AEROSPATIALE
ESPACE & DEFENSE

HUYGENS

TITLE : TM/TC DATA TABLES

Doc. n° HUY.AS/c.100.DB.0204

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	Function	Name	Signature	Date
Prepared by	Electrical Engineer	B. FANTIN		28/08/97
Approved by	Electric. System Engineer	C. PRUNIER		01/09/97
Approved by	Engineering Manager	F. GIOVAGNOLI		08/09/97
Approved by	Product Assurance	B. MARGUERIN		03/09/97
Released by	Programme Manager	G. HUTTIN		05/09/97

BOOK CAPTAIN : B. FANTIN

HUYGENS	REF : HUY AS/C 100 DB 0204
TITRE TM/TC Data Tables	DATE : 20-Aug-1997 ISSUE : 06 Page : A1 REVISION :B

EXTERNAL DISPATCHING

DESTINATAIR	QUANTITY
ESTEC	5 → 3 KSC, 2 ESTEC
Daimler-Benz Aerospace - Dornier	1 KSC

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TM/TC Data Tables	

LISTE DE DIFFUSION INTERNE

	NOM	TELEPHONE	I	REMARQUES
CA	J.C.BOSCHEL		1	
KSC	M.BRISSON		1	
CA	C. COLLET	3319	1	
KSC	P.COUZIN	3065	1	
CA	B. FANTIN	3065	1	
CA	F. GIOVAGNOLI	3066	1	
KSC	B.MARGUERIN	3302	1	
KSC	C.PRUNIER	3098	1	
KSC	G. ROUYER	7919	1	
KSC	G HUTTIN			
CA	Cil HUYGENS/~~G. HUTTIN~~		1	

CHANGE RECORD

ISSUE	REVISION	DATE	MODIFIED PAGES
00	-	13/01/93	Draft issue
01	-	09/04/93	This issue includes all the modifications of the probe baseline agreed between SDR and SDR close-out.
02	-	10/09/93	This issue includes all the modifications of the baseline agreed between SDR close-out and S/S MRR's. The telemetry and telecommand lists includes the SW identification (address) for CDMU. The POSW HK packet content has been completed.
03	-	11/02/94	Updating of the TC and TM list with an additional column (ID) Complete update of the POSW HK packet contents (according to POSW design) Complete update of the TC packet structure section Completion of the TM calibration section Introduction of SICD as reference document
04	-	15/09/94	p. 1: experiment TM/TC data table added as AD p. 5, 6: 4 new TC's added for DISR cover pyrolines p. 8: changes of TM verif. for R1 001 R2 002 O p. 12-24: - SASW status bytes 7, 8, 9 (A and B) TM added - 2 new TM's added for DISR cover pyrolines - control port added p. 25: 2 lines added for G-switch R8 lines § 4: header of packets changed § 5: MS bit of first word in packet header changed to O p. 31: control part byte added p. 37: main bus voltage deleted from report packet p. 50: NCO command word deleted in SASW Alteration TC p. 51: TC added: POSW load MTT § 8: tables filled in § 8.7: added (software parameters)
05	-	15/06/95	p. 8: TC created R6 004 O p. 15, 53: TM created : D6 007 B & D6 008 B p. 23, 53: TM created : R6 014R p. 28-29 § 4.3: RT counter MSW added p. 22, 23, 28: Correction of TM R5 007 A & R6 007 A name p. 10: TM verification added for TCs: TX HPA power ON p. 25: Signals "DWE Probe Status" deleted, and "electrical G-switches" added p. 50 § 7.13: SASW alteration TC packet splitted, with two new names p. 53-55, 58, 62, annex: TM calibrations and description corrected/added. p. 44: DDB packet definition added
05	A	12/09/95	p. 62: Viterbi status clarification (NCR 520 3221)

CHANGE RECORD

ISSUE	REVISION	DATE	MODIFIED PAGES
05	B	15/01/96	p. 13: name of D1/2 010B changed (CDMS Integr. TRR) p. 12, 13, 20: BIU fail counter byte and SASW status 10 word added p. 14: D5 016T: PDD instead of PJM p. 15: - MTU power status TM index corrected - RASU value acquisition rate corrected p. 17: RUSO A status explained p. 20: GCMS current TM PS026A name corrected p. 22, 23: MNEMO of PSA sec. voltage changed p. 23, 24: over sampled invalid TC counter added p. 28: CDR RID ESA EL-040 (byte count corrected) addition of SASW counter ward 10 and BIU fail counter for all models p. 31: addition of over sampled invalid TC counter p. 44: DBB packet transmission precision p. 46, 47: letter "O" corrected to "zero", § 7.4.2 corrected p. 47: MT counter value cancelled p. 50: SASW alteration TC's gathered again (on DASA request) p. 53: - description of conversion algorithm added for analogue TM's (CDR RID ESA SY-02) - R6013R changed into R6013B p. 53, 55: R5013, 014R and R6014R moved from page 53 to 55 p. 54: corrections and precision done through all the page p. 56: E3005S corrected into E3003S (CDR RID ESA SY-02) p. 57: S1/2 0011I corrected to S1/2 0101I (CDR RID ESA SY-02) p. 60: status EDAC register LSB "position" column corrected p. 62: NCO control word description precised Annex: values of calibration precised (FM values added when possible)
05	C	21/02/96	p. 55: Ref. to new calibration curves p. 72: PSA TXCO temperatures; FM A values corrected p. 74-75: new data
05	D	15/07/96	p. A4: change record of issue 05/B corrected (fax RDW 5577 dated 26/3/96) p. 14: TM D5 023T description corrected to DISR SII int. p. 15: TM D8 002A & D8 004A TM @ is 69 instead of 68 p. 24: TM T001T description is changed to (PCDU box) p. 53: Note added about battery voltage TM p. 54: - NCR 520 5106: TM E7004A RUSO nominal temperature corrected - NCR 520 5076: TM R1002A & R2002A nominal temperature corrected, table in annex added - nominal range corrected (R3002A, R5007A, R5008A) fax DSS 298/96: R1003A, R2003A p. 57: DBB mission phase corrected (OCh) (fax RDW 5577 dated 26/3/96) p. 62: - NCR 520 5038: note (3) added on AGC word validity - PSA receiver HK word 4 corrected p. 75: title of diagram corrected p. 76: new page with TX RF power voltage
05	E	23/09/96	p. 5, 6: New TCs added (cross-strap of RCM selection) P3 0210, P4 0210 p. 74: Corrected R4 0037 on diagram

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CHANGE RECORD

ISSUE	REVISION	DATE	MODIFIED PAGES
06	--	29/10/96	1) ECP AS/c 321 100 CASU Back-up p. 13: new G-switches status TMs (D1 001 R, D1 012 R, D2 011 R, D2 012 R) p. 23: POSW A new G-switches buffer and counter TMs added (S1 024 W, S1 025 W) p. 24: POSW B new G-switches buffer and counter TMs added (S2 024 W, S2 025 W) p. 25: T0/Ta G-switches: 4 new acquisition signals added p. 36: TMs added in HK4 packet: T0/Ta G-switches buffer and time-out counter p. 55: new G-switches TMs added (D1 011 R, D1 012 R, D2 011 R, D2 012 R) p. 58: calibration added for T0/Ta G-switches buffer and time-out counter 2) NCR 520-5247: Calibration of PDRS temperature TMs p. AN6, AN7, AN8, AN10, AN11: theoretical temperature TM calibration added in function of internal thermistor temperature 3) p. AN9: calibration curve for PSA digital AGC replaced by a comment 4) p. AN2-AN3: presentation reorganised for calibration curve (1) and (2) 5) p. AN12: new data for TX power TM calibration 6) precisions added: p. 28: RUSO TM on chain A only p. 64: bit 12 value
06	A	24/02/97	1) p. AN4 & AN5 RID FAR DWE SY 860 EM calibration are those of QM, FM after EMs upgrading 2) p. 23, 24 & 58 JPL references changed for the new G Switch Software parameters 3) p. 22, 23 Correction of PSA temperature TMs affectation (PSA box and PSA TCXO were inverted) 4) p. 22, 23 & 55 Deletion of PSA TCXO temperature following Cassini Harness modification (see NCR 520 6002/PFR Z23377) 5) p. 53 Correction of 0 level explanation for R1/2 006 B (is not only invalid : is also « OFF »)
06	B	20/08/97	1) p. 55, AN 3 : detailed calibration tables added for Probe thermistors conditioned by Orbiter (NCR 526 7022) 2) p. 63 : . Correction of Viterby TM default value, (0 instead of 1), in note (1) . (NCR 526 7033). . Note (4) added about RSW status TM (NCR 526 7026) 3) p. 19, 21 addition of JPL TM reference for redundant acquisition of PCDU relay loop TMs 4) p. AN11 : « TM Voltage » corrected by « TM resistance » on diagram 5) p. 54 : RAU AGC nominal range corrected

ORGANISME EMETTEUR	CLASSIFICATION	
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TITRE

HUYGENS TM/TC DATA TABLES

AUTEUR (S) B. FANTIN
(Personne physique)

DATE (JJ - MM - AA)	NUMERO D'ORIGINE DU DOCUMENT	NOMBRE		
		Pages	Figures	Références Bibliographiques
20/08/97	Adm. HUY.AS/C.100.DB.0204			
	Tech.			

RESUME D'AUTEUR

Le présent document rassemble sous forme de tableaux les données relatives à la TM/TC de la Sonde HUYGENS

Numéro de documentation	Nature du document	Cote archive
NOTIONS D'INDEXAGE - HUYGENS - DATA BASE - TM/TC		Catégorie de diffusion [2] [D X] [3 X] [1] Service : SE/TSE Nom : B. FIL Signature : Département : SE/TS Nom : J. PORTIER Signature :

1. INTRODUCTION

1.1 PURPOSE

This document lists all the data related to telemetry and telecommand of the HUYGENS Probe at system level.

It gives input for AIT data base and for software ICD.

1.2 DOCUMENTS

1.2.1 Reference documents

RD01 HUYGENS user manual
HUY.AS/c.100.OP.0201.

RD02 Electrical design and construction requirements (EDCR)
HUY.AS/c.100.SR.0030.

1.2.2 Applicable documents

AD01 Software ICD (SICD)
HUY.AS/c.100.ID.0237.

AD02 Experiment TM/TC data tables
HUY.AS/c.100.DB.299.

1.3 IDENTIFICATION CONVENTIONS

The two first digits of TM/TC reference indicate the unit which receives the TC or which generates the TM in accordance with Table 1.

The last digit of TM/TC reference indicates the type of the telecommand (see Table 2) or telemetry (see Table 3).

THSS	T
EPSS	P
PCDU	P5
PYRO A	P3
PYRO B	P4
PHSS	H
CDMS	D
CDMU A	D1
CDMU B	D2
PROXIMITY SENSOR A	D3
PROXIMITY SENSOR B	D4
TIMER	D6
TEMPERATURE SENSORS	D5
CASU	D7
RASU	D8
ARMING TIMER A	D9
ARMING TIMER B	D10
PDRS	R
TX A	R1
TX B	R2
LNA A (RFE)	R3
LNA B (RFE)	R4
PSA A	R5
PSA B	R6
POSW	S
CDMU A	S1
CDMU B	S2
SASW	A
PSA A	A1
PSA B	A2
ORBITER	O
LAUNCHER	L
GCMS	E1
HASI	E2
DISR	E3
ACP	E4
SSP	E5
TUSO	E6
RUSO	E7
MECHANISM	M
SEPS	M1

TABLE 1 HUYGENS PROBE SYSTEM S/S, UNITS AND EXPERIMENTS CODING RULES

TC TYPE	NAME	TYPE COLUMN IN TC LIST
High level ON/OFF	O	O/O 13 ms; O/O 45 ms; ON/OFF
Memory load command	M	ML 16

TABLE 2 TYPE OF TELECOMMAND

TM TYPE	NAME	TYPE COLUMN IN TM LIST
Analogue	A	8 bits ANA
Bi-level	B	DB (digital bi-level)
Data ready	D	D. ready
Switch status	R	Rel. stat.
Serial 16 bits	S	DS 16, pack. data
Thermistor	T	Temp.
Software byte	H	Byte
Software word (16 bits)	W	Word

TABLE 3 TYPE OF TELEMETRY

2. DIRECT TC AND COMMAND LIST

This section only addresses direct TCs (PSA & CDMU) and commands. General structure of all TCs is given in Chapter 7. TC packet structure.

Each telecommand can be identified by one of the following references:

- CMD REF as described in section 1.3

- MNEMO which gives a comprehensive mnemonic of the command.

The column "TC@" gives the parameter which shall be used to send a direct TC (see section 7). It is represented in a decimal basis.

The column "TM VERIF" gives the reference of the telemetry which allows to check the correct execution of the telecommand.

The column "TYPE" gives the type as defined in RD02 (hardware and protocol).

The columns "SOURCE" and "DESTIN." give the name of the unit which sends the telecommand and which receives it.

The command signals can not be controlled by the ground. They have no reference (they correspond to wired links internal to the Probe System).

NOTE : Special cases in 2.1 DIRECT TC LIST are :

a. D1 001 M and D2 001 M correspond to the umbilical hardware link from PSA to CDMU, through which all TCs are sent to the Probe and are referenced in the EICD. Consequently, there is no associated functional TC and no CDMU TC address.

b. All memory load TC to experiments are transmitted via a single CDMU experiment link per experiment, through specific TC packets (see § 7.1). Associated functional TCs are defined in AD 02.

c. R5 007 M and R6 003 M is not a direct TC but a SASW alteration TC (see § 7.13).

WARNING : In case of examination of the POSW or SASW software map, take into account that command names of chain A only appear.

