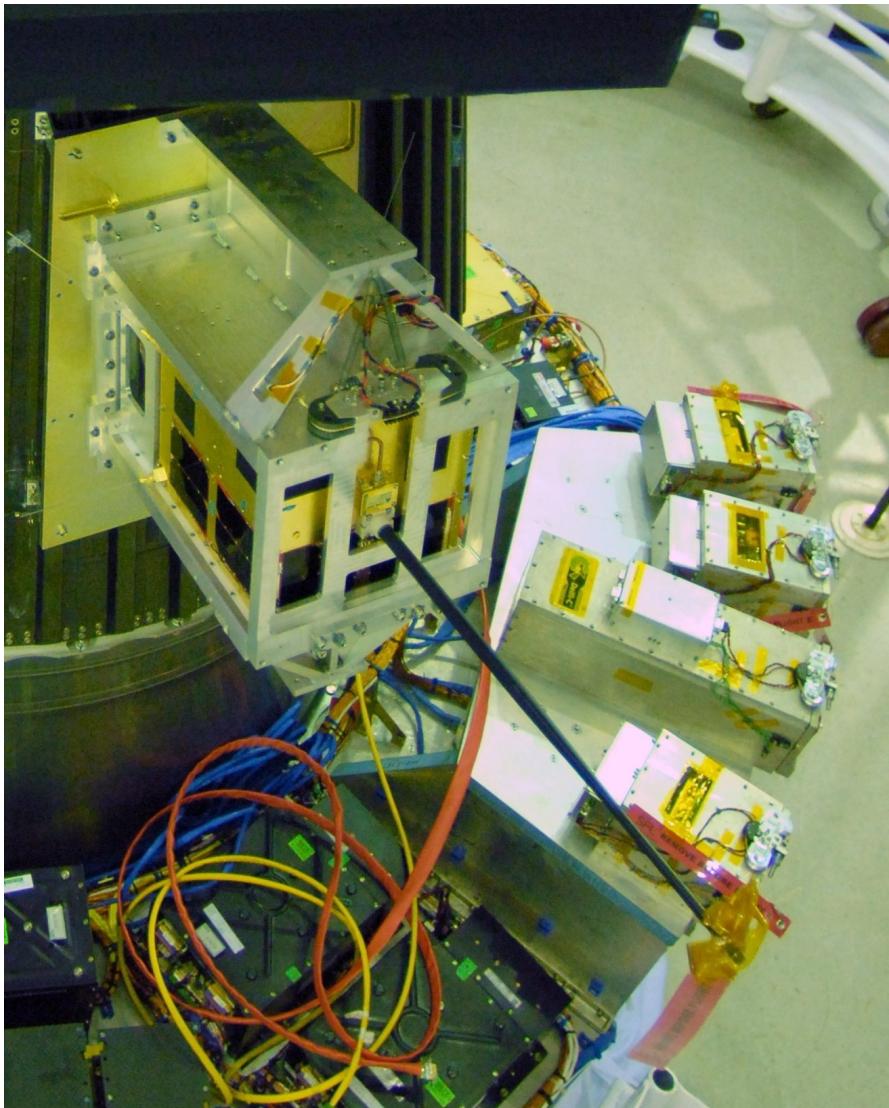
25 Februari 2009



VERON Twente

8





VERON Twente



25 Februari 2009



VERON Twente

11



VERON Twente

25 Februari 2009



28 April 2008 - Launch day

- 05:53: Launch from India



28 April 2008 - Launch day

- 05:53: Launch from India
- 09:29: Delfi-C3 HEARD by Rick Mann, US



28 April 2008 - Launch day

- 05:53: Launch from India
- 09:29: Delfi-C3 HEARD by Rick Mann, US
- After that: silence



28 April 2008 - Launch day

- 05:53: Launch from India
- 09:29: Delfi-C3 HEARD by Rick Mann, US
- After that: silence
- 13:55: in Delft...



28 April 2008 - Launch day

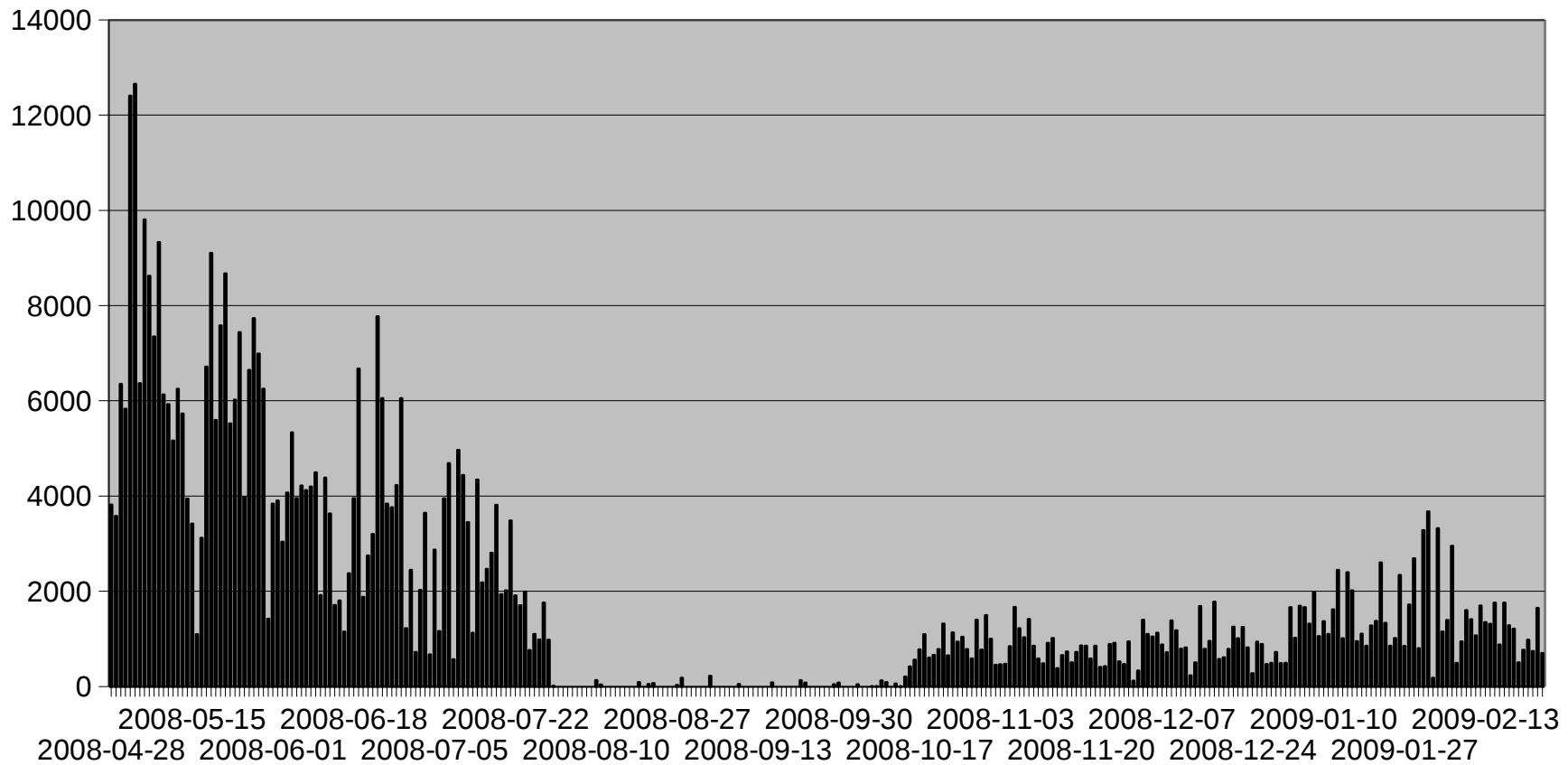
- 05:53: Launch from India
 - 09:29: Delfi-C3 HEARD by Rick Mann, US
 - After that: silence
 - 13:55: in Delft...
-
- Today: 100% Mission success
 - Science mission accomplished
 - Designated DO-64 by AMSAT on May 15 2008 (T + 17 days)



Radio amateur network

- Overwhelming response from the amateur radio community
- 300+ amateurs (others on guest account)
- 3000+ downloads of RASCAL
- Top submitters
 - JA0CAW
 - **PA0DLO Nico Janssen**
 - ZL2BX
 - **PE1ITR Rob Hardenberg**

Packets per day



Ground segment (1)



VERON Twente

20

Ground segment (2)



VERON Twente

21

Delfi-C3 RASCAL

File Options

Audio level

SigmaTel Audio

Frequency

1664 Hz Sync

TUDELF - DUTCH SPACE - TNO

Delfi-C³

WWW.DELFI.C3.NL

Satellite		OBC		EPS		MeBo Z+	
Packet counter	36 packets	OBC temperature	27.885 deg. C	EMP op. mode	OBC	MEP Z+ op. mode	OBC
Bootcounter attempt	12 boots	System bus voltage	0.0 V	GaAs Z+ X+ current	0.0 mA	MDP Z+ op. mode	OBC
Bootcounter succes	12 boots	OBC current	2.765 mA	GaAs Z+ X- current	0.0 mA	MeBo Z+ current	2.765 mA
Operational mode	science	ComBo		GaAs Z- Y+ current	48.825 mA	MeBo Z-	
Last Rx Cmd RAP	RAP 1	CEP mode	OBC	GaAs Z- Y- current	273.42 mA	MEP Z- op. mode	OBC
		AWP mode	OBC	ComBo Current	5.9250 mA	MDP Z- op. mode	OBC

RAP 1		RAP 2		ICB Z+		ICB Z-	
REP1 op. mode	OBC	REP2 op. mode	OBC	ADP 1 op. mode	OBM	ADP3 op. mode	OBC
RCP1 op. mode	OBC	RCP2 op. mode	OBM	ADP 2 op. mode	OBM	ADP4 op. mode	OBC
RBP1 op. mode	OBC	RBP2 op. mode	OBM	Solar Panel Z+ X+	undeployed	Solar Panel Z- Y+	deployed
RAP 1 temperature	30.945 deg. C	RAP 2 temperature	-68.1 deg. C	Solar Panel Z+ X-	undeployed	Solar Panel Z- Y-	deployed
RAP 1 Rx current	24.885 mA	RAP 2 Rx current	22.91 mA	Antenna Z+ X+	undeployed	Antenna Z- X+	deployed
RAP 1 Tx current	114.94 mA	RAP 2 Tx current	0.0 mA	Antenna Z+ X-	undeployed	Antenna Z- X-	undeployed
RAP 1 fwd. power	123.35 mW	RAP 2 fwd. power	0.0 mW	Antenna Z+ Y+	undeployed	Antenna Z- Y+	undeployed
RAP 1 refl. power	0.6194 mW	RAP 2 refl. power	0.0 mW	Antenna Z+ Y-	undeployed	Antenna Z- Y-	undeployed