2.1 DIRECT TC LIST

CMD REF	TC @	NAME OF THE COMMAND	TYPE	TM VERIF		SOURCE	DESTIN.	MNEMO
				channel A	channel B			
D1 001 M		Umbilical memory load A	ML 16	TC counter		PSA A	CDMU A	UMBMLxxA
D2 001 M		Umbilical memory load B	ML 16		TC counter	PSA B	CDMU B	UMBMLxxB
D6 001 M	1	coast timer 1 load/init.	ML 16	D6 001 S	D6 002 S	CDMU A	TIMER 1	CTIMLOAD1A
D6 002 M	1	coast timer 1 load/init.	ML 16	D6 001 S	D6 002 S	CDMU B	TIMER 1	CTIMLOAD1B
D6 003 M	6	coast timer 2 load/init.	ML 16	D6 003 S	D6 004 S	CDMU A	TIMER 2	CTIMLOAD2A
D6 004 M	6	coast timer 2 load/init.	ML 16	D6 003 S	D6 004 S	CDMU B	TIMER 2	CTIMLOAD2B
D6 005 M	11	coast timer 3 load/init.	ML 16	D6 005 S	D6 006 S	CDMU A	TIMER 3	CTIMLOAD3A
D6 006 M	11	coast timer 3 load/init.	ML 16	D6 005 S	D6 006 S	CDMU B	TIMER 3	CTIMLOAD3B
E1 001 M	2	GCMS memory load A	ML 16	E1 002 S	E1 003 S	CDMU A	GCMS	GCMSMLxxA
E1 002 M	2	GCMS memory load B	ML 16	E1 002 S	E1 003 S	CDMU B	GCMS	GCMSMLxxB
E2 001 M	3	HASI memory load A	ML 16	E2 002 S	E2 005 S	CDMU A	HASI	HASIMLxxA
E2 002 M	3	HASI memory load B	ML 16	E2 002 S	E2 005 S	CDMU B	HASI	HASIMLxxB
E3 001 M	4	DISR memory load A	ML 16	E3 002 S	E3 003 S	CDMU A	DISR	DISRMLxxA
E3 002 M	4	DISR memory load B	ML 16	E3 002 S	E3 003 S	CDMU B	DISR	DISRMLxxB
E4 001 M	5	ACP memory load A	ML 16	E4 002 S	E4 005 S	CDMU A	ACP	ACPMLxxA
E4 002 M	5	ACP memory load B	ML 16	E4 002 S	E4 005 S	CDMU B	ACP	ACPMLxxB
E5 001 M	7	SSP memory load A	ML 16	E5 002 S	E5 003 S	CDMU A	SSP	SSPMLxxA
E5 002 M	7	SSP memory load B	ML 16	E5 002 S	E5 003 S	CDMU B	SSP	SSPMLxxB
P3 001 O	5	Pyro 1 power off	O/O 45ms	P3 002 R	-	CDMU A	PYRO 1	PY1PWROFF
P3 002 O	59	Pyro 1 and 2 fire A	O/O 45ms	-	-	CDMU A	PYRO 1&2	PY12FIREA
P3 003 O	12	Pyro 1 group 1 disarm	O/O 13ms	-	-	CDMU A	PYRO 1	PY1GR1DISARM
P3 004 O	21	Pyro 1 group 2 disarm	O/O 13ms	-	-	CDMU A	PYRO 1	PY1GR2DISARM
P3 005 O	29	Pyro 1 group 3 disarm	O/O 13ms	-	-	CDMU A	PYRO 1	PY1GR3DISARM
P3 006 O	37	Pyro 1 group 4 disarm	O/O 13ms	-	-	CDMU A	PYRO 1	PY1GR4DISARM
P3 007 O	3	Pyro 1 PDD set	O/O 13ms	P3 004 B	-	CDMU A	PYRO 1	PY1PDDSET
P3 008 O	4	Pyro 1 GCMS IN set	O/O 13ms	P3 005 B	-	CDMU A	PYRO 1	PY1GCMSINSET
P3 009 O	10	Pyro 1 GCMS OUT set	O/O 13ms	P3 006 B	-	CDMU A	PYRO 1	PY1GCMSOUTSET
P3 010 O	22	Pyro 1 BCM set	O/O 13ms	P3 07-09B	-	CDMU A	PYRO 1	PY1BCMSET
P3 011 O	13	Pyro 1 FSM set	O/O 13ms	P3 10-12B	-	CDMU A	PYRO 1	PY1FSMSET
P3 012 O	7	Pyro 1 PJM set	O/O 13ms	P3 13-15B	-	CDMU A	PYRO 1	PY1PJMSET
P3 013 O	2	Pyro 1 PDD reset	O/O 13ms	P3 004 B	-	CDMU A	PYRO 1	PY1PDDRES
P3 014 O	6	Pyro 1 GCMS IN reset	O/O 13ms	P3 005 B	-	CDMU A	PYRO 1	PY1GCMSINRES
P3 015 O	11	Pyro 1 GCMS OUT reset	O/O 13ms	P3 006 B	-	CDMU A	PYRO 1	PY1GCMSOUTRES
P3 016 O	23	Pyro 1 BCM reset	O/O 13ms	P3 07-09B	-	CDMU A	PYRO 1	PY1BCMRES
P3 017 O	14	Pyro 1 FSM reset	O/O 13ms	P3 10-12B	-	CDMU A	PYRO 1	PY1FSMRES
P3 018 O	18	Pyro 1 PJM reset	O/O 13ms	P3 13-15B	-	CDMU A	PYRO 1	PY1PJMRES
P3 019 O	15	Pyro 1 DISR cover set	O/O 13ms	P3 016B	-	CDMU A	PYRO 1	PY1DCOVSET
P3 020 O	30	Pyro 1 DISR cover reset	O/O 13ms	P3 016B	-	CDMU A	PYRO 1	PY1DCOVRES
P3 021 O	31	Pyro 1 BCM set B	O/O 13ms	P3 07-09 B	-	CDMU B	PYRO 1	PY1BCMSETB

CMD REF	TC @	NAME OF THE COMMAND	TYPE	TM VERIF		SOURCE	DESTIN.	MNEMO
				channel A	channel B			
P4 001 O	5	Pyro 2 power off	O/O 45ms	-	P4 002 R	CDMU B	PYRO 2	PY2PWROFF
P4 002 O	59	Pyro 1 and 2 fire B	O/O 45ms	-	-	CDMU B	PYRO 1&2	PY12FIREB
P4 003 O	12	Pyro 2 group 1 disarm	O/O 13ms	-	-	CDMU B	PYRO 2	PY2GR1DISARM
P4 004 O	21	Pyro 2 group 2 disarm	O/O 13ms	-	-	CDMU B	PYRO 2	PY2GR2DISARM
P4 005 O	29	Pyro 2 group 3 disarm	O/O 13ms	-	-	CDMU B	PYRO 2	PY2GR3DISARM
P4 006 O	37	Pyro 2 group 4 disarm	O/O 13ms	-	-	CDMU B	PYRO 2	PY2GR4DISARM
P4 007 O	3	Pyro 2 PDD set	O/O 13ms	-	P4 004 B	CDMU B	PYRO 2	PY2PDDSET
P4 008 O	4	Pyro 2 GCMS IN set	O/O 13ms	-	P4 005 B	CDMU B	PYRO 2	PY2GCMSINSET
P4 009 O	10	Pyro 2 GCMS OUT set	O/O 13ms	-	P4 006 B	CDMU B	PYRO 2	PY2GCMSOUTSET
P4 010 O	22	Pyro 2 BCM set	O/O 13ms	-	P4 07-09B	CDMU B	PYRO 2	PY2BCMSET
P4 011 O	13	Pyro 2 FSM set	O/O 13ms	-	P4 10-12B	CDMU B	PYRO 2	PY2FSMSET
P4 012 O	7	Pyro 2 PJM set	O/O 13ms	-	P4 13-15B	CDMU B	PYRO 2	PY2PJMSET
P4 013 O	2	Pyro 2 PDD reset	O/O 13ms	-	P4 004 B	CDMU B	PYRO 2	PY2PDDRES
P4 014 O	6	Pyro 2 GCMS IN reset	O/O 13ms	-	P4 005 B	CDMU B	PYRO 2	PY2GCMSINRES
P4 015 O	11	Pyro 2 GCMS OUT reset	O/O 13ms	-	P4 006 B	CDMU B	PYRO 2	PY2GCMSOUTRES
P4 016 O	23	Pyro 2 BCM reset	O/O 13ms	-	P4 07-09B	CDMU B	PYRO 2	PY2BCMRES
P4 017 O	14	Pyro 2 FSM reset	O/O 13ms	-	P4 10-12B	CDMU B	PYRO 2	PY2FSMRES
P4 018 O	18	Pyro 2 PJM reset	O/O 13ms	-	P4 13-15B	CDMU B	PYRO 2	PY2PJMRES
P4 019 O	15	Pyro 2 DISR cover set	O/O 13ms	-	P4 016 B	CDMU B	PYRO 2	PY2DCOVSET
P4 020 O	30	Pyro 2 DISR cover reset	O/O 13ms	-	P4 016 B	CDMU B	PYRO 2	PY2DCOVRES
P4 021 O	31	Pyro 2 BCM set A	O/O 13ms	-	P4 07-09 B	CDMU A	PYRO 2	PY2BCMSETA

CMD REF	TC @	NAME OF THE COMMAND	TYPE	TM VERIF		SOURCE	DESTIN.	MNEMO
				channel A	channel B			
P5 001 O	0	section 1 input relay ON	O/O 45ms	P5 014 R	-	CDMU A	PCDU	INRELON1A
P5 002 O	16	section 2 input relay ON	O/O 45ms	P5 015 R	-	CDMU A	PCDU	INRELON2A
P5 003 O	24	section 3 input relay ON	O/O 45ms	P5 016 R		CDMU A	PCDU	INRELON3A
P5 004 O	8	section 4 input relay ON	O/O 45ms	-	P5 018 R	CDMU A	PCDU	INRELON4A
P5 005 O	32	section 5 input relay ON	O/O 45ms	-	P5 019 R	CDMU A	PCDU	INRELON5A
P5 006 O	1	section 1 input relay OFF	O/O 45ms	P5 014 R	-	CDMU A	PCDU	INRELOFF1A
P5 007 O	17	section 2 input relay OFF	O/O 45ms	P5 015 R	-	CDMU A	PCDU	INRELOFF2A
P5 008 O	25	section 3 input relay OFF	O/O 45ms	P5 016 R		CDMU A	PCDU	INRELOFF3A
P5 009 O	9	section 4 input relay OFF	O/O 45ms	-	P5 018 R	CDMU A	PCDU	INRELOFF4A
P5 010 O	33	section 5 input relay OFF	O/O 45ms	-	P5 019 R	CDMU A	PCDU	INRELOFF5A
P5 011 O	0	section 1 input relay ON	O/O 45ms	P5 014 R	-	CDMU B	PCDU	INRELON1B
P5 012 O	16	section 2 input relay ON	O/O 45ms	P5 015 R	-	CDMU B	PCDU	INRELON2B
P5 013 O	24	section 3 input relay ON	O/O 45ms	P5 016 R		CDMU B	PCDU	INRELON3B
P5 014 O	8	section 4 input relay ON	O/O 45ms	-	P5 018 R	CDMU B	PCDU	INRELON4B
P5 015 O	32	section 5 input relay ON	O/O 45ms	-	P5 019 R	CDMU B	PCDU	INRELON5B
P5 016 O	1	section 1 input relay OFF	O/O 45ms	P5 014 R	-	CDMU B	PCDU	INRELOFF1B
P5 017 O	17	section 2 input relay OFF	O/O 45ms	P5 015 R	-	CDMU B	PCDU	INRELOFF2B
P5 018 O	25	section 3 input relay OFF	O/O 45ms	P5 016 R		CDMU B	PCDU	INRELOFF3B
P5 019 O	9	section 4 input relay OFF	O/O 45ms	-	P5 018 R	CDMU B	PCDU	INRELOFF4B
P5 020 O	33	section 5 input relay OFF	O/O 45ms	-	P5 019 R	CDMU B	PCDU	INRELOFF5B
P5 021 O	19	coast timer 1 power ON	O/O 13ms	P5 078 R	-	CDMU A	PCDU	CTIMON1A
P5 022 O	20	coast timer 1 power OFF	O/O 13ms	P5 078 R	-	CDMU A	PCDU	CTIMOFF1A
P5 023 O	26	coast timer 2 power ON	O/O 13ms	P5 079 R		CDMU A	PCDU	CTIMON2A
P5 024 O	27	coast timer 2 power OFF	O/O 13ms	P5 079 R		CDMU A	PCDU	CTIMOFF2A
P5 025 O	26	coast timer 2 power ON	O/O 13ms	P5 079 R		CDMU B	PCDU	CTIMON2B
P5 026 O	27	coast timer 2 power OFF	O/O 13ms	P5 079 R		CDMU B	PCDU	CTIMOFF2B
P5 027 O	19	coast timer 3 power ON	O/O 13ms	-	P5 081 R	CDMU B	PCDU	CTIMON3B
P5 028 O	20	coast timer 3 power OFF	O/O 13ms	-	P5 081 R	CDMU B	PCDU	CTIMOFF3B
P5 029 O	40	TX A power ON	O/O 13ms	P5 037 B		CDMU A	PCDU	TXAPWRON
P5 030 O	42	GCMS1 N power ON	O/O 13ms	P5 038 B		CDMU A	PCDU	GCMS1NPWRON
P5 031 O	50	DISR1 N power ON	O/O 13ms	P5 039 B		CDMU A	PCDU	DISR1NPWRON
P5 032 O	44	ACP1 N power ON	O/O 13ms	P5 041 B		CDMU A	PCDU	ACP1NPWRON
P5 033 O	46	TUSO N power ON	O/O 13ms	P5 043 B		CDMU A	PCDU	TUSONPWRON
P5 034 O	48	HASI1 N power ON	O/O 13ms	P5 044 B		CDMU A	PCDU	HASI1NPWRON
P5 035 O	52	SSP N power ON	O/O 13ms	P5 045 B		CDMU A	PCDU	SSPNPWRON
P5 036 O	41	TX A power OFF	O/O 13ms	P5 037 B		CDMU A	PCDU	TXAPWROFF
P5 037 O	43	GCMS1 N power OFF	O/O 13ms	P5 038 B		CDMU A	PCDU	GCMS1NPWROFF
P5 038 O	51	DISR1 N power OFF	O/O 13ms	P5 039 B		CDMU A	PCDU	DISR1NPWROFF
P5 039 O	45	ACP1 N power OFF	O/O 13ms	P5 041 B		CDMU A	PCDU	ACP1NPWROFF
P5 040 O	54	ACP3 N power ON	O/O 13ms	P5 042 B		CDMU A	PCDU	ACP3NPWRON
P5 041 O	57	GCMS2 N power OFF	O/O 13ms	P5 040 B		CDMU A	PCDU	GCMS2NPWROFF
P5 042 O	47	TUSO N power OFF	O/O 13ms	P5 043 B		CDMU A	PCDU	TUSONPWROFF
P5 043 O	49	HASI1 N power OFF	O/O 13ms	P5 044 B		CDMU A	PCDU	HASI1NPWROFF
P5 044 O	53	SSP N power OFF	O/O 13ms	P5 045 B		CDMU A	PCDU	SSPNPWROFF
P5 045 O	56	DISR2 N power OFF	O/O 13ms	P5 046 B		CDMU A	PCDU	DISR2NPWROFF
P5 046 O	55	ACP3 N power OFF	O/O 13ms	P5 042 B		CDMU A	PCDU	ACP3NPWROFF
P5 047 O	58	Pr. S. A power OFF	O/O 13ms	P5 049 B		CDMU A	PCDU	RAUAPWROFF
P5 048								

CMD REF	TC @	NAME OF THE COMMAND	TYPE	TM VERIF		SOURCE	DESTIN.	MNEMO
				channel A	channel B			
P5 049 O	40	TX B power ON	O/O 13ms		P5 065 B	CDMU B	PCDU	TXBPWRON
P5 050 O	42	GCMS1 R power ON	O/O 13ms	-	P5 066 B	CDMU B	PCDU	GCMS1RPWRON
P5 051 O	50	DISR1 R power ON	O/O 13ms	-	P5 067 B	CDMU B	PCDU	DISR1RPWRON
P5 052 O	44	ACP1 R power ON	O/O 13ms	-	P5 069 B	CDMU B	PCDU	ACP1RPWRON
P5 053 O	54	ACP3 R power ON	O/O 13ms	-	P5 070 B	CDMU B	PCDU	ACP3RPWRON
P5 054 O	46	TUSO R power ON	O/O 13ms	-	P5 071 B	CDMU B	PCDU	TUSORPWRON
P5 055 O	48	HASI1 R power ON	O/O 13ms	-	P5 072 B	CDMU B	PCDU	HASI1RPWRON
P5 056 O	52	SSP R power ON	O/O 13ms	-	P5 073 B	CDMU B	PCDU	SSPRPWRON
P5 057 O	41	TX B power OFF	O/O 13ms	-	P5 065 B	CDMU B	PCDU	TXBPWROFF
P5 058 O	43	GCMS1 R power OFF	O/O 13ms	-	P5 066 B	CDMU B	PCDU	GCMS1RPWROFF
P5 059 O	51	DISR1 R power OFF	O/O 13ms	-	P5 067 B	CDMU B	PCDU	DISR1RPWROFF
P5 060 O	45	ACP1 R power OFF	O/O 13ms	-	P5 069 B	CDMU B	PCDU	ACP1RPWROFF
P5 061 O	55	ACP3 R power OFF	O/O 13ms	-	P5 070 B	CDMU B	PCDU	ACP3RPWROFF
P5 062 O	57	GCMS2 R power OFF	O/O 13ms	-	P5 068 B	CDMU B	PCDU	GCMS2RPWROFF
P5 063 O	47	TUSO R power OFF	O/O 13ms	-	P5 071 B	CDMU B	PCDU	TUSORPWROFF
P5 064 O	49	HASI1 R power OFF	O/O 13ms	-	P5 072 B	CDMU B	PCDU	HASI1RPWROFF
P5 065 O	53	SSP R power OFF	O/O 13ms	-	P5 073 B	CDMU B	PCDU	SSPRPWROFF
P5 066 O	56	DISR2 R power OFF	O/O 13ms	-	P5 074 B	CDMU B	PCDU	DISR2RPWROFF
P5 067 O	58	Pr. S. B power OFF	O/O 13ms	-	P5 077 B	CDMU B	PCDU	RAUBPWROFF
P5 068								
R1 001 O	28	TXA HPA power OFF	O/O 13ms	R1 002 A	-	CDMU A	TX A	HPAAPWROFF
R1 002 O	34	TCXO A Probe selection	O/O 13ms	R1 005 R	-	CDMU A	TX A	TCXOPRSELECTA
R1 003 O	35	TUSO selection	O/O 13ms	R1 005 R	-	CDMU A	TX A	TUSOSELECT
R1 004 O	36	TXA HPA power ON	O/O 13ms	R1 002 A	-	CDMU A	TX A	HPAAPWRON
R2 001 O	28	TXB HPA power OFF	O/O 13ms	-	R2 002 A	CDMU B	TX B	HPABPWROFF
R2 002 O	36	TXB HPA power ON	O/O 13ms	-	R2 002 A	CDMU B	TX B	HPABPWRON
R2 003 O	34	TCXO B Probe selection	O/O 13ms	-	R2 005 R	CDMU B	TX B	TCXOPRSELECTB
R5 001								
R5 002								
R5 003 O	1	TCXO PSE selection	ON / OFF	R5 014 R	-	PSA A	PSA A	TCXOPSESELECT
R5 004 O	0	RUSO selection	ON / OFF	R5 014 R	-	PSA A	PSA A	RUSOSELECT
R5 005 O	2	RUSO power ON	ON / OFF	R5 013 R	-	PSA A	PSA A	RUSOPWRON
R5 006 O	3	RUSO power OFF	ON / OFF	R5 013 R	-	PSA A	PSA A	RUSOPWROFF
R5 007 M	alter.	NCO control word alteration	ML 16	R5 01-02 S	-	PSA A	PSA A	NCOCTRLA
R6 001								
R6 002								
R6 003 M	alter.	NCO control word alteration	ML 16	-	R6 01-02 S	PSA B	PSA B	NCOCTRLB
R6 004 O	1	TCXO PSB selection	ON/OFF	-	R6 014 R	PSA B	PSA B	TCXOPSBSELECT

2.2 COMMAND SIGNAL LIST

DESCRIPTION OF THE SIGNAL	TYPE	TM VERIF		SOURCE	DESTIN.
		channel A	channel B		
BCP A	BCP	-	-	CDMU A	GCMS
BCP A	BCP	-	-	CDMU A	HASI
BCP A	BCP	-	-	CDMU A	DISR
BCP A	BCP	-	-	CDMU A	ACP
BCP A	BCP	-	-	CDMU A	SSP
BCP B	BCP	-	-	CDMU B	GCMS
BCP B	BCP	-	-	CDMU B	HASI
BCP B	BCP	-	-	CDMU B	DISR
BCP B	BCP	-	-	CDMU B	ACP
BCP B	BCP	-	-	CDMU B	SSP
Processor valid	proc. val.			CDMU A	GCMS
Processor valid	proc. val.			CDMU A	HASI
Processor valid	proc. val.			CDMU A	DISR
Processor valid	proc. val.			CDMU A	ACP
Processor valid	proc. val.			CDMU A	SSP
Pyro 1 group 1 arming	ON / OFF	-	-	CDMU A *	PYRO 1
Pyro 1 group 2 arming	ON / OFF	-	-	CDMU A *	PYRO 1
Pyro 1 group 3 arming	ON / OFF	-	-	CDMU A *	PYRO 1
Pyro 1 group 4 arming	ON / OFF	-	-	CDMU A *	PYRO 1
Pyro 1 power on	ON / OFF	P3 002 R	-	PCDU	PYRO 1
Pyro 2 group 1 arming	ON / OFF	-	-	CDMU B *	PYRO 2
Pyro 2 group 2 arming	ON / OFF	-	-	CDMU B *	PYRO 2
Pyro 2 group 3 arming	ON / OFF	-	-	CDMU B *	PYRO 2
Pyro 2 group 4 arming	ON / OFF	-	-	CDMU B *	PYRO 2
Pyro 2 power on	ON / OFF	-	P4 002 R	PCDU	PYRO 2
DISR2 N energize ON	ON / OFF	P5 046 B	-	CDMU A *	PCDU
HASI2 N energize ON	ON / OFF	P5 047 B	-	CDMU A *	PCDU
Pr. S. A energize ON	ON / OFF	P5 049 B	-	CDMU A *	PCDU
GCMS 2 N energize ON	ON / OFF	P5 040B	-	CDMU A *	PCDU
ACP 2 N energize ON	ON / OFF	P5 047B	-	CDMU A *	PCDU
HASI2 N energize OFF	ON / OFF	P5 048 B	-	CDMU A *	PCDU
ACP2 N energize OFF	ON / OFF	P5 047 B	-	CDMU A *	PCDU
DISR2 R energize ON	ON / OFF	-	P5 074 B	CDMU B *	PCDU
HASI2 R energize ON	ON / OFF	-	P5 076 B	CDMU B *	PCDU
Pr. S. B energize ON	ON / OFF	-	P5 063 B	CDMU B *	PCDU
GCMS 2 R energize ON	ON / OFF	-	P5 068 B	CDMU B *	PCDU
ACP 2 R energize ON	ON / OFF	-	P5 075 B	CDMU B *	PCDU
HASI2 R energize OFF	ON / OFF	-	P5 076 B	CDMU B *	PCDU
ACP2 R energize OFF	ON / OFF	-	P5 075 B	CDMU B *	PCDU

COMMAND SIGNALS

* generated by arming timer

DESCRIPTION OF THE SIGNAL	TYPE	TM VERIF		SOURCE	DESTIN.
		channel A	channel B		
PCDU section 1 ON	ON / OFF	P5 014 R	-	TIMER N	PCDU
PCDU section 2 ON	ON / OFF	P5 015 R	-	TIMER N	PCDU
PCDU section 3 ON	ON / OFF	P5 016 R	P5 017 R	TIMER N	PCDU
PCDU section 4 ON	ON / OFF	-	P5 018 R	TIMER N	PCDU
PCDU section 5 ON	ON / OFF	-	P5 019 R	TIMER N	PCDU
PCDU section 1 ON	ON / OFF	P5 014 R	-	TIMER R	PCDU
PCDU section 2 ON	ON / OFF	P5 015 R	-	TIMER R	PCDU
PCDU section 3 ON	ON / OFF	P5 016 R	P5 017 R	TIMER R	PCDU
PCDU section 4 ON	ON / OFF	-	P5 018 R	TIMER R	PCDU
PCDU section 5 ON	ON / OFF	-	P5 019 R	TIMER R	PCDU
TX A HPA power ON	ON / OFF	R1 002 A	-	CDMU A *	TX A
opto anode nominal	enable	-	-	ACP	GCMS
opto anode redundant	enable	-	-	ACP	GCMS
HASI RAU A interface	ANA	-	-	RAU A	HASI
HASI blanck 1	enable	-	-	RAU A	HASI
HASI RAU B interface	ANA	-	-	RAU B	HASI
HASI blanck 2	enable	-	-	RAU B	HASI
Subcarrier clock A	CK	-	-	CDMU A	TX A
Data clock A (associated to NRZ acquis.signal)	CK	-	-	CDMU A	TX A
TX B HPA power ON	ON / OFF	-	R2 002 A	CDMU B *	TX B
Subcarrier clock B	CK	-	-	CDMU B	TX B
Data clock B (associated to NRZ acquis. signal)	CK	-	-	CDMU B	TX B
TUSO clock	CK	-	-	TUSO	TX A
RUSO clock	CK	-	-	RUSO	PSA A
Probe 1553 TC A	1553	TC counter	-	Orbiter	PSA A
Probe 1553 TC B	1553	-	TC counter	Orbiter	PSA B

COMMAND SIGNALS

* generated by arming timer

3. TM AND ACQUISITION SIGNAL LISTS

This section provides TM list and acquisition signal list.

Telemetries:

Each telemetry signal can be identified by the following parameters:

- REF TM as described in section 1.3

- MNEMO which gives a comprehensive mnemonic of the signal.

The column TM@ provides:

- The OBDH, address used by the POSW to perform an acquisition.
- the multiplexer channel for analog signal acquisition by SASW
- no indication for the software parameters.

The columns "SAMPLE INTERV." give the periodicity of:

- the acquisition of the parameter by the software
- the telemetry of the parameter in the nominal telemetry packets.

The columns "SOURCE" and "DESTIN." give the name of the unit which provides the signal and which acquires it.

The column "REFERENCE VOLTAGE" indicates the voltage of the signal return line.

The columns "TM POSITION" give the position of the parameter in the nominal telemetry packets with following rules:

- n° HK column indicates the relevant housekeeping packet: HK1 to HK4 for probe parameters and PSE for PSE parameters

- index column indicates the position of the parameter inside the housekeeping packet:

  . for a 8 bits parameter, position of the byte
  . for a 16 bits parameter, position of the most significant byte
  . for a 1 bit parameter, position of the byte - position of the bit
  . for a parameter sent several times within a packet, first position/last position.

The column "JPL ref." is given for information only. These references shall be not used for HUYGENS documents.

Some probe parameters are also transmitted in the report packet (see section 5.5).

REF TM	TM @	DESCRIPTION OF TM	TYPE	SAMPLE INTERV.		SOURCE	DESTIN.	REFERENCE VOLTAGE	TM POSITION		MNEMO	JPL ref.
				ACQUIS	TELEM.				n° HK	index		
A1 001 H	✓	Invalid TC counter	byte		1 s	SASW A	SASW A		PSE	11	SINVTCA	P-2601
A1 002 H	✓	Valid TC counter	byte		1 s	SASW A	SASW A		PSE	12	SVALTCA	P-2602
A1 003 H	✓	Fixed point overflow counter	byte		1 s	SASW A	SASW A		PSE	13	SFXOVA	P-2603
A1 004 H	✓	Float point overflow counter	byte		1 s	SASW A	SASW A		PSE	14	SFLOVA	P-2604
A1 005 H	✓	Exception counter	byte		1 s	SASW A	SASW A		PSE	15	SEXCEPTA	P-2605
A1 006 H	✓	Overrun counter	byte		1 s	SASW A	SASW A		PSE	16	SOVERA	P-2606
A1 007 H		Status EDAC register LSB	byte		125 ms	SASW A	SASW A		PSE	17/24	SEDACSTA	P-2607
A1 008 H	✓	PSA init status	byte		1 s	SASW A	SASW A		PSE	10	SINITSTA	P-2608
A1 009 H	✓	BIU fail counter	byte		1 s	SASW A	SASW A		PSE	135	SBIUFCONTA	P-2624
A1 001 W	✓	CPU fault register	word		1 s	SASW A	SASW A		PSE	25	SFLTREGA	P-2609
A1 002 W		RAM first failure address	word		1 s	SASW A	SASW A		PSE	27	SRAMFADDA	P-2610
A1 003 W	✓	SASW health LSW status	word		1 s	SASW A	SASW A		PSE	31	SHLTHLSA	P-2611
A1 004 W	✓	SASW health MSW status	word		1 s	SASW A	SASW A		PSE	29	SHLTHMSA	P-2612
A1 005 W	✓	SASW status 1	word		1 s	SASW A	SASW A		PSE	115	SASWST1A	P-2613
A1 006 W	✓	SASW status 2	word		1 s	SASW A	SASW A		PSE	117	SASWST2A	P-2614
A1 007 W	✓ ✓	SASW status 3	word		1 s	SASW A	SASW A		PSE	119	SASWST3A	P-2615
A1 008 W	✓	SASW status 4	word		1 s	SASW A	SASW A		PSE	121	SASWST4A	P-2616
A1 009 W		BIU RAM first failure address	word		1 s	SASW A	SASW A		PSE	33	SBIURAMAA	P-2617
A1 010 W	✓	BIU fail register	word		125 ms	SASW A	SASW A		PSE	35/50	SBIUFAILA	P-2618
A1 011 W	✓	SASW status 5	word		1 s	SASW A	SASW A		PSE	123	SASWST5A	P-2619
A1 012 W	✓	SASW status 6	word		1 s	SASW A	SASW A		PSE	125	SASWST6A	P-2620
A1 013 W	✓	SASW status 7	word		1 s	SASW A	SASW A		PSE	127	SASWST7A	P-2621
A1 014 W	✓	SASW status 8	word		1 s	SASW A	SASW A		PSE	129	SASWST8A	P-2622
A1 015 W	✓	SASW status 9	word		1 s	SASW A	SASW A		PSE	131	SASWST9A	P-2623
A1 016 W		SASW status 10	word		1 s	SASW A	SAW A		PSE	133	SASWST10A	P-2625
A2 001 H	✓	Invalid TC counter	byte		1 s	SASW B	SASW B		PSE	11	SINVTCB	P-2701
A2 002 H	✓	Valid TC counter	byte		1 s	SASW B	SASW B		PSE	12	SVALTCB	P-2702
A2 003 H	✓	Fixed point overflow counter	byte		1 s	SASW B	SASW B		PSE	13	SFXOVB	P-2703
A2 004 H	✓	Floating point overflow counter	byte		1 s	SASW B	SASW B		PSE	14	SFLOVB	P-2704
A2 005 H	✓	Exception counter	byte		1 s	SASW B	SASW B		PSE	15	SEXCEPTB	P-2705
A2 006 H	✓	Overrun counter	byte		1 s	SASW B	SASW B		PSE	16	SOVERB	P-2706
A2 007 H		Status EDAC register LSB	byte		125 ms	SASW B	SASW B		PSE	17/24	SEDACSTB	P-2707
A2 008 H	✓	PSA init status	byte		1 s	SASW B	SASW B		PSE	10	SINITSTB	P-2708
A2 009 H	✓	BIU fail counter	byte		1 s	SASW B	SASW B		PSE	135	SBIUFCONTB	P-2724
A2 001 W	✓	CPU fault register	word		1 s	SASW B	SASW B		PSE	25	SFLTREGB	P-2709
A2 002 W		RAM first failure address	word		1 s	SASW B	SASW B		PSE	27	SRAMFADDB	P-2710
A2 003 W	✓	SASW health LSW status	word		1 s	SASW B	SASW B		PSE	31	SHLTHLSB	P-2711
A2 004 W	✓	SASW health MSW status	word		1 s	SASW B	SASW B		PSE	29	SHLTHMSB	P-2712
A2 005 W	✓	SASW status 1	word		1 s	SASW B	SASW B		PSE	115	SASWST1B	P-2713