Terminal

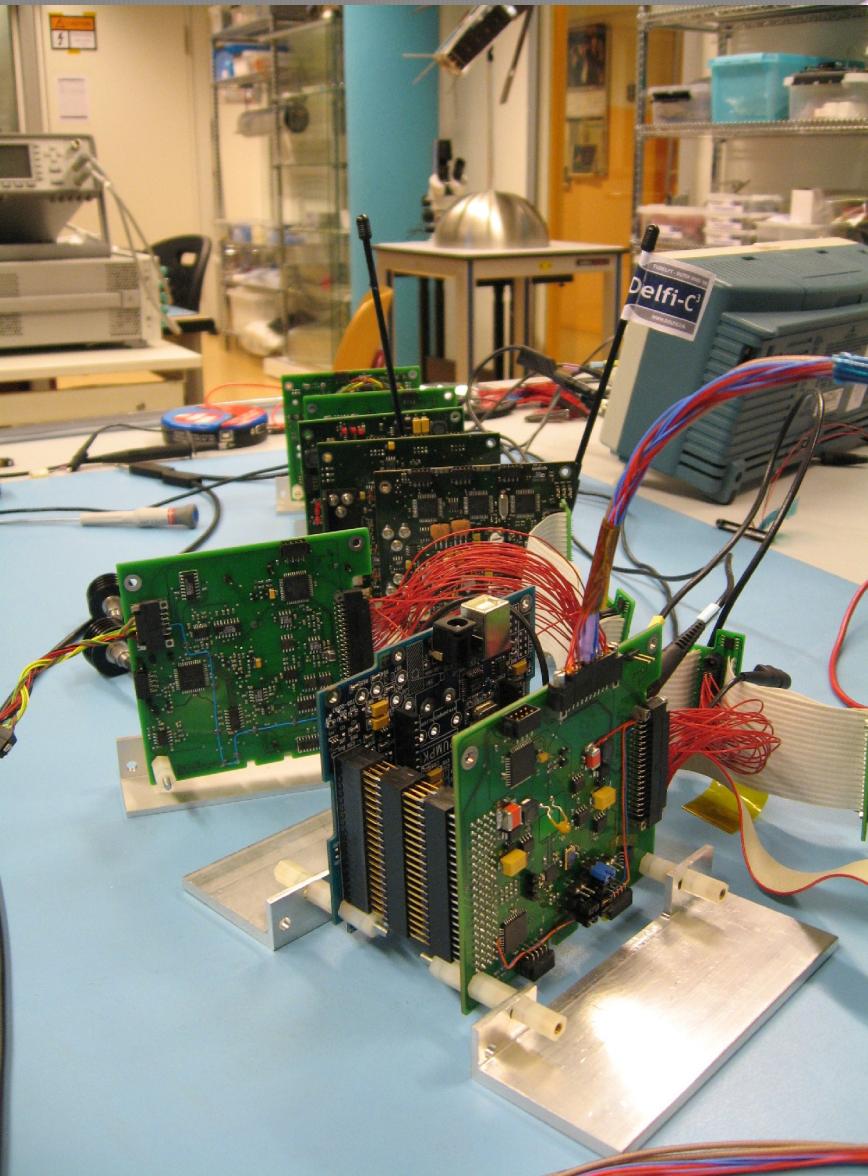
```
from: DLFIC3 to: TLM    a8 98 9b 40 40 40 00 88 98 8c 92 86 66 01 03 f0 0c 00 1
from: DLFIC3 to: TLM    a8 98 9b 40 40 40 00 88 98 8c 92 86 66 01 03 f0 0c 00 1
from: DLFIC3 to: TLM    a8 98 9b 40 40 40 00 88 98 8c 92 86 66 01 03 f0 0c 00 1
from: DLFIC3 to: TLM    a8 98 9b 40 40 40 00 88 98 8c 92 86 66 01 03 f0 0c 00 1
from: DLFIC3 to: TLM    a8 98 9b 40 40 40 00 88 98 8c 92 86 66 01 03 f0 0c 00 2
from: DLFIC3 to: TLM    a8 98 9b 40 40 40 00 88 98 8c 92 86 66 01 03 f0 0c 00 2
from: DLFIC3 to: TLM    a8 98 9b 40 40 40 00 88 98 8c 92 86 66 01 03 f0 0c 00 2
from: DLFIC3 to: TLM    a8 98 9b 40 40 40 00 88 98 8c 92 86 66 01 03 f0 0c 00 2
```

Status messages

Packets received: 7 Last packet received: 17/Apr/08 14:32:44

Primary repository	Secondary repository
Disk: 7 Sent: 0	Disk: 7 Sent: 0

```
[14:32:11] Starting RASCAL
[14:32:12] Loaded primary repository data: 0 frames
[14:32:12] Loaded secondary repository data: 0 frames
[14:32:13] Sampling Primary Sound Capture Driver
[14:32:13] Sampling SigmaTel Audio
[14:32:44] Unable to connect to server 80.138.144.157
```