(1) signal referenced to 0 V emitter

REF TM	TM @	DESCRIPTION OF TM	TYPE	SAMPLE INTERV.		SOURCE	DESTIN.	REFERENCE VOLTAGE	TM POSITION		MNEMO	JPL ref.
				ACQUIS	TELEM.				n° HK	index		
A2 006 W		SASW status 2	word		1 s	SASW B	SASW B		PSE	117	SASWST2B	P-2714
A2 007 W		SASW status 3	word		1 s	SASW B	SASW B		PSE	119	SASWST3B	P-2715
A2 008 W		SASW status 4	word		1 s	SASW B	SASW B		PSE	121	SASWST4B	P-2716
A2 009 W		BIU RAM first failure address	word		1 s	SASW B	SASW B		PSE	33	SBIURAMAB	P-2717
A2 010 W	✓	BIU fail register	word		125 ms	SASW B	SASW B		PSE	35/50	SBIUFAILB	P-2718
A2 011 W		SASW status 5	word		1 s	SASW B	SASW B		PSE	123	SASWST5B	P-2719
A2 012 W		SASW status 6	word		1 s	SASW B	SASW B		PSE	125	SASWST6B	P-2720
A2 013 W		SASW status 7	word		1 s	SASW B	SASW B		PSE	127	SASWST7B	P-2721
A2 014 W		SASW status 8	word		1 s	SASW B	SASW B		PSE	129	SASWST8B	P-2722
A2 015 W		SASW status 9	word		1 s	SASW B	SASW B		PSE	131	SASWST9B	P-2723
A2 016 W		SASW status 10	word		1 s	SASW B	SASW B		PSE	133	SASWST10B	p-2725
D1 001												
D1 002 A	✓111	CDMU A supply voltage (5V)	8 bit ANA	16 s	16 s	CDMU A	CDMU A	0V CDMU A	HK 2	46	CDMUAANA1	P-0102
D1 003 A	✓108	CDMU A A/D calibration (4V)	8 bit ANA	16 s	16 s	CDMU A	CDMU A	0V CDMU A	HK 2	43	CDMUAANA2	P-0103
D1 004 A	✓110	CDMU A A/D calibration (0.3V)	8 bit ANA	16 s	16 s	CDMU A	CDMU A	0V CDMU A	HK 2	45	CDMUAANA3	P-0104
D1 005 A	✓109	CDMU A A/D calibration (0.5V)	8 bit ANA	16 s	16 s	CDMU A	CDMU A	0V CDMU A	HK 2	44	CDMUAANA4	P-0105
D1 006 B	✓198	CDMU A BL test (0V)	DB	16 s	16 s	CDMU A	CDMU A	0V CDMU A	HK 1	13-01	CDMUABL1	P-0106
D1 007 B	✓197	CDMU A BL test (5V)	DB	16 s	16 s	CDMU A	CDMU A	0V CDMU A	HK 1	13-02	CDMUABL2	P-0107
D1 008 T	30	DC/DC CONV temperature 1	Temp.	16 s	16 s	CDMU A	CDMU A	0V CDMU A	HK 2	13	CDMUATEMP1	P-0108
D1 009 T	31	DC/DC CONV temperature 2	Temp.	16 s	16 s	CDMU A	CDMU A	0V CDMU A	HK 2	14	CDMUATEMP2	P-0109
D1 010 B	✓199	Arming timer A status	DB	16 s	16 s	CDMU A	CDMU A	0V CDMU A	HK 1	13-00	GSWITCHA	P-0110
D1 011 R	✓13	T0/Ta G-switch 1A status (12 m/s2)	rel.stat.	16s	16s	CDMU A	CDMU A	0V CDMU A	HK 1	12-02	T0GSWITCH1A	P-0111
D1 012 R	✓14	T0/Ta G-switch 2A status (62 m/s2)	rel.stat.	16s	16s	CDMU A	CDMU A	0V CDMU A	HK 1	12-01	T0GSWITCH2A	P-0112
D2 001												
D2 002 A	✓111	CDMU B supply voltage (5V)	8 bit ANA	16 s	16 s	CDMU B	CDMU B	0V CDMU B	HK 2	46	CDMUBANA1	P-0202
D2 003 A	✓108	CDMU B A/D calibration (4V)	8 bit ANA	16 s	16 s	CDMU B	CDMU B	0V CDMU B	HK 2	43	CDMUBANA2	P-0203
D2 004 A	✓110	CDMU B A/D calibration (0.3V)	8 bit ANA	16 s	16 s	CDMU B	CDMU B	0V CDMU B	HK 2	45	CDMUBANA3	P-0204
D2 005 A	✓109	CDMU B A/D calibration (0.5V)	8 bit ANA	16 s	16 s	CDMU B	CDMU B	0V CDMU B	HK 2	44	CDMUBANA4	P-0205
D2 006 B	✓198	CDMU B BL test (0V)	DB	16 s	16 s	CDMU B	CDMU B	0V CDMU B	HK 1	13-01	CDMUBBL1	P-0206
D2 007 B	✓197	CDMU B BL test (5V)	DB	16 s	16 s	CDMU B	CDMU B	0V CDMU B	HK 1	13-02	CDMUBBL2	P-0207
D2 008 T	30	DC/DC CONV temperature 1	Temp.	16 s	16 s	CDMU B	CDMU B	0V CDMU B	HK 2	13	CDMUBTEMP1	P-0208
D2 009 T	31	DC/DC CONV temperature 2	Temp.	16 s	16 s	CDMU B	CDMU B	0V CDMU B	HK 2	14	CDMUBTEMP2	P-0209
D2 010 B	✓199	Arming timer B status	DB	16 s	16 s	CDMU B	CDMU B	0V CDMU B	HK 1	13-00	GSWITCHB	P-0210
D2 011 R	✓13	T0/Ta G-switch 1B status (12 m/s2)	rel.stat.	16s	16s	CDMU B	CDMU B	0V CDMU B	HK 1	12-02	T0GSWITCH1B	P-0211
D2 012 R	✓14	T0/Ta G-switch 2B status (62 m/s2)	rel.stat.	16s	16s	CDMU B	CDMU B	0V CDMU B	HK 1	12-01	T0GSWITCH2B	P-0212

(1) signal referenced to 0 V emitter

REF TM	TM @	DESCRIPTION OF TM	TYPE	SAMPLE INTERV.		SOURCE	DESTIN.	REFERENCE VOLTAGE	TM POSITION		MNEMO	JPL ref.
				ACQUIS	TELEM.				n° HK	index		
D3 001 S	256	Prox. Sens. A monitoring N	DS 16	2 s	2 s	P. Sens. A	CDMU A	differential(1)	HK 3	49/64	see § 8.5	P-0301
D3 002 S	258	Prox. Sens. A monitoring R	DS 16	2 s	2 s	P. Sens. A	CDMU B	differential(1)	HK 3	65/80	see § 8.5	P-0302
D3 003												
D3 004												
D3 005 A	74	Prox. Sens. A AGC voltage	8 bit ANA	1 s	1 s	P. Sens. A	CDMU A	0V P. Sens. A	HK 1	18/33	RAUAAGC	P-0305
D4 001 S	256	Prox. Sens. B monitoring N	DS 16	2 s	2 s	P. Sens. B	CDMU B	differential(1)	HK 3	49/64	see § 8.5	P-0401
D4 002 S	258	Prox. Sens. B monitoring R	DS 16	2 s	2 s	P. Sens. B	CDMU A	differential(1)	HK 3	65/80	see § 8.5	P-0402
D4 003												
D4 004												
D4 005 A	74	Prox. Sens. B AGC voltage	8 bit ANA	1 s	1 s	P. Sens. B	CDMU B	0V P. Sens. B	HK 1	18/33	RAUBAGC	P-0405
D5 001 T	16	Probe temp. 1 A (SEPS A)	Temp.	16 s	16 s	TEMP	CDMU A	0V CDMU A	HK 2	1	PTEMP1A	P-0501
D5 002 T	17	Probe temp. 2 A (SEPS C)	Temp.	16 s	16 s	TEMP	CDMU A	0V CDMU A	HK 2	2	PTEMP2A	P-0502
D5 003 T	18	Probe temp. 3 A (PJM A)	Temp.	16 s	16 s	TEMP	CDMU A	0V CDMU A	HK 2	3	PTEMP3A	P-0503
D5 004 T	19	Probe temp. 4 A (PJM C)	Temp.	16 s	16 s	TEMP	CDMU A	0V CDMU A	HK 2	4	PTEMP4A	P-0504
D5 005 T	20	Probe temp. 5 A (batt 1a)	Temp.	16 s	16 s	TEMP	CDMU A	0V CDMU A	HK 2	5	PTEMP5A	P-0505
D5 006 T	21	Probe temp. 6 A (batt 3b)	Temp.	16 s	16 s	TEMP	CDMU A	0V CDMU A	HK 2	6	PTEMP6A	P-0506
D5 007 T	24	Probe temp. 7 A (batt 5a)	Temp.	16 s	16 s	TEMP	CDMU A	0V CDMU A	HK 2	7	PTEMP7A	P-0507
D5 008 T	25	Probe temp. 8 A (PCDU box)	Temp.	16 s	16 s	TEMP	CDMU A	0V CDMU A	HK 2	8	PTEMP8A	P-0508
D5 009 T	26	Probe temp. 9 A (TX A box)	Temp.	16 s	16 s	TEMP	CDMU A	0V CDMU A	HK 2	9	PTEMP9A	P-0509
D5 010 T	27	Probe temp. 10 A (GCMS flange)	Temp.	16 s	16 s	TEMP	CDMU A	0V CDMU A	HK 2	10	PTEMP10A	P-0510
D5 011 T	28	Probe temp. 11 A (DISR SH ext.)	Temp.	16 s	16 s	TEMP	CDMU A	0V CDMU A	HK 2	11	PTEMP11A	P-0511
D5 012 T	29	Probe temp. 12 A (foam inside)	Temp.	16 s	16 s	TEMP	CDMU A	0V CDMU A	HK 2	12	PTEMP12A	P-0512
D5 013 T	16	Probe temp. 1 B (SEPS B)	Temp.	16 s	16 s	TEMP	CDMU B	0V CDMU B	HK 2	1	PTEMP1B	P-0513
D5 014 T	17	Probe temp. 2 B (SEPS A)	Temp.	16 s	16 s	TEMP	CDMU B	0V CDMU B	HK 2	2	PTEMP2B	P-0514
D5 015 T	18	Probe temp. 3 B (PJM B)	Temp.	16 s	16 s	TEMP	CDMU B	0V CDMU B	HK 2	3	PTEMP3B	P-0515
D5 016 T	19	Probe temp. 4 B (PDD)	Temp.	16 s	16 s	TEMP	CDMU B	0V CDMU B	HK 2	4	PTEMP4B	P-0516
D5 017 T	20	Probe temp. 5 B (batt 4b)	Temp.	16 s	16 s	TEMP	CDMU B	0V CDMU B	HK 2	5	PTEMP5B	P-0517
D5 018 T	21	Probe temp. 6 B (batt 2a)	Temp.	16 s	16 s	TEMP	CDMU B	0V CDMU B	HK 2	6	PTEMP6B	P-0518
D5 019 T	24	Probe temp. 7 B (batt 3a)	Temp.	16 s	16 s	TEMP	CDMU B	0V CDMU B	HK 2	7	PTEMP7B	P-0519
D5 020 T	25	Probe temp. 8 B (batt 1b)	Temp.	16 s	16 s	TEMP	CDMU B	0V CDMU B	HK 2	8	PTEMP8B	P-0520
D5 021 T	26	Probe temp. 9 B (TX B box)	Temp.	16 s	16 s	TEMP	CDMU B	0V CDMU B	HK 2	9	PTEMP9B	P-0521
D5 022 T	27	Probe temp. 10 B (TUSO box)	Temp.	16 s	16 s	TEMP	CDMU B	0V CDMU B	HK 2	10	PTEMP10B	P-0522
D5 023 T	28	Probe temp. 11 B (DISR SH int.)	Temp.	16 s	16 s	TEMP	CDMU B	0V CDMU B	HK 2	11	PTEMP11B	P-0523
D5 024 T	29	Probe temp. 12 B (after cone ins.)	Temp.	16 s	16 s	TEMP	CDMU B	0V CDMU B	HK 2	12	PTEMP12B	P-0524

(1) signal referenced to 0 V emitter

REF TM	TM @	DESCRIPTION OF TM	TYPE	SAMPLE INTERV.		SOURCE	DESTIN.	REFERENCE VOLTAGE	TM POSITION		MNEMO	JPL ref.
				ACQUIS	TELEM.				n° HK	index		
D6 001 S	/257	coast timer 1 value A	DS 16	16 s	16 s	MTU	CDMU A	differential(1)	HK 3	81	CTIM1VALA	P-0601
D6 002 S	/257	coast timer 1 value B	DS 16	16 s	16 s	MTU	CDMU B	differential(1)	HK 3	81	CTIM1VALB	P-0602
D6 003 S	/261	coast timer 2 value A	DS 16	16 s	16 s	MTU	CDMU A	differential(1)	HK 3	83	CTIM2VALA	P-0603
D6 004 S	/261	coast timer 2 value B	DS 16	16 s	16 s	MTU	CDMU B	differential(1)	HK 3	83	CTIM2VALB	P-0604
D6 005 S	/266	coast timer 3 value A	DS 16	16 s	16 s	MTU	CDMU A	differential(1)	HK 3	85	CTIM3VALA	P-0605
D6 006 S	/266	coast timer 3 value B	DS 16	16 s	16 s	MTU	CDMU B	differential(1)	HK 3	85	CTIM3VALB	P-0606
D6 007 B	/231	MTU 1 power status (3)	DB	16 s	16 s	MTU	CDMU A	0 V MTU	HK 1	17-00	MTU1PWRSTATA	P-0607
D6 008 B	/231	MTU 2 power status (3)	DB	16 s	16 s	MTU	CDMU B	0 V MTU	HK 1	17-00	MTU2PWRSTATB	P-0608
D7 001 A	64	central accelero 1 value A	8 bit ANA	125 ms	1 s	CASU	CDMU A	0V CASU	HK 4	1/16	CACC1VALA	P-0701
D7 002 A	65	central accelero 2 value A	8 bit ANA	125 ms	1 s	CASU	CDMU A	0V CASU	HK 4	17/32	CACC2VALA	P-0702
D7 003 A	66	central accelero 3 value A	8 bit ANA	125 ms	1 s	CASU	CDMU A	0V CASU	HK 4	33/48	CACC3VALA	P-0703
D7 004 A	64	central accelero 1 value B	8 bit ANA	125 ms	1 s	CASU	CDMU B	0V CASU	HK 4	1/16	CACC1VALB	P-0704
D7 005 A	65	central accelero 2 value B	8 bit ANA	125 ms	1 s	CASU	CDMU B	0V CASU	HK 4	17/32	CACC2VALB	P-0705
D7 006 A	66	central accelero 3 value B	8 bit ANA	125 ms	1 s	CASU	CDMU B	0V CASU	HK 4	33/48	CACC3VALB	P-0706
D7 007												
D7 008												
D7 009												
D7 010												
D7 011												
D7 012												
D7 013												
D7 014												
D8 001 A	67	radial accelero 1 value A	8 bit ANA	125 ms	250 ms	RASU	CDMU A	0V RASU	HK 2	47/110	RACC1VALA	P-0801
D8 002 A	69	radial accelero 3 value A (2)	8 bit ANA	-	-	RASU	CDMU A	0V RASU	-	-	(RACC2VALA)	P-0802
D8 003												
D8 004 A	69	radial accelero 1 value B (2)	8 bit ANA	-	-	RASU	CDMU B	0V RASU	-	-	(RACC1VALB)	P-0804
D8 005 A	67	radial accelero 3 value B	8 bit ANA	125 ms	250 ms	RASU	CDMU B	0V RASU	HK 2	47/110	RACC2VALB	P-0805
D8 006												
D8 007												
D8 008												
D8 009												
D8 010												
D8 011												
D8 012												

NOTE (2) : these TMs are wired to CDMU, but are not processed nor transmitted by POSW/CDMU
NOTE (3) : implemented only on FM and FS MTU

(1) signal referenced to 0 V emitter

REF TM	TM @	DESCRIPTION OF TM	TYPE	SAMPLE INTERV.		SOURCE	DESTIN.	REFERENCE VOLTAGE	TM POSITION		MNEMO	JPL ref.
				ACQUIS	TELEM.				n° HK	index		
E1 001 S	260	GCMS A science	Pack. data	-		GCMS	CDMU A	differential(1)			GCMSSCIENA	P-1101
E1 002 S	259	GCMS A status	DS 16	16 s	16 s	GCMS	CDMU A	differential(1)	HK 3	87	GCMSSTATA	P-1102
E1 003 S	259	GCMS B status	DS 16	16 s	16 s	GCMS	CDMU B	differential(1)	HK 3	87	GCMSSTATB	P-1103
E1 004 S	260	GCMS B science	Pack. data	-		GCMS	CDMU B	differential(1)			GCMSSCIENB	P-1104
E1 005 D	192	GCMS N packet ready	D. ready	125 ms	16 s	GCMS	CDMU A	differential(1)	HK 1	13-07	GCMS N ready	P-1105
E1 006 D	192	GCMS R packet ready	D. ready	125 ms	16 s	GCMS	CDMU B	differential(1)	HK 1	13-07	GCMS R ready	P-1106
E2 001 S	268	HASI A science	Pack. data	-		HASI	CDMU A	differential(1)			HASISCIENA	P-1201
E2 002 S	267	HASI A status	DS 16	16 s	16 s	HASI	CDMU A	differential(1)	HK 3	93	HASISTATA	P-1202
E2 003 R	8	HASI boom A status	rel. stat.	16 s	16 s	HASI	CDMU A	0V CDMU A	HK 1	12-07	BOOMSTATA	P-1203
E2 004 R	8	HASI boom B status	rel. stat.	16 s	16 s	HASI	CDMU B	0V CDMU B	HK 1	12-07	BOOMSTATB	P-1204
E2 005 S	267	HASI B status	DS 16	16 s	16 s	HASI	CDMU B	differential(1)	HK 3	93	HASISTATB	P-1205
E2 006 S	268	HASI B science	Pack. data	-		HASI	CDMU B	differential(1)			HASISCIENB	P-1206
E2 007 D	195	HASI N packet ready	D. ready	125 ms	16 s	HASI	CDMU A	differential(1)	HK 1	13-04	HASI N ready	P-1207
E2 008 D	195	HASI R packet ready	D. ready	125 ms	16 s	HASI	CDMU B	differential(1)	HK 1	13-04	HASI R ready	P-1208
E3 001 S	263	DISR A science	Pack. data	-		DISR	CDMU A	differential(1)			DISRSCIENA	P-1301
E3 002 S	262	DISR A status	DS 16	16 s	16 s	DISR	CDMU A	differential(1)	HK 3	89	DISRSTATA	P-1302
E3 003 S	262	DISR B status	DS 16	16 s	16 s	DISR	CDMU B	differential(1)	HK 3	89	DISRSTATB	P-1303
E3 004 S	263	DISR B science	Pack. data	-		DISR	CDMU B	differential(1)			DISRSCIENB	P-1304
E3 005 D	193	DISR N packet ready	D. ready	125 ms	16 s	DISR	CDMU A	differential(1)	HK 1	13-06	DISR N ready	P-1305
E3 006 D	193	DISR R packet ready	D. ready	125 ms	16 s	DISR	CDMU B	differential(1)	HK 1	13-06	DISR R ready	P-1306
E4 001 S	265	ACP A science	Pack. data	-		ACP	CDMU A	differential(1)			ACPSCIENA	P-1401
E4 002 S	264	ACP A status	DS 16	16 s	16 s	ACP	CDMU A	differential(1)	HK 3	91	ACPSTATA	P-1402
E4 003												
E4 004												
E4 005 S	264	ACP B status	DS 16	16 s	16 s	ACP	CDMU B	differential(1)	HK 3	91	ACPSTATB	P-1405
E4 006 S	265	ACP B science	Pack. data	-		ACP	CDMU B	differential(1)			ACPSCIENB	P-1406
E4 007 D	194	ACP N packet ready	D. ready	125 ms	16 s	ACP	CDMU A	differential(1)	HK 1	13-05	ACP N ready	P-1407
E4 008 D	194	ACP R packet ready	D. ready	125 ms	16 s	ACP	CDMU B	differential(1)	HK 1	13-05	ACP R ready	P-1408
E5 001 S	270	SSP A science	Pack. data	-		SSP	CDMU A	differential(1)			SSPSCIENA	P-1501
E5 002 S	269	SSP A status	DS 16	16 s	16 s	SSP	CDMU A	differential(1)	HK 3	95	SSPSTATA	P-1502
E5 003 S	269	SSP B status	DS 16	16 s	16 s	SSP	CDMU B	differential(1)	HK 3	95	SSPSTATB	P-1503
E5 004 S	270	SSP B science	Pack. data	-		SSP	CDMU B	differential(1)			SSPSCIENB	P-1504
E5 005 D	196	SSP N packet ready	D. ready	125 ms	16 s	SSP	CDMU A	differential(1)	HK 1	13-03	SSP N ready	P-1505
E5 006 D	196	SSP R packet ready	D. ready	125 ms	16 s	SSP	CDMU B	differential(1)	HK 1	13-03	SSP R ready	P-1506
E6 001 A	71	TUSO A temp. 1 (lamp)	8 bit ANA	16 s	16 s	TUSO	CDMU A	0V TUSO	HK 2	15	TUSOTEM1A	P-1601
E6 002 A	72	TUSO A temp. 2 (resonator)	8 bit ANA	16 s	16 s	TUSO	CDMU A	0V TUSO	HK 2	16	TUSOTEM2A	P-1602
E6 003 A	73	TUSO A temp. 3 (crystal)	8 bit ANA	16 s	16 s	TUSO	CDMU A	0V TUSO	HK 2	17	TUSOTEM3A	P-1603
E6 004 B	226	TUSO A status (lock)	DB	16 s	16 s	TUSO	CDMU A	0V TUSO	HK 1	17-05	TUSOSTATA	P-1604
E6 005 A	71	TUSO B temp. 1 (lamp)	8 bit ANA	16 s	16 s	TUSO	CDMU B	0V TUSO	HK 2	15	TUSOTEM1B	P-1605

(1) signal referenced to 0 V emitter

REF TM	TM @	DESCRIPTION OF TM	TYPE	SAMPLE INTERV.		SOURCE	DESTIN.	REFERENCE VOLTAGE	TM POSITION		MNEMO	JPL ref.
				ACQUIS	TELEM.				n° HK	index		
E6 006 A	72 ρ	TUSO B temp. 2 (resonator)	8 bit ANA	16 s	16 s	TUSO	CDMU B	0V TUSO	HK 2	16	TUSOTEM2B	P-1606
E6 007 A	73 ρ	TUSO B temp. 3 (crystal)	8 bit ANA	16 s	16 s	TUSO	CDMU B	0V TUSO	HK 2	17	TUSOTEM3B	P-1607
E6 008 B	226 ρ	TUSO B status (lock)	DB	16 s	16 s	TUSO	CDMU B	0V TUSO	HK 1	17-05	TUSOSTATB	P-1608
E7 001 A	ANA 5β	RUSO A temp. 1 (lamp)	8 bit ANA	1 s	1 s	RUSO	PSA A	0V RUSO	PSE	6	RUSOTEM1A	P-1701
E7 002 A	ANA 6ρ	RUSO A temp. 2 (resonator)	8 bit ANA	1 s	1 s	RUSO	PSA A	0V RUSO	PSE	7	RUSOTEM2A	P-1702
E7 003 B	ANA 4ρ	RUSO A status (lock)	8b.ANA (2)	1 s	1 s	RUSO	PSA A	0V RUSO	PSE	5	RUSOSTATA	P-1703
E7 004 A	ANA 7ρ	RUSO A temp. 3 (crystal)	8 bit ANA	1 s	1 s	RUSO	PSA A	0V RUSO	PSE	8	RUSOTEM3A	P-1704
M1 001 T	-	SEPS temperature 1 (SEPS A)	temp.	-		SEPS	Orbiter	0V orbiter	-		SEPSTEMP1	P-2101
M1 002 T	-	SEPS temperature 2 (SEPS A)	temp.	-		SEPS	Orbiter	0V orbiter	-		SEPSTEMP2	P-2102
M1 003 T	-	SEPS temperature 3 (SEPS B)	temp.	-		SEPS	Orbiter	0V orbiter	-		SEPSTEMP3	P-2103
M1 004 T	-	SEPS temperature 4 (SEPS C)	temp.	-		SEPS	Orbiter	0V orbiter	-		SEPSTEMP4	P-2104

(2) NOTE: this bilevel is transmitted through an analog channel; see §8.1.

(1) signal referenced to 0 V emitter

REF TM	TM @	DESCRIPTION OF TM	TYPE	SAMPLE INTERV.		SOURCE	DESTIN.	REFERENCE VOLTAGE	TM POSITION		MNEMO	JPL ref.
				ACQUIS	TELEM.				n° HK	index		
P3 001 R	-	pyro energy safety loop	rel. stat.	-		PYRO	LAUNCHER	0V launcher	-		PYENERGLOOP	P-2301
P3 002 R	✓9	pyro 1 energy status	rel. stat.	16 s	16 s	PYRO 1	CDMU A	0V CDMU A	HK 1	12-06	PY1ENERSTAT	P-2302
P3 003 R	-	pyro arming safety loop	rel. stat.	-		PYRO	LAUNCHER	0V launcher	-		PYARMLOOP	P-2303
P3 004 B	✓216	PDD selection relay A status	DB	125 ms	16 s	PYRO 1	CDMU A	0V PYRO A	HK 1	16-07	PDDARELST	P-2304
P3 005 B	✓208	GCMS IN selection relay A status	DB	125 ms	16 s	PYRO 1	CDMU A	0V PYRO A	HK 1	15-07	GCMSINAREST	P-2305
P3 006 B	✓209	GCMS OUT selection relay A status	DB	125 ms	16 s	PYRO 1	CDMU A	0V PYRO A	HK 1	15-06	GCMSOUTAREST	P-2306
P3 007 B	✓210	BC 1 selection relay A status	DB	125 ms	16 s	PYRO 1	CDMU A	0V PYRO A	HK 1	15-05	BC1ARELST	P-2307
P3 008 B	✓211	BC 2 selection relay A status	DB	125 ms	16 s	PYRO 1	CDMU A	0V PYRO A	HK 1	15-04	BC2ARELST	P-2308
P3 009 B	✓212	BC 3 selection relay A status	DB	125 ms	16 s	PYRO 1	CDMU A	0V PYRO A	HK 1	15-03	BC3ARELST	P-2309
P3 010 B	✓213	FS 1 selection relay A status	DB	125 ms	16 s	PYRO 1	CDMU A	0V PYRO A	HK 1	15-02	FS1ARELST	P-2310
P3 011 B	✓214	FS 2 selection relay A status	DB	125 ms	16 s	PYRO 1	CDMU A	0V PYRO A	HK 1	15-01	FS2ARELST	P-2311
P3 012 B	✓215	FS 3 selection relay A status	DB	125 ms	16 s	PYRO 1	CDMU A	0V PYRO A	HK 1	15-00	FS3ARELST	P-2312
P3 013 B	✓217	Par. J. 1 selection relay A status	DB	125 ms	16 s	PYRO 1	CDMU A	0V PYRO A	HK 1	16-06	PJ1ARELST	P-2313
P3 014 B	✓218	Par. J. 2 selection relay A status	DB	125 ms	16 s	PYRO 1	CDMU A	0V PYRO A	HK 1	16-05	PJ2ARELST	P-2314
P3 015 B	✓219	Par. J. 3 selection relay A status	DB	125 ms	16 s	PYRO 1	CDMU A	0V PYRO A	HK 1	16-04	PJ3ARELST	P-2315
P3 016 B	✓230	DISR cover selection relay A status	DB	125 ms	16 s	PYRO 1	CDMU A	0V PYRO A	HK 1	17-01	DCOVARELST	P-2316
P4 002 R	✓ 9	pyro 2 energy status	rel. stat.	16 s	16 s	PYRO 2	CDMU B	0V CDMU B	HK 1	12-06	PY2ENERSTAT	P-2402
P4 004 B	✓216	PDD selection relay B status	DB	125 ms	16 s	PYRO 2	CDMU B	0V PYRO B	HK 1	16-07	PDDBRELST	P-2404
P4 005 B	✓208	GCMS IN selection relay B status	DB	125 ms	16 s	PYRO 2	CDMU B	0V PYRO B	HK 1	15-07	GCMSINBREST	P-2405
P4 006 B	✓209	GCMS OUT selection relay B status	DB	125 ms	16 s	PYRO 2	CDMU B	0V PYRO B	HK 1	15-06	GCMSOUTBREST	P-2406
P4 007 B	✓210	BC 1 selection relay B status	DB	125 ms	16 s	PYRO 2	CDMU B	0V PYRO B	HK 1	15-05	BC1BRELST	P-2407
P4 008 B	✓211	BC 2 selection relay B status	DB	125 ms	16 s	PYRO 2	CDMU B	0V PYRO B	HK 1	15-04	BC2BRELST	P-2408
P4 009 B	✓212	BC 3 selection relay B status	DB	125 ms	16 s	PYRO 2	CDMU B	0V PYRO B	HK 1	15-03	BC3BRELST	P-2409
P4 010 B	✓213	FS 1 selection relay B status	DB	125 ms	16 s	PYRO 2	CDMU B	0V PYRO B	HK 1	15-02	FS1BRELST	P-2410
P4 011 B	✓214	FS 2 selection relay B status	DB	125 ms	16 s	PYRO 2	CDMU B	0V PYRO B	HK 1	15-01	FS2BRELST	P-2411
P4 012 B	✓215	FS 3 selection relay B status	DB	125 ms	16 s	PYRO 2	CDMU B	0V PYRO B	HK 1	15-00	FS3BRELST	P-2412
P4 013 B	✓217	Par. J. 1 selection relay B status	DB	125 ms	16 s	PYRO 2	CDMU B	0V PYRO B	HK 1	16-06	PJ1BRELST	P-2413
P4 014 B	✓218	Par. J. 2 selection relay B status	DB	125 ms	16 s	PYRO 2	CDMU B	0V PYRO B	HK 1	16-05	PJ2BRELST	P-2414
P4 015 B	✓219	Par. J. 3 selection relay B status	DB	125 ms	16 s	PYRO 2	CDMU B	0V PYRO B	HK 1	16-04	PJ3BRELST	P-2415
P4 016 B	✓230	DISR cover selection relay B status	DB	125 ms	16 s	PYRO 2	CDMU B	0V PYRO B	HK 1	17-01	DCOVBRELST	P-2416