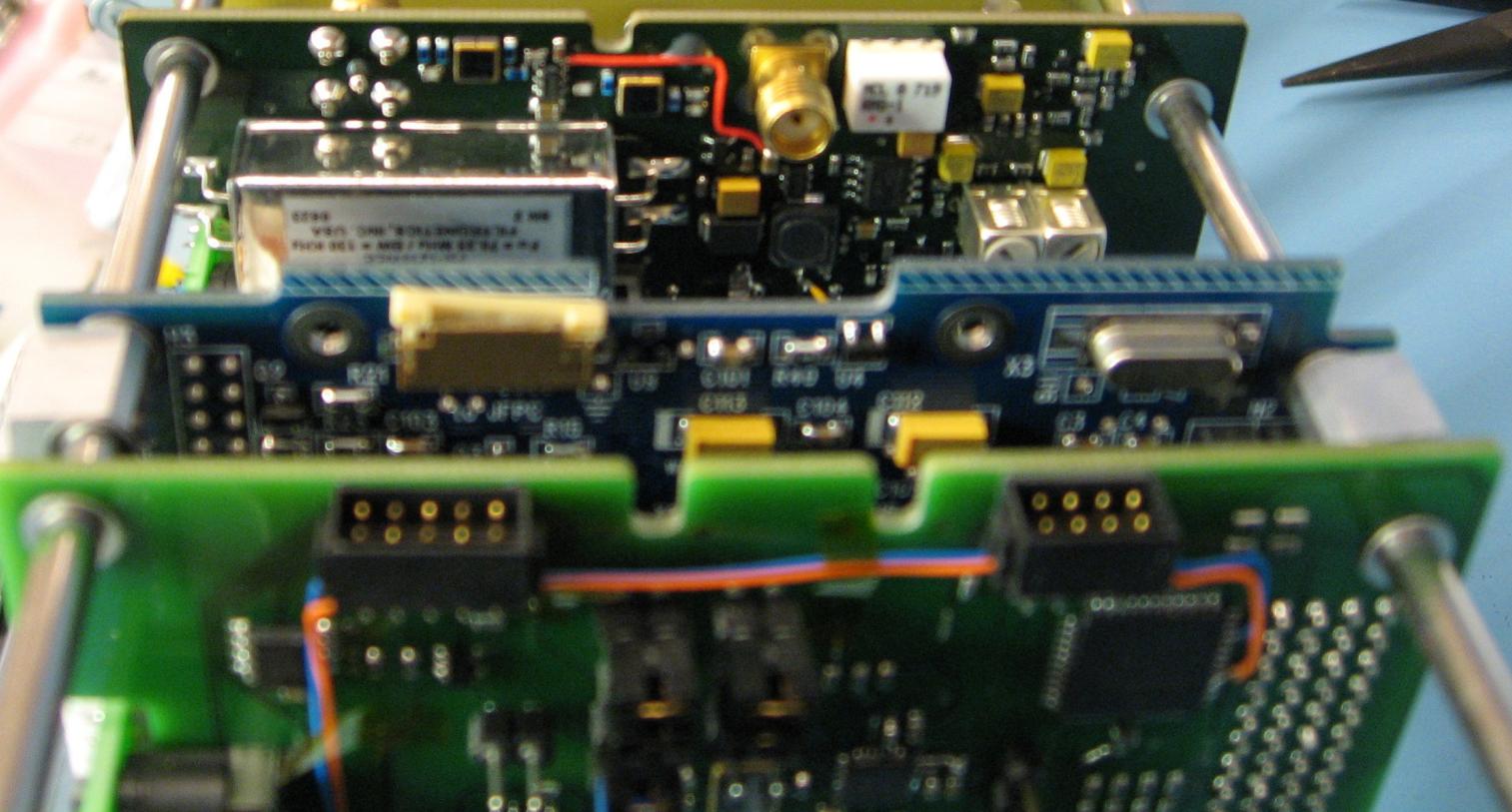


VERON Twente

23



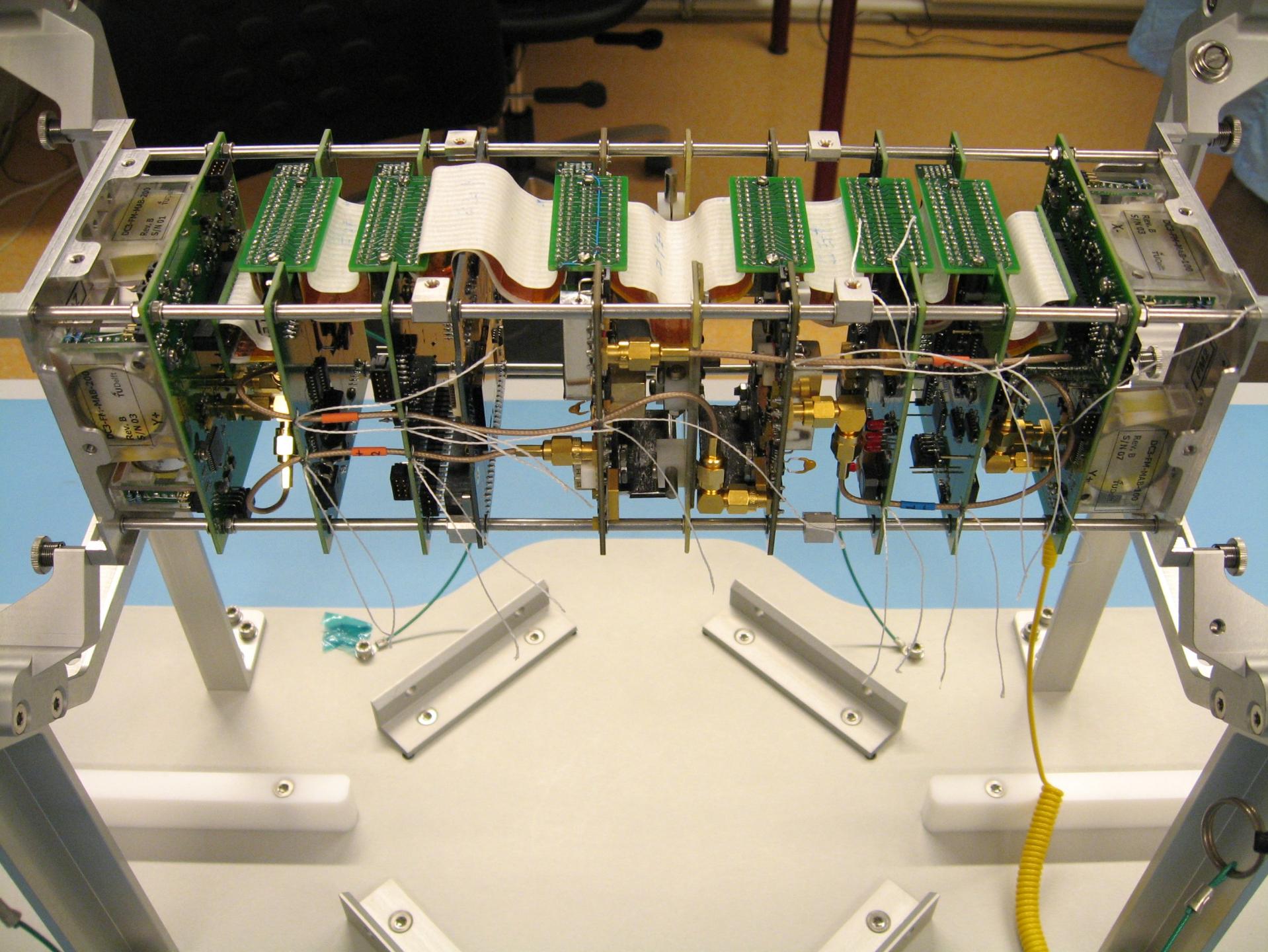
25 Februari 2009



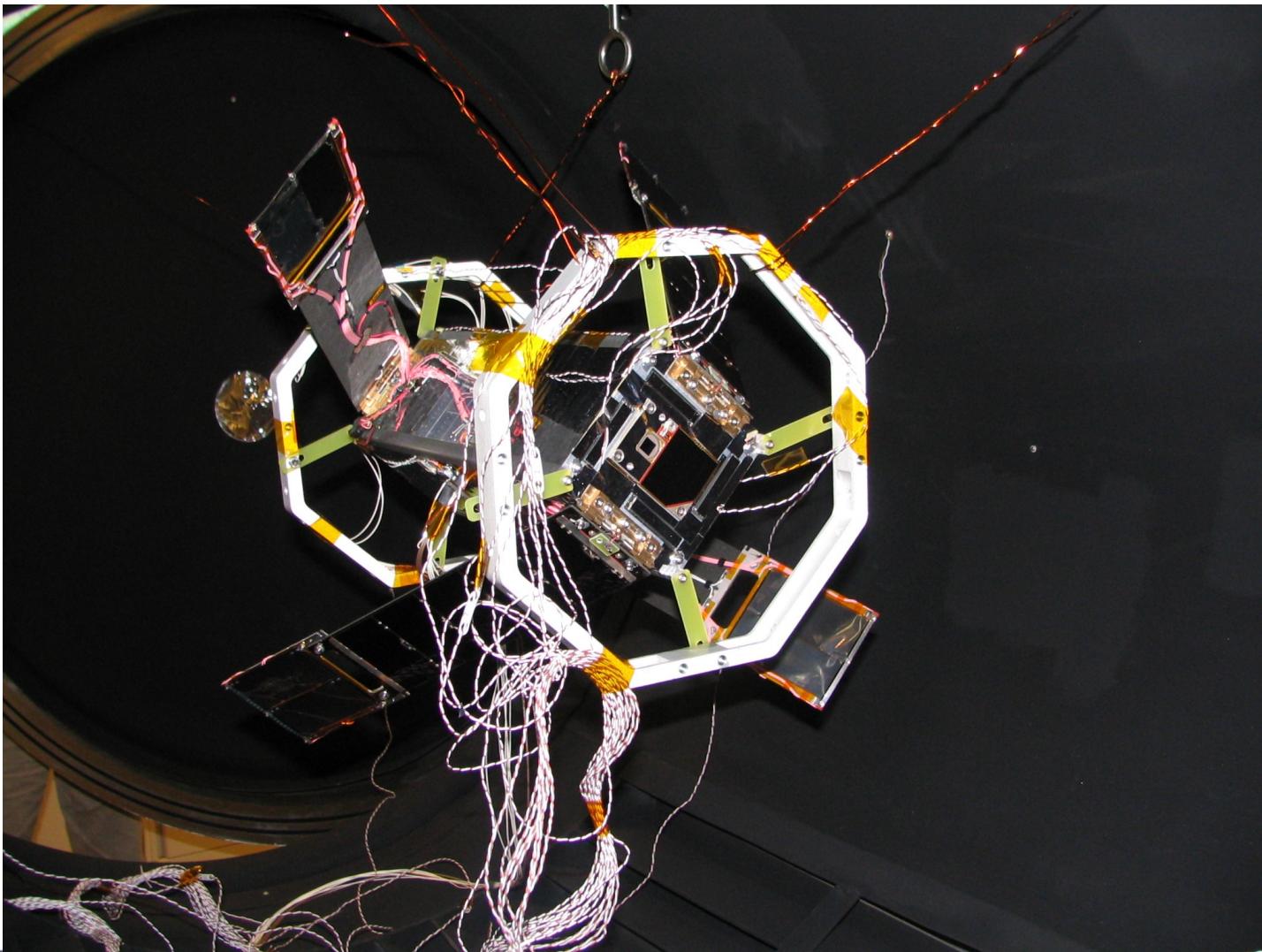
05918
V3000 00000000000000000000000000000000