(1) signal referenced to 0 V emitter

REF TM	TM@	DESCRIPTION OF TM	TYPE	SAMPLE INTERV. ACQUIS	SAMPLE INTERV. TELEM.	SOURCE	DESTIN.	REFERENCE VOLTAGE	TM POSITION n° HK	TM POSITION index	MNEMO	JPL ref.
PS 001 R	-	input relay loop	rel. stat.	-		PCDU	Orbiter	0V orbiter	-		INRELAYLOOP	P-2501 P-3701
PS 002 A	/78 P	battery 1 voltage A	8 bit ANA	16 s	16 s	PCDU	CDMU A	0V PCDU	HK 2	21	BAT1VOLTA	P-2502
PS 003 A	79 P	battery 2 voltage A	8 bit ANA	16 s	16 s	PCDU	CDMU A	0V PCDU	HK 2	22	BAT2VOLTA	P-2503
PS 004 A	80 P	battery 3 voltage A	8 bit ANA	16 s	16 s	PCDU	CDMU A	0V PCDU	HK 2	23	BAT3VOLTA	P-2504
PS 005 A	80 P	battery 3 voltage B	8 bit ANA	16 s	16 s	PCDU	CDMU B	0V PCDU	HK 2	23	BAT3VOLTB	P-2505
PS 006 A	79 P	battery 4 voltage B	8 bit ANA	16 s	16 s	PCDU	CDMU B	0V PCDU	HK 2	22	BAT4VOLTB	P-2506
PS 007 A	78 P	battery 5 voltage B	8 bit ANA	16 s	16 s	PCDU	CDMU B	0V PCDU	HK 2	21	BAT5VOLTB	P-2507
PS 008 A	83 P	BDR 1 current A (at bus level)	8 bit ANA	16 s	16 s	PCDU	CDMU A	0V PCDU	HK 2	26	BDR1CURRA	P-2508
PS 009 A	84 P	BDR 2 current A (at bus level)	8 bit ANA	16 s	16 s	PCDU	CDMU A	0V PCDU	HK 2	27	BDR2CURRA	P-2509
PS 010 A	85 P	BDR 3 current A (at bus level)	8 bit ANA	16 s	16 s	PCDU	CDMU A	0V PCDU	HK 2	28	BDR3CURRA	P-2510
PS 011 A	85 P	BDR 3 current B (at bus level)	8 bit ANA	16 s	16 s	PCDU	CDMU B	0V PCDU	HK 2	28	BDR3CURRB	P-2511
PS 012 A	84 P	BDR 4 current B (at bus level)	8 bit ANA	16 s	16 s	PCDU	CDMU B	0V PCDU	HK 2	27	BDR4CURRB	P-2512
PS 013 A	83 P	BDR 5 current B (at bus level)	8 bit ANA	16 s	16 s	PCDU	CDMU B	0V PCDU	HK 2	25	BDR5CURRB	P-2513
PS 014 R	/0	section 1 input relay status A	rel. stat.	16 s	16 s	PCDU	CDMU A	0V CDMU A	HK 1	11-07	INREL1STATA	P-2514
PS 015 R	/1	section 2 input relay status A	rel. stat.	16 s	16 s	PCDU	CDMU A	0V CDMU A	HK 1	11-06	INREL2STATA	P-2515
PS 016 R	/2	section 3 input relay status A	rel. stat.	16 s	16 s	PCDU	CDMU A	0V CDMU A	HK 1	11-05	INREL3STATA	P-2516
PS 017												
PS 018 R	/1	section 4 input relay status B	rel. stat.	16 s	16 s	PCDU	CDMU B	0V CDMU B	HK 1	11-06	INREL4STATB	P-2518
PS 019 R	/0	section 5 input relay status B	rel. stat.	16 s	16 s	PCDU	CDMU B	0V CDMU B	HK 1	11-07	INREL5STATB	P-2519
PS 020 A	98 P	main bus voltage A	8 bit ANA	16 s	16 s	PCDU	CDMU A	0V PCDU	HK 2	41	BUSVOLTA	P-2520
PS 021 A	98 P	main bus voltage B	8 bit ANA	16 s	16 s	PCDU	CDMU B	0V PCDU	HK 2	41	BUSVOLTB	P-2521

(1) signal referenced to 0 V emitter

REF TM	TM @	DESCRIPTION OF TM	TYPE	SAMPLE INTERV.		SOURCE	DESTIN.	REFERENCE VOLTAGE	TM POSITION		MNEMO	JPL ref.
				ACQUIS	TELEM.				n° HK	index		
P5 022 A	81	28 V CDMU A power current	8 bit ANA	16 s	16 s	PCDU	CDMU A	0V PCDU	HK 2	24	CDMUAPWR	P-2522
P5 023 A	82	28 V TX A power current	8 bit ANA	16 s	16 s	PCDU	CDMU A	0V PCDU	HK 2	25	TXAPWR	P-2523
P5 024 A	86	28 V GCMS 1 N power current	8 bit ANA	16 s	16 s	PCDU	CDMU A	0V PCDU	HK 2	29	GCMS1NPWR	P-2524
P5 025 A	88	28 V DISR 1 N power current	8 bit ANA	16 s	16 s	PCDU	CDMU A	0V PCDU	HK 2	31	DISR1NPWR	P-2525
P5 026 A	87	28 V GCMS2 N+R power current	8 bit ANA	16 s	16 s	PCDU	CDMU A	0V PCDU	HK 2	30	GCMS2NPWR	P-2526
P5 027 A	90	28 V ACP 1 N power current	8 bit ANA	16 s	16 s	PCDU	CDMU A	0V PCDU	HK 2	33	ACP1NPWR	P-2527
P5 028 A	92	28 V ACP 3 N power current	8 bit ANA	16 s	16 s	PCDU	CDMU A	0V PCDU	HK 2	35	ACP3NPWR	P-2528
P5 029 A	93	28 V TUSO N power current	8 bit ANA	16 s	16 s	PCDU	CDMU A	0V PCDU	HK 2	36	TUSONPWR	P-2529
P5 030 A	95	28 V HASI 1 N power current	8 bit ANA	16 s	16 s	PCDU	CDMU A	0V PCDU	HK 2	38	HASI1NPWR	P-2530
P5 031 A	94	28 V SSP N power current	8 bit ANA	16 s	16 s	PCDU	CDMU A	0V PCDU	HK 2	37	SSPNPWR	P-2531
P5 032 A	89	28 V DISR 2 N power current	8 bit ANA	16 s	16 s	PCDU	CDMU A	0V PCDU	HK 2	32	DISR2NPWR	P-2532
P5 033 A	91	28 V ACP 2 N power current	8 bit ANA	16 s	16 s	PCDU	CDMU A	0V PCDU	HK 2	34	ACP2NPWR	P-2533
P5 034 A	96	28 V HASI 2 N power current	8 bit ANA	16 s	16 s	PCDU	CDMU A	0V PCDU	HK 2	39	HASI2NPWR	P-2534
P5 035 A	97	28 V Prox. Sens. A power current	8 bit ANA	16 s	16 s	PCDU	CDMU A	0V PCDU	HK 2	40	RAUAPWR	P-2535
P5 036 B	✓200	28 V CDMU A limiter status	DB	16 s	16 s	PCDU	CDMU B	0V PCDU	HK 1	14-07	CDMUASTAT	P-2536
P5 037 B	✓227	28 V TX A limiter status	DB	16 s	16 s	PCDU	CDMU A	0V PCDU	HK 1	17-04	TXASTAT	P-2537
P5 038 B	✓201	28 V GCMS 1 N limiter status	DB	16 s	16 s	PCDU	CDMU A	0V PCDU	HK 1	14-06	GCMS1NSTAT	P-2538
P5 039 B	✓202	28 V DISR 1 N limiter status	DB	16 s	16 s	PCDU	CDMU A	0V PCDU	HK 1	14-05	DISR1NSTAT	P-2539
P5 040 B	✓203	28 V GCMS 2 N limiter status	DB	16 s	16 s	PCDU	CDMU A	0V PCDU	HK 1	14-04	GCMS2NSTAT	P-2540
P5 041 B	✓204	28 V ACP 1 N limiter status	DB	16 s	16 s	PCDU	CDMU A	0V PCDU	HK 1	14-03	ACP1NSTAT	P-2541
P5 042 B	✓205	28 V ACP 3 N limiter status	DB	16 s	16 s	PCDU	CDMU A	0V PCDU	HK 1	14-02	ACP3NSTAT	P-2542
P5 043 B	✓206	28 V TUSO N limiter status	DB	16 s	16 s	PCDU	CDMU A	0V PCDU	HK 1	14-01	TUSONSTAT	P-2543
P5 044 B	✓220	28 V HASI 1 N limiter status	DB	16 s	16 s	PCDU	CDMU A	0V PCDU	HK 1	16-03	HASI1NSTAT	P-2544
P5 045 B	✓221	28 V SSP N limiter status	DB	16 s	16 s	PCDU	CDMU A	0V PCDU	HK 1	16-02	SSPNSTAT	P-2545
P5 046 B	✓222	28 V DISR 2 N limiter status	DB	16 s	16 s	PCDU	CDMU A	0V PCDU	HK 1	16-01	DISR2NSTAT	P-2546
P5 047 B	✓223	28 V ACP 2 N limiter status	DB	16 s	16 s	PCDU	CDMU A	0V PCDU	HK 1	16-00	ACP2NSTAT	P-2547
P5 048 B	✓228	28 V HASI 2 N limiter status	DB	16 s	16 s	PCDU	CDMU A	0V PCDU	HK 1	17-03	HASI2NSTAT	P-2548
P5 049 B	✓229	28 V Prox. Sens. A limiter status	DB	16 s	16 s	PCDU	CDMU A	0V PCDU	HK 1	17-02	RAUASTAT	P-2549

(1) signal referenced to 0 V emitter

REF TM	TM@	DESCRIPTION OF TM	TYPE	SAMPLE INTERV. ACQUIS	SAMPLE INTERV. TELEM.	SOURCE	DESTIN.	REFERENCE VOLTAGE	TM POSITION n° HK	TM POSITION index	MNEMO	JPL ref.
P5 050 A	81	28 V CDMU B power current	8 bit ANA	16 s	16 s	PCDU	CDMUB	0V PCDU	HK 2	24	CDMUBPWR	P-2550
P5 051 A	82	28 V TX B power current	8 bit ANA	16 s	16 s	PCDU	CDMUB	0V PCDU	HK 2	25	TXBPWR	P-2551
P5 052 A	86	28 V GCMS 1 R power current	8 bit ANA	16 s	16 s	PCDU	CDMUB	0V PCDU	HK 2	29	GCMS1RPWR	P-2552
P5 053 A	88	28 V DISR 1 R power current	8 bit ANA	16 s	16 s	PCDU	CDMUB	0V PCDU	HK 2	31	DISR1RPWR	P-2553
P5 054 A	87	28 V GCMS 2 R power current	8 bit ANA	16 s	16 s	PCDU	CDMUB	0V PCDU	HK 2	30	GCMS2RPWR	P-2554
P5 055 A	90	28 V ACP 1 R power current	8 bit ANA	16 s	16 s	PCDU	CDMUB	0V PCDU	HK 2	33	ACP1RPWR	P-2555
P5 056 A	92	28 V ACP 3 R power current	8 bit ANA	16 s	16 s	PCDU	CDMUB	0V PCDU	HK 2	35	ACP3RPWR	P-2556
P5 057 A	93	28 V TUSO R power current	8 bit ANA	16 s	16 s	PCDU	CDMUB	0V PCDU	HK 2	36	TUSORPWR	P-2557
P5 058 A	95	28 V HASI 1 R power current	8 bit ANA	16 s	16 s	PCDU	CDMUB	0V PCDU	HK 2	38	HASI1RPWR	P-2558
P5 059 A	94	28 V SSP R power current	8 bit ANA	16 s	16 s	PCDU	CDMUB	0V PCDU	HK 2	37	SSPRPWR	P-2559
P5 060 A	89	28 V DISR 2 R power current	8 bit ANA	16 s	16 s	PCDU	CDMUB	0V PCDU	HK 2	32	DISR2RPWR	P-2560
P5 061 A	91	28 V ACP 2 R power current	8 bit ANA	16 s	16 s	PCDU	CDMUB	0V PCDU	HK 2	34	ACP2RPWR	P-2561
P5 062 A	96	28 V HASI 2 R power current	8 bit ANA	16 s	16 s	PCDU	CDMUB	0V PCDU	HK 2	39	HASI2RPWR	P-2562
P5 063 A	97	28 V Prox. Sens. B power current	8 bit ANA	16 s	16 s	PCDU	CDMUB	0V PCDU	HK 2	40	PAUBPWR	P-2563
P5 064 B	✓200	28 V CDMU B limiter status	DB	16 s	16 s	PCDU	CDMUA	0V PCDU	HK 1	14-07	CDMUBSTAT	P-2564
P5 065 B	✓227	28 V TX B limiter status	DB	16 s	16 s	PCDU	CDMUB	0V PCDU	HK 1	17-04	TXBSTAT	P-2565
P5 066 B	✓201	28 V GCMS 1 R limiter status	DB	16 s	16 s	PCDU	CDMUB	0V PCDU	HK 1	14-06	GCMS1RSTAT	P-2566
P5 067 B	✓202	28 V DISR 1 R limiter status	DB	16 s	16 s	PCDU	CDMUB	0V PCDU	HK 1	14-05	DISR1RSTAT	P-2567
P5 068 B	✓203	28 V GCMS 2 R limiter status	DB	16 s	16 s	PCDU	CDMUB	0V PCDU	HK 1	14-04	GCMS2RSTAT	P-2568
P5 069 B	✓204	28 V ACP 1 R limiter status	DB	16 s	16 s	PCDU	CDMUB	0V PCDU	HK 1	14-03	ACP1RSTAT	P-2569
P5 070 B	✓205	28 V ACP 3 R limiter status	DB	16 s	16 s	PCDU	CDMUB	0V PCDU	HK 1	14-02	ACP3RSTAT	P-2570
P5 071 B	✓206	28 V TUSO R limiter status	DB	16 s	16 s	PCDU	CDMUB	0V PCDU	HK 1	14-01	TUSORSTAT	P-2571
P5 072 B	✓220	28 V HASI 1 R limiter status	DB	16 s	16 s	PCDU	CDMUB	0V PCDU	HK 1	16-03	HASI1RSTAT	P-2572
P5 073 B	✓221	28 V SSP R limiter status	DB	16 s	16 s	PCDU	CDMUB	0V PCDU	HK 1	16-02	SSPRSTAT	P-2573
P5 074 B	✓222	28 V DISR 2 R limiter status	DB	16 s	16 s	PCDU	CDMUB	0V PCDU	HK 1	16-01	DISR2RSTAT	P-2574
P5 075 B	✓223	28 V ACP 2 R limiter status	DB	16 s	16 s	PCDU	CDMUB	0V PCDU	HK 1	16-00	ACP2RSTAT	P-2575
P5 076 B	✓228	28 V HASI 2 R limiter status	DB	16 s	16 s	PCDU	CDMUB	0V PCDU	HK 1	17-03	HASI2RSTAT	P-2576
P5 077 B	✓229	28 V Prox. Sens. B limiter status	DB	16 s	16 s	PCDU	CDMUB	0V PCDU	HK 1	17-02	PAUBSTAT	P-2577
P5 078 R	✓ 5	coast timer 1 relay status A	rel. stat.	16 s	16 s	PCDU	CDMUA	0V CDMU A	HK 1	11-01	CTIM1STATA	P-2578
P5 079 R	✓ 7	coast timer 2 relay status A	rel. stat.	16 s	16 s	PCDU	CDMUA	0V CDMU A	HK 1	11-00	CTIM2STATA	P-2579
P5 080												
P5 081 R	✓ 6	coast timer 3 relay status B	rel. stat.	16 s	16 s	PCDU	CDMUB	0V CDMU B	HK 1	11-01	CTIM3STATB	P-2581
P5 082 R	-	timer relay loop	rel. stat.	-		PCDU	Orbiter	0V orbiter	-		CTIMLOOP	P-2582 P-3782

(1) signal referenced to 0 V emitter

REF TM	TM@	DESCRIPTION OF TM	TYPE	SAMPLE INTERV. ACCUM	SAMPLE INTERV. TELEM.	SOURCE	DESTIN.	REFERENCE VOLTAGE	TM POSITION n° HK	TM POSITION index	MNEMO	JPL ref.
R1 001												
P R1 002 A	75	TX A output power	8 bit ANA	16 s	16 s	TX A	CDMU A	0V TX A	HK 2	18	TXARFPWR	P-3002
P R1 003 A	76	TX A power ampli temp	8 bit ANA	16 s	16 s	TX A	CDMU A	0V TX A	HK 2	19	TXATEMP	P-3003
R1 004 A	77	TX A secondary supply voltage	8 bit ANA	16 s	16 s	TX A	CDMU A	0V TX A	HK 2	20	TXAVOLTAGE	P-3004
P R1 005 R	10	TX A selection status (TUSO/TCXO)	ref. stat.	16 s	16 s	TX A	CDMU A	0V CDMU A	HK 1	12-05	TXASELECTST	P-3005
P R1 006 B	225	TCXO output level	DB	16 s	16 s	TX A	CDMU A	0V TX A	HK 1	17-06	TCXOASTAT	P-3006
P R1 007 A	102	HPA A power supply voltage	8 bit ANA	16 s	16 s	TX A	CDMU A	0V TX A	HK 2	42	HPAAVOLTAGE	P-3007
R2 001												
P R2 002 A	75	TX B output power	8 bit ANA	16 s	16 s	TX B	CDMU B	0V TX B	HK 2	18	TXBRFPWR	P-3002
P R2 003 A	76	TX B power ampli temp	8 bit ANA	16 s	16 s	TX B	CDMU B	0V TX B	HK 2	19	TXBTEMP	P-3003
R2 004 A	77	TX B secondary supply voltage	8 bit ANA	16 s	16 s	TX B	CDMU B	0V TX B	HK 2	20	TXBVOLTAGE	P-3004
P R2 005 R	10	TX B selection status	ref. stat.	16 s	16 s	TX B	CDMU B	0V CDMU B	HK 1	12-05	TXBSELECTST	P-3005
P R2 006 B	225	TCXO output level	DB	16 s	16 s	TX B	CDMU B	0V TX B	HK 1	17-06	TCXOBSTAT	P-3006
P R2 007 A	102	HPA B power supply voltage	8 bit ANA	16 s	16 s	TX B	CDMU B	0V TX B	HK 2	42	HPABVOLTAGE	P-3007
R3 001												
P R3 002 A	ANA 3	LNA A supply voltage	8 bit ANA	1 s	1 s	LNA A	PSA A	0V LNA A	PSE	4	LNAAVOLT	P-3002
R3 003 T	-	LNA A temp	temp.	1 s	1 s	LNA A	Orbiter	0V orbiter	-		LNAATEMPO	P-3003
R4 001												
P R4 002 A	ANA 3	LNA B supply voltage	8 bit ANA	1 s	1 s	LNA B	PSA B	0V LNA B	PSE	4	LNABVOLT	P-3402
R4 003 T	-	LNA B temp	temp.	1 s	1 s	LNA B	Orbiter	0V orbiter	-		LNABTEMPO	P-3403
8,9,A,B,C P R5 001 S	RXIF	PSA A receiver HK word 1	DS 16	125 ms	125 ms	PSA A	PSA A	0 V PSA A	PSE	51/66	RXADSPW1	P-3501
8,9,A,B,C P R5 002 S	RXIF	PSA A receiver HK word 2	DS 16	125 ms	125 ms	PSA A	PSA A	0 V PSA A	PSE	67/82	RXADSPW2	P-3502
A P R5 003 S	RXIF	PSA A receiver HK word 3	DS 16	125 ms	125 ms	PSA A	PSA A	0 V PSA A	PSE	83/98	RXADSPW3	P-3503
C P R5 004 S	RXIF	PSA A receiver HK word 4	DS 16	125 ms	125 ms	PSA A	PSA A	0 V PSA A	PSE	99/114	RXADSPW4	P-3504
R5 005												
R5 006												
P R5 007 A	ANA 1	PSA A secondary supply voltage	8 bit ANA	1 s	1 s	PSA A	PSA A	0 V PSA A	PSE	2	PSAASECVOLT	P-3507
P R5 008 A	ANA 0	PSA A RX supply voltage	8 bit ANA	1 s	1 s	PSA A	PSA A	0 V PSA A	PSE	1	RXAVOLTAGE	P-3508
R5 009												
P R5 010 T	ANA 2	PSA A temp	temp.	1 s	1 s	PSA A	PSA A	0 V PSA A	PSE	3	RXATEMP	P-3510
R5 011 T												
R5 012												
P R5 013 R	STAT 6	RUSO power status	rel. stat.	1 s	1 s	PSA A	PSA A	0 V PSA A	PSE	9-6	RUSOPWRST	P-3513
R5 014 R	STAT 7	PSA A selection status (RUSO/TCXO)	rel. stat.	1 s	1 s	PSA A	PSA A	0 V PSA A	PSE	9-7	PSASELECTST	P-3514
R5 015 B	STAT 5	PSA A chain identifier	DB	1 s	1 s	PSA A	PSA A	0 V PSA A	PSE	9-5	PSAACHAINID	P-3515
8,9,A,B,C P R6 001 S	RXIF	PSA B receiver HK word 1	DS 16	125 ms	125 ms	PSA B	PSA B	0 V PSA B	PSE	51/66	RXBDSPW1	P-3601
8,9,A,B,C P R6 002 S	RXIF	PSA B receiver HK word 2	DS 16	125 ms	125 ms	PSA B	PSA B	0 V PSA B	PSE	67/82	RXBDSPW2	P-3602
A P R6 003 S	RXIF	PSA B receiver HK word 3	DS 16	125 ms	125 ms	PSA B	PSA B	0 V PSA B	PSE	83/98	RXBDSPW3	P-3603
C P R6 004 S	RXIF	PSA B receiver HK word 4	DS 16	125 ms	125 ms	PSA B	PSA B	0 V PSA B	PSE	99/114	RXBDSPW4	P-3604

(1) signal referenced to 0 V emitter

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REF TM	TM@	DESCRIPTION OF TM	TYPE	SAMPLE INTERV. ACQUIS	SAMPLE INTERV. TELEM.	SOURCE	DESTIN.	REFERENCE VOLTAGE	TM POSITION n° HK	TM POSITION index	MNEMO	JPL ref.
R6 005												
R5 006												
R6 007 A	ANA 1	PSA B secondary supply voltage	8 bit ANA	1 s	1 s	PSA B	PSA B	0 V PSA B	PSE	2	PSABSECVOLT	P-3607
R5 008 A	ANA 0	PSA B RX supply voltage	8 bit ANA	1 s	1 s	PSA B	PSA B	0 V PSA B	PSE	1	RXBVOLTAGE	P-3608
R6 009												
R6 010 T	ANA 2	PSA B temp	temp.	1 s	1 s	PSA B	PSA B	0 V PSA B	PSE	3	RXBTEMP	P-3610
R6 011 T												
R6 012												
R6 013 B	STAT 5	PSA B chain identifier	DB	1 s	1 s	PSA B	PSA B	0 V PSA B	PSE	9-5	PSABCHAINID	P-3613
R6 014 R	STAT 7	PSA B selection status (TC/XO)	rel. stat.	1 s	1 s	PSA B	PSA B	0 V PSA B	PSE	9-7	PSABSELECTST	P-3614
S1 001 H		RAM single error counter (LSB)	byte	-	16 s	POSW A	POSW A		HK 1	1	PRAM1ERA	P-2801
S1 002 H		Invalid TC counter	byte	-	16 s	POSW A	POSW A		HK 1	2	PINVTCA	P-2802
S1 003 H		Valid TC counter	byte	-	16 s	POSW A	POSW A		HK 1	3	PVALTCA	P-2803
S1 004 H		Fixed point overflow counter	byte	-	16 s	POSW A	POSW A		HK 1	4	PFXOVA	P-2804
S1 005 H		Floating point overflow counter	byte	-	16 s	POSW A	POSW A		HK 1	5	PFLOVA	P-2805
S1 006 H		Exception counter	byte	-	16 s	POSW A	POSW A		HK 1	6	PEXCEPTA	P-2806
S1 007 H		Overrun counter	byte	-	16 s	POSW A	POSW A		HK 1	7	POVERA	P-2807
S1 008 H		RAM double error counter	byte	-	16 s	POSW A	POSW A		HK 1	8	PRAM2ERA	P-2808
S1 009 H		CMD counter	byte	-	16 s	POSW A	POSW A		HK 1	9	PCMDCNTA	P-2809
S1 010 H		CDMU init status	byte	-	16 s	POSW A	POSW A		HK 1	10	PINISTATA	P-2810
S1 011 H		DDB spin	byte	-	2 s	POSW A	POSW A		HK 3	1/8	PDDBSPINA	P-2811
S1 012 H		DDB mission phase	byte	-	2 s	POSW A	POSW A		HK 3	9/16	PDDBPHAZA	P-2812
S1 013 H		CDMU A control port	byte	-	16 s	POSW A	POSW A		HK 1	52	PCONTPORTA	P-2833
S1 014 H		Oversampled Invalid TC counter	byte	-	1 s	POSW A	POSW A		HK 1	53/68	POVINVTCA	P-2834
S1 013 W		DDB F2 + DDB altitude	word	-	2 s	POSW A	POSW A		HK 3	17/32	see § 8.7	P-2813
S1 014 W		DDB F1 + DDB time	word	-	2 s	POSW A	POSW A		HK 3	33/48	see § 8.7	P-2814
S1 015 W		Selection relays status (SRS)	word	-	16 s	POSW A	POSW A		HK 1	34	PSRAA	P-2815
S1 016 W		CPU fault register	word	-	16 s	POSW A	POSW A		HK 1	36	PCPUFLTA	P-2816
S1 017 W		RAM first failure address	word	-	16 s	POSW A	POSW A		HK 1	38	PRAMFADDA	P-2817
S1 018 W		POSW status 1	word	-	16 s	POSW A	POSW A		HK 1	40	POSWST1A	P-2818
S1 019 W		POSW status 2	word	-	16 s	POSW A	POSW A		HK 1	42	POSWST2A	P-2819
S1 020 W		POSW status 3	word	-	16 s	POSW A	POSW A		HK 1	44	POSWST3A	P-2820
S1 021 W		POSW status 4	word	-	16 s	POSW A	POSW A		HK 1	46	POSWST4A	P-2821
S1 022 W		POSW health LSW status	word	-	16 s	POSW A	POSW A		HK 1	50	PHLTHLSA	P-2822
S1 023 W		POSW health MSW status	word	-	16 s	POSW A	POSW A		HK 1	48	PHLTHMSA	P-2823
S1 024 W		T0/Ta G-switch 1&2 A buffer	word		1 s	POSW A	POSW A		HK 4	49/80	TOGSWBUFFA	see page 58
S1 025 W		T0 G-switch Time-out A counter	word	-	16 s	POSW A	POSW A		HK 4	81	TOGSWTIMEA	

(1) signal referenced to 0 V emitter

TELEMETRY LIST (§3.1): sheet 12

REF TM	TM@	DESCRIPTION OF TM	TYPE	SAMPLE INTERV. ACQUIS	SAMPLE INTERV. TELEM.	SOURCE	DESTINL	REFERENCE VOLTAGE	TM POSITION n° HK	TM POSITION Index	MNEMO	JPL ref.
S2 001 H	✓	RAM single error counter (LSB)	byte	-	16 s	POSWB	POSWB		HK 1	1	PRAM1ERB	P-2901
S2 002 H	✓	Invalid TC counter	byte	-	16 s	POSWB	POSWB		HK 1	2	PINVTCB	P-2902
S2 003 H	✓	Valid TC counter	byte	-	16 s	POSWB	POSWB		HK 1	3	PVALTCB	P-2903
S2 004 H	✓	Fixed point overflow counter	byte	-	16 s	POSWB	POSWB		HK 1	4	PFXOVB	P-2904
S2 005 H	✓	Floating point overflow counter	byte	-	16 s	POSWB	POSWB		HK 1	5	PFLOVB	P-2905
S2 006 H	✓	Exception counter	byte	-	16 s	POSWB	POSWB		HK 1	6	PEXCEPTB	P-2906
S2 007 H	✓	Overrun counter	byte	-	16 s	POSWB	POSWB		HK 1	7	POVERB	P-2907
S2 008 H	✓	RAM double error counter	byte	-	16 s	POSWB	POSWB		HK 1	8	PRAM2ERB	P-2908
S2 009 H	✓	CMD counter	byte	-	16 s	POSWB	POSWB		HK 1	9	PCMDCNTB	P-2909
S2 010 H	✓	CDMU init status	byte	-	16 s	POSWB	POSWB		HK 1	10	PINITSTATB	P-2910
S2 011 H	✓	DDB spin	byte	-	2 s	POSWB	POSWB		HK 3	1/8	PDDBSPINB	P-2911
S2 012 H		DDB mission phase	byte	-	2 s	POSWB	POSWB		HK 3	9/16	PDDBPHAZB	P-2912
S2 013 H		CDMU B control port	byte	-	16 s	POSWB	POSWB		HK 1	52	PCONTPORTB	P-2933
S2 014 H		Oversampled invalid TC counter	byte	-	1 s	POSWB	POSWB		HK 1	53/68	POVINVTCB	P-2934
S2 013 W	✓	DDB F2 - DDB attitude	word	-	2 s	POSWB	POSWB		HK 3	17/32	see § 8.7	P-2913
S2 014 W	✓	DDB F1 - DDB time	word	-	2 s	POSWB	POSWB		HK 3	33/48	see § 8.7	P-2914
S2 015 W	✓	Selection relays status (SRS)	word	-	16 s	POSWB	POSWB		HK 1	34	PSRAB	P-2915
S2 016 W	✓	CPU fault register	word	-	16 s	POSWB	POSWB		HK 1	36	PCPUFLTB	P-2916
S2 017 W		RAM first failure address	word	-	16 s	POSWB	POSWB		HK 1	38	PRAMFADDB	P-2917
S2 018 W	✓	POSW status 1	word	-	16 s	POSWB	POSWB		HK 1	40	POSWST1B	P-2918
S2 019 W		POSW status 2	word	-	16 s	POSWB	POSWB		HK 1	42	POSWST2B	P-2919
S2 020 W	✓	POSW status 3	word	-	16 s	POSWB	POSWB		HK 1	44	POSWST3B	P-2920
S2 021 W		POSW status 4	word	-	16 s	POSWB	POSWB		HK 1	46	POSWST4B	P-2921
S2 022 W	✓	POSW health LSW status	word	-	16 s	POSWB	POSWB		HK 1	50	PHLTHLSB	P-2922
S2 023 W	✓	POSW health MSW status	word	-	16 s	POSWB	POSWB		HK 1	48	PHLTHMSB	P-2923
S2 024 W	✓	TC/Ta G-switch 1&2 B buffer	word		1 s	POSWB	POSWB		HK 4	49/80	TCGSWBUFFB	see page
S2 025 W	✓	Tc G-switch Time-out B counter	word	-	16 s	POSWB	POSWB		HK 4	81	TCGSWTIMEB	58
T 001 T	-	Pr. temp. 1 (PCDU box).	temp.	-	-	THSS	Orbiter	0V orbiter	-		PROBTEMP1	P-4001
T 002 T	-	Pr. temp. 2 (PCDU box)	temp.	-	-	THSS	Orbiter	0V orbiter	-		PROBTEMP2	P-4002

(1) signal referenced to 0 V emitter

3.2 ACQUISITION SIGNAL LIST

DESCRIPTION	TYPE	SOURCE	DESTIN.	REFERENCE VOLTAGE
TM A data through umbilical (RF bite)	RF link	TX A	PSA A via RFE	differential (1)
TM B data through umbilical (RF bite)	RF link	TX B	PSA B via RFE	differential (1)
Probe TM A data packet	NRZ	CDMU A	TX A	differential (1)
Probe TM B data packet	NRZ	CDMU B	TX B	differential (1)
Probe 1553 TM A	1553	PSA A	Orbiter	isolated
Probe 1553 TM B	1553	PSA B	Orbiter	isolated
separation strap A	strap	SEPS	PCDU	0 V PCDU
separation strap B	strap	SEPS	PCDU	0 V PCDU
G-switch 1	RS	G-SW1	MTU	0V MTU
G-switch 2	RS	G-SW2	MTU	0V MTU
electrical G-switch function A (CASU line 1)	analog.	CASU	CDMU A*	0 V CASU
electrical G-switch function B (CASU line 3)	analog.	CASU	CDMU B*	0 V CASU
T0/Ta G-switch 1A	RS	G-SW1A	CDMU A*	0V CDMU
T0/Ta G-switch 2A	RS	G-SW2A	CDMU A*	0V CDMU
T0/Ta G-switch 1B	RS	G-SW1B	CDMU B*	0V CDMU
T0/Ta G-switch 2B	RS	G-SW2B	CDMU B*	0V CDMU

* signal to Arming Timer

NOTE:
T0/Ta G-switches are not only acquisition signals; they are used also for triggering mode changes.