05918
V3000 00000000000000000000000000000000

05918
V3000 00000000000000000000000000000000



TVAC Test



VERON Twente

26



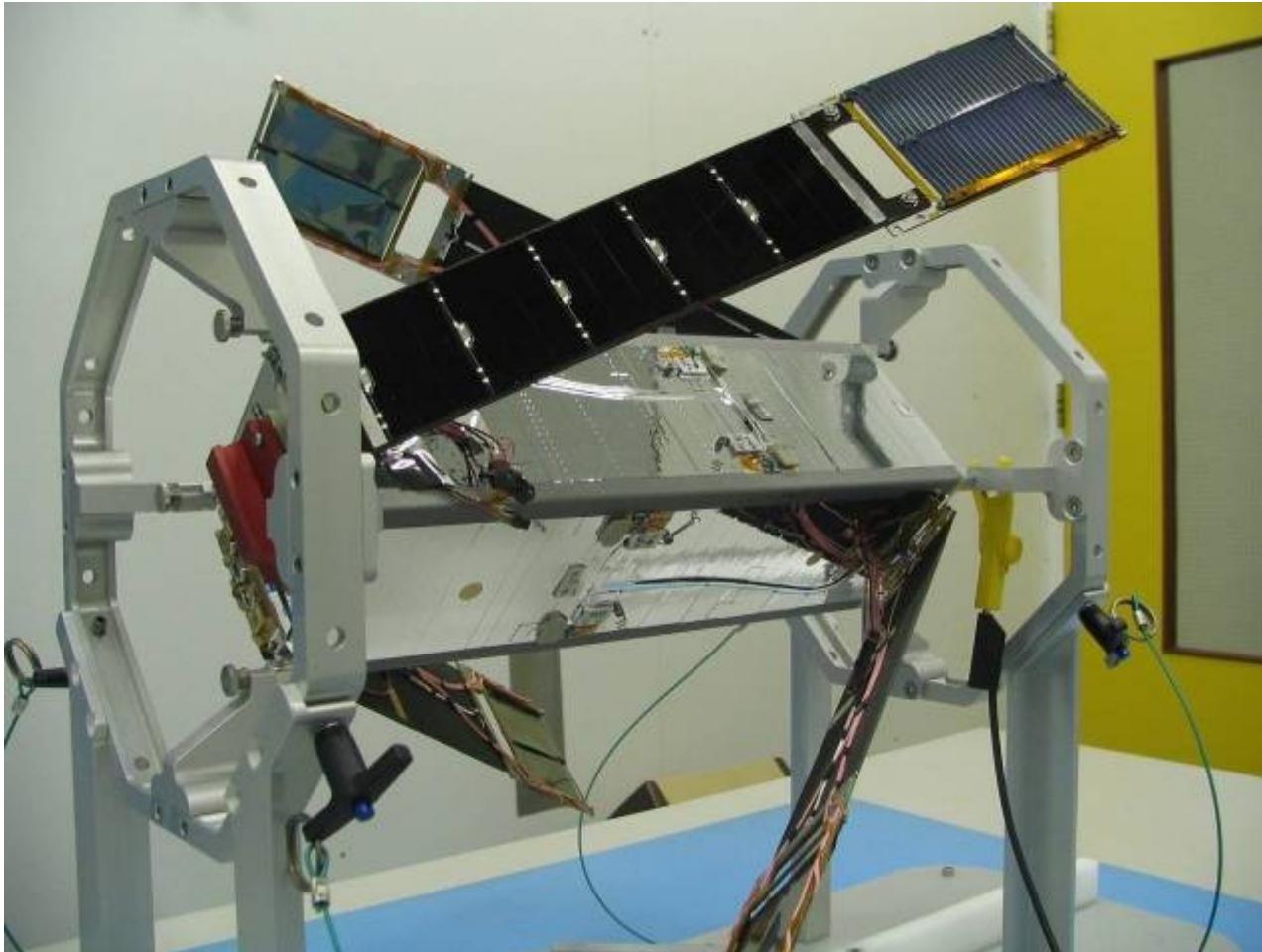
Vibe Test



VERON Twente

27

Flight configuration (antennas not deployed)

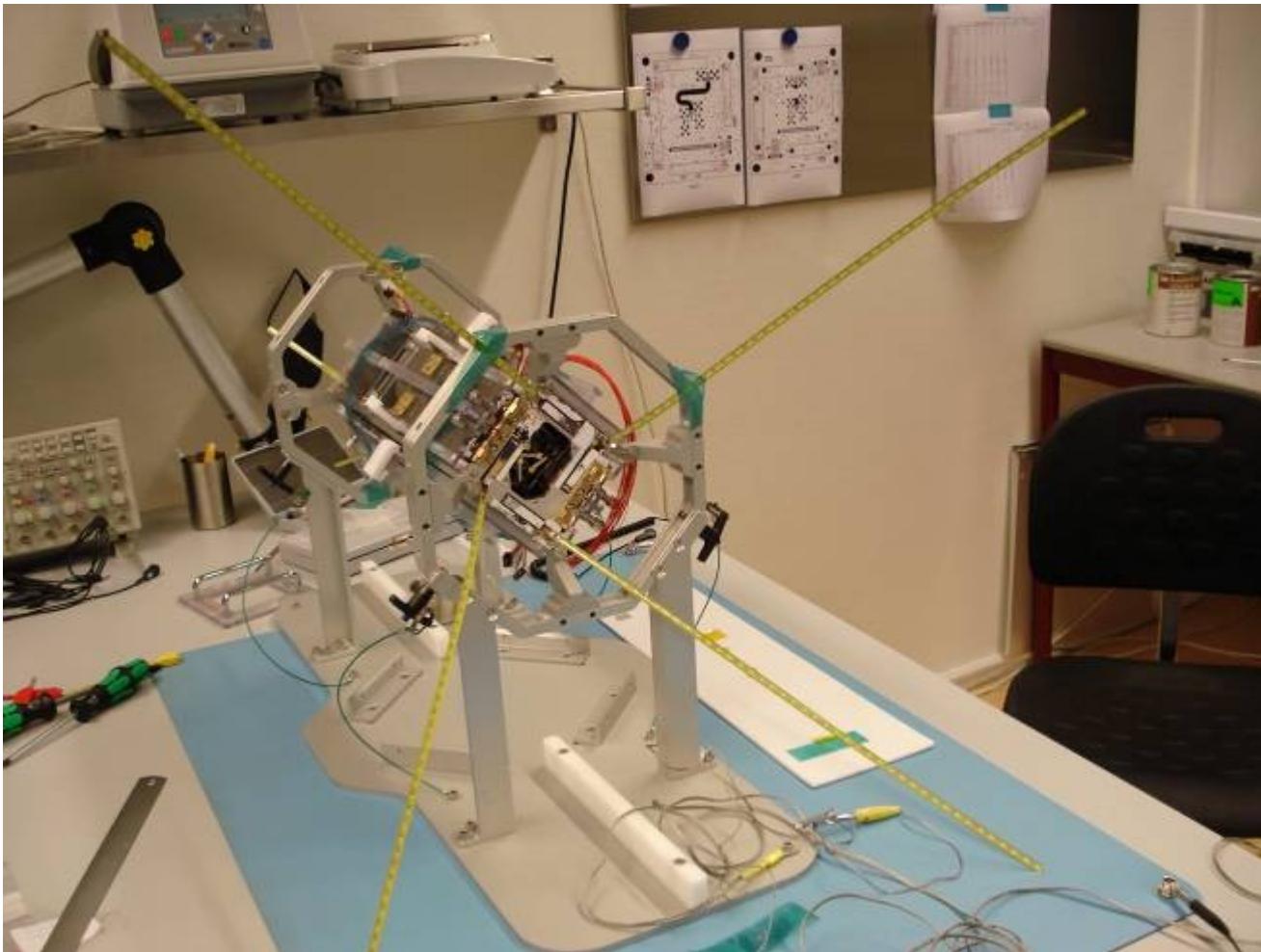


VERON Twente

28



Deployed antennas

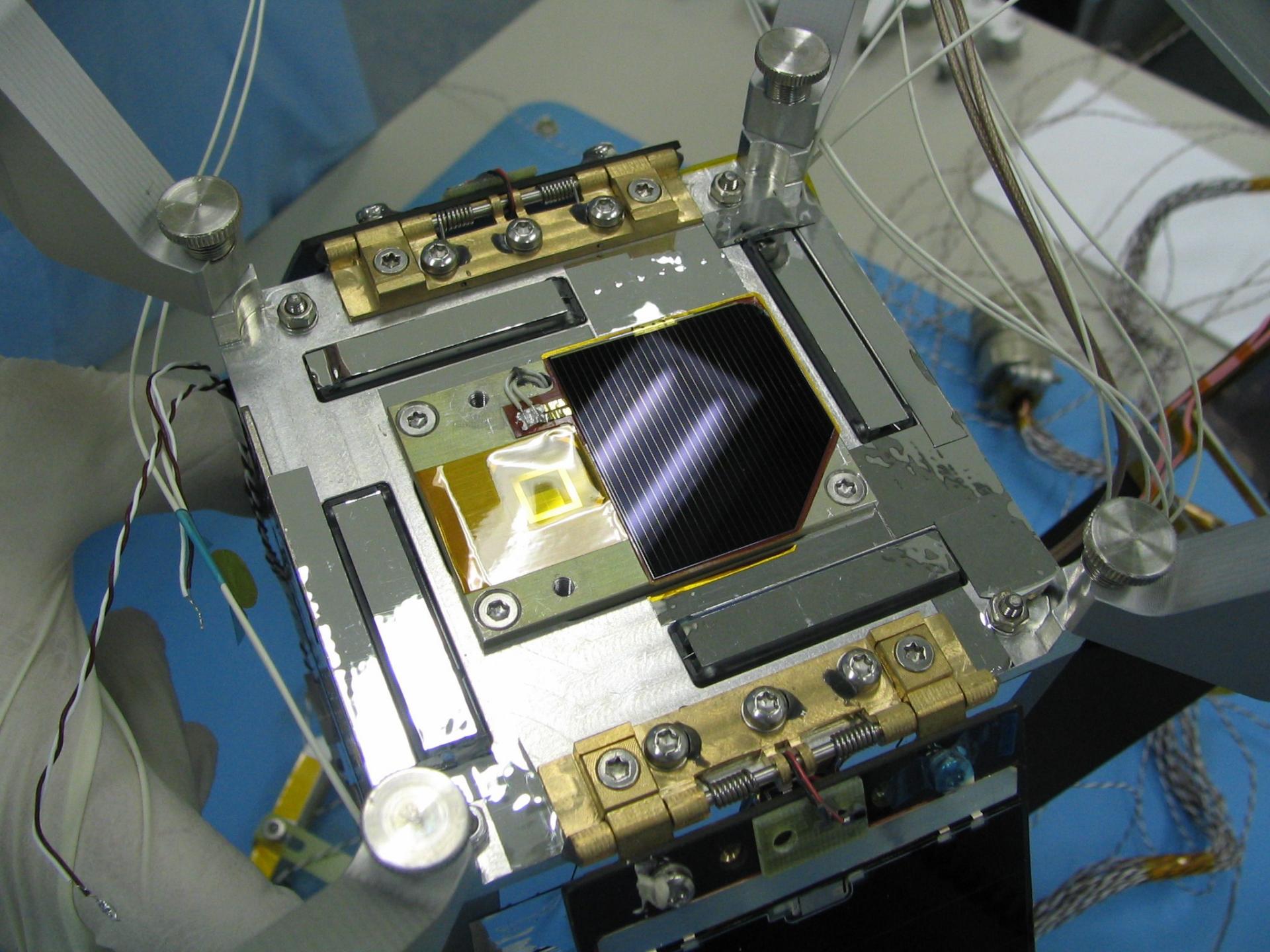


VERON Twente

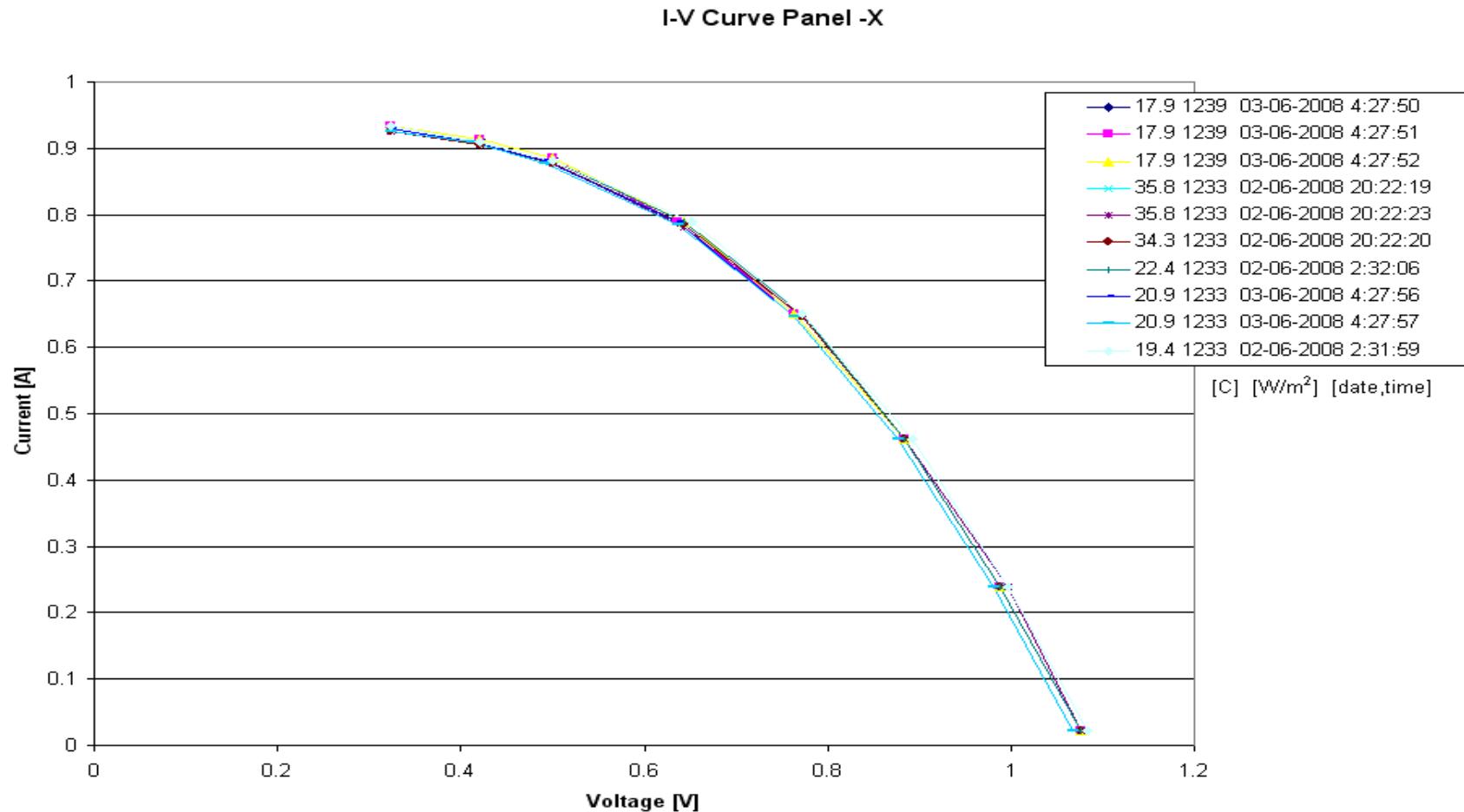
29



25 Februari 2009



TFSC payload data

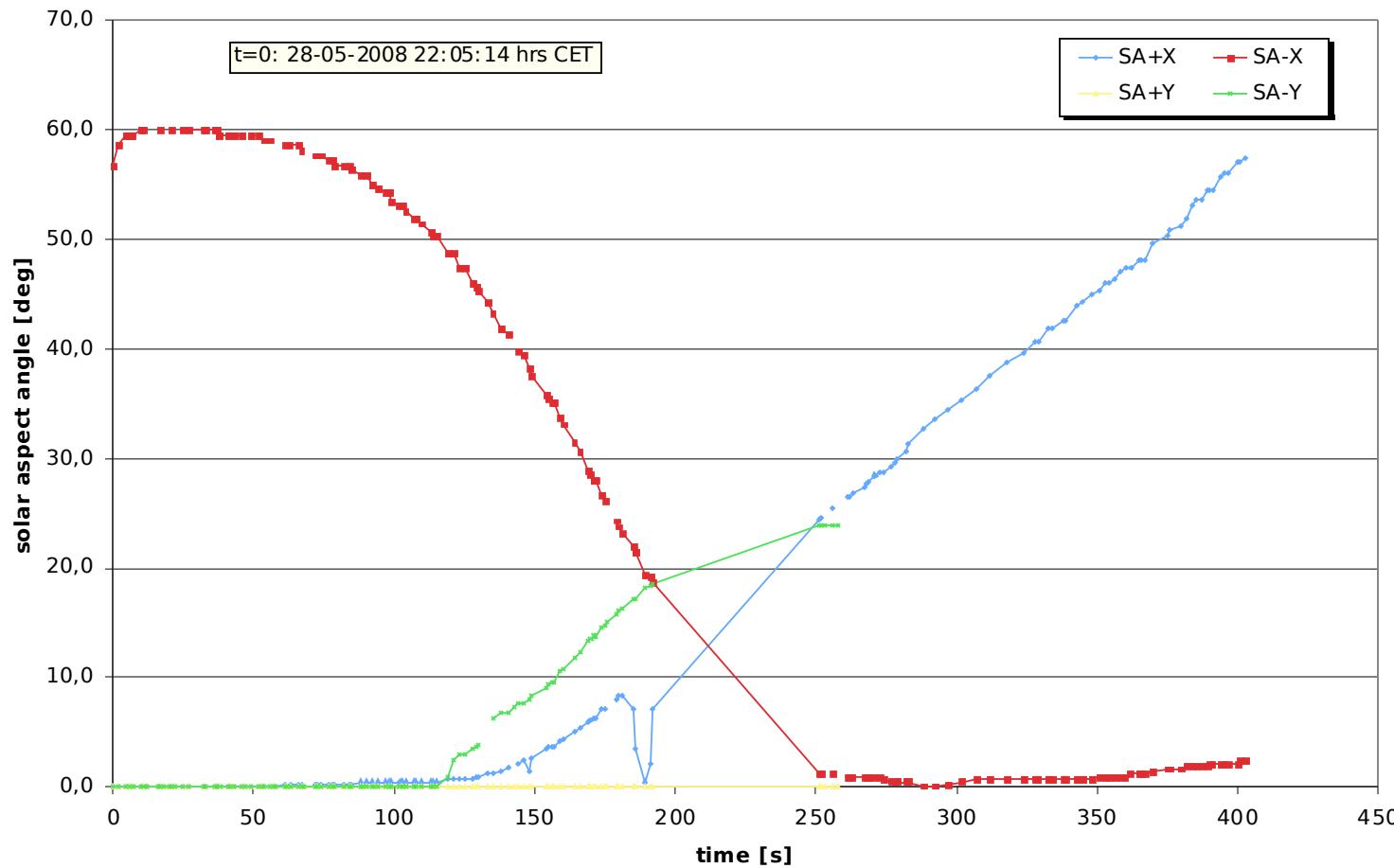


VERON Twente

31

Antenna shading

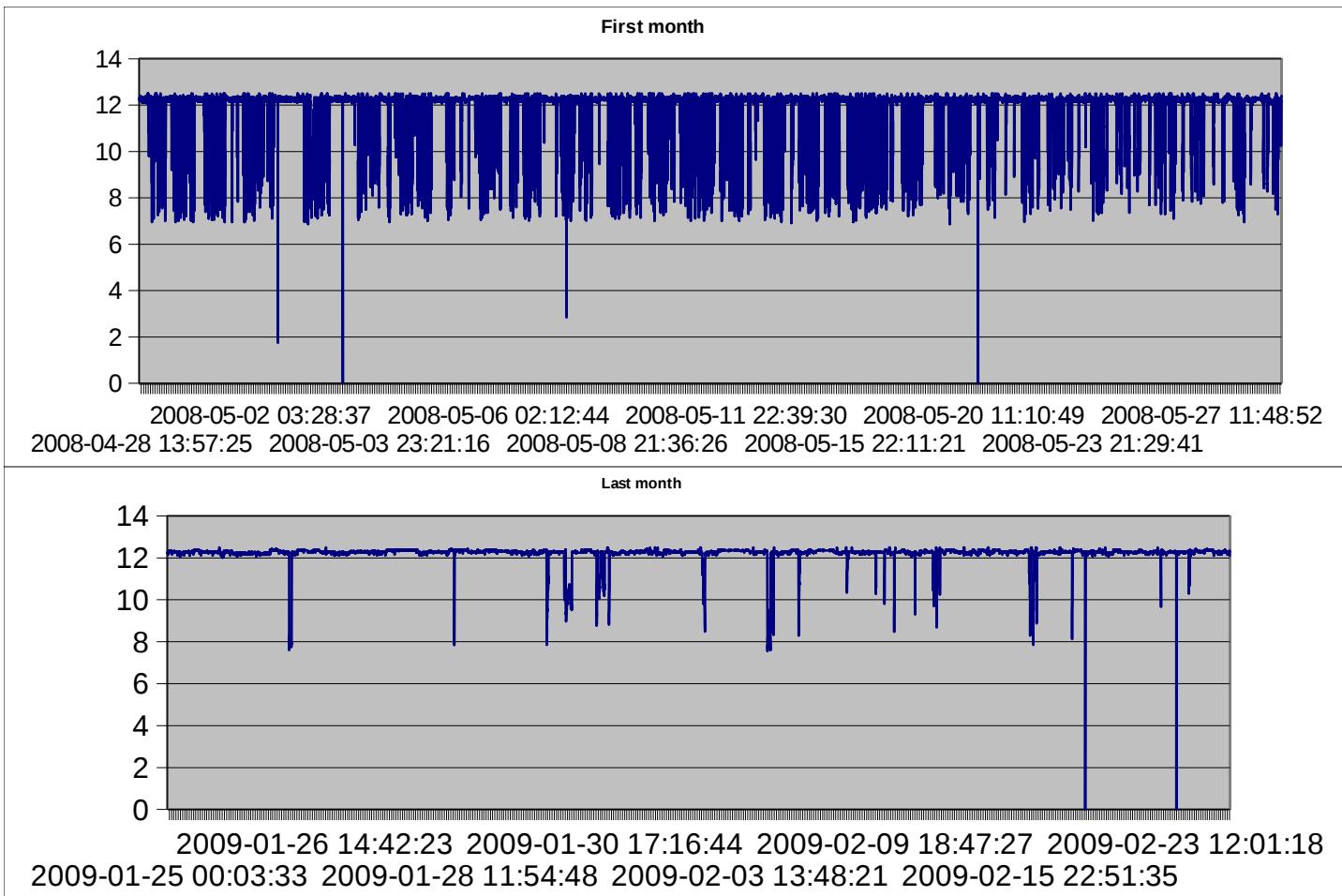
reference diode output



VERON Twente

32

Bus voltage



Transponder issues

- Diagnostic test results:
 - Local oscillator and uplink frequency OK for both RHCP and LHCP polarization
 - Over 400 W uplink power required to get a marginal downlink
 - Not useful for radio amateurs
 - Transmitter running at full gain
 - Corresponding command receiver also not working
- Conclusion:
 - Somewhere in the chain between antennae and power splitter there is a short or an open connection
 - Can be anything: Bad cable or solder joint, failed component, tin whisker, etc.
 - No further actions possible from ground





VERON Twente

35

Future?





www.delfic3.nl
pa3weg@delfic3.nl