4. TM PACKET STRUCTURE

4.1 SUPERPACKET

byte	MSB			LSB
6	0000	1111	10a1	1011
	11	PKT SEQ CONT		
	length = 1026 - 1			
6	0000	0000	S/C TIME (b31-24)	
	S/C TIME (bit 23-8)			
	S/C TIME (bit 7-0)		RT counter (LSB)	
10	0000	1011	abb1	0000
	(1) M.C. frame count		(2.1) V.C. frame count	
	1001	1000	0000	0000
	0000	0011	(2.2) V.C. frame count	
	(2.3) V.C. frame count			
882	TM PKT slot 1 (63 words)			
	TM PKT slot 2 (63 words)			
	TM PKT slot 3 (63 words)			
	TM PKT slot 4 (63 words)			
	TM PKT slot 5 (63 words)			
	TM PKT slot 6 (63 words)			
	TM PKT slot 7 (63 words)			
128	Reed Solomon check symbols			

1032 bytes

notes: (1): Master Channel frame count (1 byte)
(2): Virtual Channel frame count (4 bytes)
(2.1): bits (07-00)
(2.2): bits (31-24)
(2.3): bits (23-08)

a = 0 & b = 1 for chain A
a = 1 & b = 0 for chain B

4.2 PSE housekeeping packet

byte count	byte index	MSB			LSB	byte index	
6		0000	1111	10a0	1100		a = 0 for chain A a = 1 for chain B
		11	PKT SEQ CONT				
		length = 176 - 1					
8		0000	0000	S/C TIME (b31-24)			
		S/C TIME (bit 23-8)					
		S/C TIME (bit 7-0)		RT counter (LSB)			
		RT counter (MSW)					
24	1	1 RX supply voltage			rate=1s		
	2	1 PSA secondary power voltage			rate=1s		
	3	1 TCXO temp			rate=1s		
	4	1 LNA supply voltage			rate=1s		
	5	1 RUSO status	(chain A only)		rate=1s		
	6	1 RUSO temp 1 byte	(chain A only)		rate=1s		
	7	1 RUSO temp 2 byte	(chain A only)		rate=1s		
	8	1 RUSO temp 3 byte	(chain A only)		rate=1s		3 bits used: see §3.1, TMs with TM@ = 'STAT' n° of bit
	9	1 PSA status			rate=1s		
	10	1 PSA init status			rate=1s		
	11	invalid TC counter byte			rate=1s		
	12	valid TC counter byte			rate=1s		
	13	fixed point overflow count byte			rate=1s		
	14	floating point overflow count byte			rate=1s		
	15	exception counter byte			rate=1s		
	16	overrun counter byte			rate=1s		
	17/24	8 status EDAC register LSB			rate=125ms		A 10074
26	25	1 CPU fault register word			rate=1s	26	
	27	RAM 1st failure address word			rate=1s		
	29	SASW health status MSW			rate=1s		
	31	SASW health status LSW			rate=1s		
	33	BIU RAM 1st failure address word			rate=1s	34	
	35/50	8 BIU fail register word			rate=125ms	50	
64	51/66	8 receiver HK word 1			rate=125ms		
	67/82	8 receiver HK word 2			rate=125ms		see § 8.7
	83/98	8 receiver HK word 3			rate=125ms		
	99/	8 receiver HK word 4			rate=125ms	/114	
21	115	SASW status word 1			rate=1s		
	117	SASW status word 2			rate=1s		
	119	SASW status word 3			rate=1s		For detailed definition of SASW status words, see AD 01 § B.4.7.(3)
	121	SASW status word 4			rate=1s		
	123	SASW status word 5			rate=1s		
	125	SASW status word 6			rate=1s		
	127	SASW status word 7			rate=1s		
	129	SASW status word 8			rate=1s		
	131	SASW status word 9			rate=1s		
	133	SASW status word 10 (spare)			rate=1s		
	135	BIU fail counter byte			rate=1s		
33	136/	33 spare bytes				/168	

182 bytes

4.3 PSE dump packet

byte			
6	0000	1111	10a1 1101
	11	PKT SEQ CONT	
	length = 176 - 1		
8	0000	0000	S/C TIME (b31-24)
	S/C TIME (bit 23-8)		
	S/C TIME (bit 7-0)		RT counter (LSB)
	RT counter (MSW)		
2	start address of the dumped words		
166	83 dumped words		

182 bytes

4.4 PSE dump super packet

byte			
6	0000	1111	10a0 1111
	11	PKT SEQ CONT	
	length = 1026 - 1		
6	0000	0000	S/C TIME (b31-24)
	S/C TIME (bit 23-8)		
	S/C TIME (bit 7-0)		RT counter (LSB)
640	BIU memory dump		
380	190 spare words		

1032 bytes

a = 0 for chain A
a = 1 for chain B

5. POSW HK PACKET CONTENT

5.1 HK 1 packet content

byte count	byte index	MSB			LSB	byte index
		0000	1111	10a0	0101	
6		11	PKT SEQ CONT			
		length = 120 - 1				
6		MSW RT counter				
		LSB RT counter		MSB MT counter		
		LSW MT counter				
	1	RAM single error counter		Invalid TC counter		2
		Valid TC counter		Fix. Overflow counter		
		Float. Overflow counter		Exception counter		
		Overrun counter		RAM double error counter		
		CMD counter		CDMU init status		10
	11	Probe status 1		Probe status 5		
		Probe status 7		Probe status 4		
		Probe status 2		Probe status 3		
		Probe status 6		Pr. S. AGC (first acq.)		
		Prox. Sens. AGC voltage		Prox. Sens. AGC voltage		20
	21	Prox. Sens. AGC voltage		Prox. Sens. AGC voltage		
		Prox. Sens. AGC voltage		Prox. Sens. AGC voltage		
		Prox. Sens. AGC voltage		Prox. Sens. AGC voltage		
		Prox. Sens. AGC voltage		Prox. Sens. AGC voltage		
		Prox. Sens. AGC voltage		Prox. Sens. AGC voltage		30
68	31	Prox. Sens. AGC voltage		Prox. Sens. AGC voltage		
		Pr. S. AGC (last acq.)		SRS: mem.pyro select. MSB		
		SRS: mem.pyro select. LSB		CPU fault register MSB		
		CPU fault register LSB		RAM first failure ad MSB		
		RAM first failure ad LSB		POSW status 1 MSB		40
	41	POSW status 1 LSB		POSW status 2 MSB		For detailed
		POSW status 2 LSB		POSW status 3 MSB		definition of
		POSW status 3 LSB		POSW status 4 MSB		POSW status, see
		POSW status 4 LSB		POSW health status MSB		AD 01 § A.4.7.
		POSW health status (middle word)				50
	51	POSW health status LSB		Control port		52
	53	Oversampled inv. TC count.		Oversampled inv. TC count.		
		Oversampled inv. TC count.		Oversampled inv. TC count.		
		Oversampled inv. TC count.		Oversampled inv. TC count.		
		Oversampled inv. TC count.		Oversampled inv. TC count.		
		Oversampled inv. TC count.		Oversampled inv. TC count.		
		Oversampled inv. TC count.		Oversampled inv. TC count.		
		Oversampled inv. TC count.		Oversampled inv. TC count.		
		Oversampled inv. TC count.		Oversampled inv. TC count.		68
46	69	46 spare bytes				114

126 bytes

a = 0 chain A
a = 1 chain B

NOTE: Parameters in Probe Status 1 to 7 are defined in AD01 (S-ICD) § A.4.3

5.2 HK 2 packet content

byte	byte index	MSB			LSB	byte index
6		0000	1111	10a0	0110	
		11	PKT SEQ CONT			
		length = 120 - 1				
6		MSW RT counter				
		LSB RT counter		MSB MT counter		
		LSW MT counter				
110	1	Probe temperature 1		Probe temperature 2		2
	3	Probe temperature 3		Probe temperature 4		
		Probe temperature 5		Probe temperature 6		
		Probe temperature 7		Probe temperature 8		
		Probe temperature 9		Probe temperature 10		10
	11	Probe temperature 11		Probe temperature 12		
		CDMU conv. temp. 1		CDMU conv. temp. 2		
		TUSO temperature 1		TUSO temperature 2		
		TUSO temperature 3		TX output power		
		TX power ampli temp		TX secondary supply volt		20
	21	battery 1 / 5 voltage		battery 2 / 4 voltage		
		battery 3 voltage		28 V CDMU pow. current		
		28 V TX power current		BDR 1 / 5 current		
		BDR 2 / 4 current		BDR 3 current		
		28 V GCMS 1 pow. cur.		28 V GCMS 2 pow. cur.		30
	31	28 V DISR 1 pow. current		28 V DISR 2 pow. current		
		28 V ACP 1 pow. current		28 V ACP 2 pow. current		
		28 V ACP 3 pow. current		28 V TUSO pow. current		
		28 V SSP pow. current		28 V HASI 1 pow. current		
		28 V HASI 2 pow. current		28 V Prox. Sens. pow. cur		40
	41	main bus voltage		HPA power supply voltage		
		CDMU A/D calibrat. 4V		CDMU A/D calibrat. 0.5V		
		CDMU A/D calibrat. 0.3V		CDMU supply voltage		

HK 2 packet content (cont'd)

		radial acc. (first acq.)	radial accelero value	
		radial accelero value	radial accelero value	*50*
	51	radial accelero value	radial accelero value	
		radial accelero value	radial accelero value	
		radial accelero value	radial accelero value	
		radial accelero value	radial accelero value	
		radial accelero value	radial accelero value	*60*
	61	radial accelero value	radial accelero value	
		radial accelero value	radial accelero value	
		radial accelero value	radial accelero value	
(110)		radial accelero value	radial accelero value	
		radial accelero value	radial accelero value	*70*
	71	radial accelero value	radial accelero value	
		radial accelero value	radial accelero value	
		radial accelero value	radial accelero value	
		radial accelero value	radial accelero value	
		radial accelero value	radial accelero value	*80*
	81	radial accelero value	radial accelero value	
		radial accelero value	radial accelero value	
		radial accelero value	radial accelero value	
		radial accelero value	radial accelero value	
		radial accelero value	radial accelero value	*90*
	91	radial accelero value	radial accelero value	
		radial accelero value	radial accelero value	
		radial accelero value	radial accelero value	
		radial accelero value	radial accelero value	
		radial accelero value	radial accelero value	*100*
	101	radial accelero value	radial accelero value	
		radial accelero value	radial accelero value	
		radial accelero value	radial accelero value	
		radial accelero value	radial accelero value	
		radial accelero value	radial acc. (last acq.)	*110*
04	*111*	4 spare bytes		*114*

126 bytes

a = 0 chain A
a = 1 chain B

5.3 HK 3 packet content

byte	*byte index*	MSB			LSB	*byte index*
		0000	1111	10a1	0111	
6		11	PKT SEQ CONT			
		length = 120 - 1				
6		MSW RT counter				
		LSB RT counter		MSB MT counter		
		LSW MT counter				
	1	DDB spin (first generat.)		DDB spin		
		DDB spin		DDB spin		
		DDB spin		DDB spin		
		DDB spin		DDB spin (last generat.)		
	9	DDB miss. ph. (1st gen.)		DDB mission phase		
	11	DDB mission phase		DDB mission phase		
		DDB mission phase		DDB mission phase		
		DDB mission phase		DDB miss. ph. (last gen.)		
	17	DDB altitude & flag F2 (first generated)				
		DDB altitude & flag F2				
	21	DDB altitude & flag F2				
		DDB altitude & flag F2				
		DDB altitude & flag F2				
		DDB altitude & flag F2				
96		DDB altitude & flag F2				
	31	DDB altitude & flag F2 (last generated)				
	33	DDB time & flag F1 (first generated)				
		DDB time & flag F1				
		DDB time & flag F1				
		DDB time & flag F1				
	41	DDB time & flag F1				
		DDB time & flag F1				
		DDB time & flag F1				
		DDB time & flag F1 (last generated)				

HK 3 packet content (cont'd)

(96)	*49*	Prox. Sens. N monit. (first acquired)	
	51	Prox. Sens. N monitoring	
		Prox. Sens. N monitoring	
		Prox. Sens. N monitoring	
		Prox. Sens. N monitoring	
		Prox. Sens. N monitoring	
	61	Prox. Sens. N monitoring	
		Prox. Sens. N monit. (last acquired)	
	65	Prox. Sens. R monit. (first acquired)	
		Prox. Sens. R monitoring	
		Prox. Sens. R monitoring	
	71	Prox. Sens. R monitoring	
		Prox. Sens. R monitoring	
		Prox. Sens. R monitoring	
		Prox. Sens. R monitoring	
		Prox. Sens. R monit. (last acquired)	
	81	coast timer 1 value	
		coast timer 2 value	
		coast timer 3 value	
	87	GCMS status	
	89	DISR status	
	91	ACP status	
	93	HASI status	
	95	SSP status	*96*
18	*97*	18 spare bytes	*114*

126 bytes

a = 0 chain A
a = 1 chain B

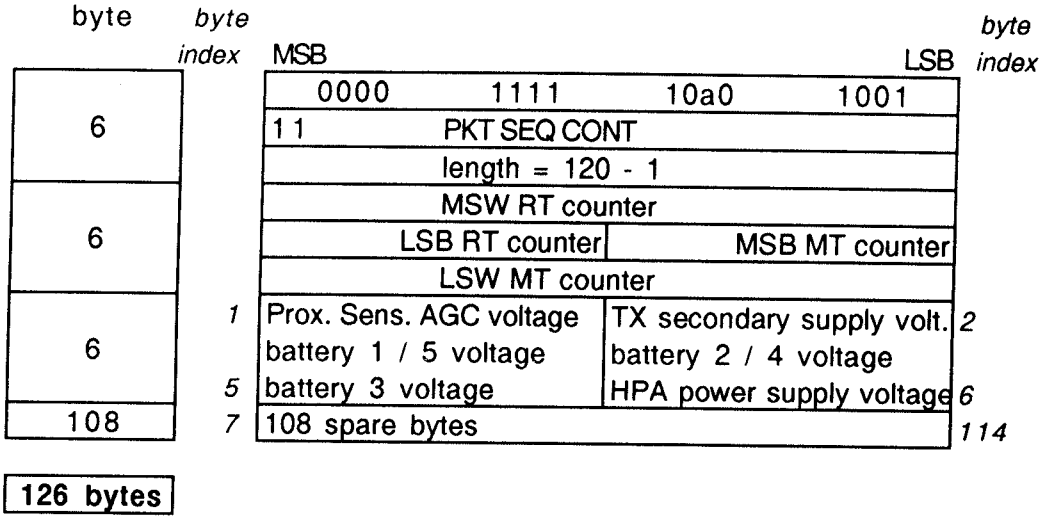
5.4 HK 4 packet content

byte	byte index	MSB		LSB	byte index
6		0000 1111 10a1 1000			
		11 PKT SEQ CONT			
		length = 120 - 1			
6		MSW RT counter			
		LSB RT counter	MSB MT counter		
		LSW MT counter			
48	1	central acc. 1 (first acq.)	central accelero 1 value		2
		central accelero 1 value	central accelero 1 value		
		central accelero 1 value	central accelero 1 value		
		central accelero 1 value	central accelero 1 value		
		central accelero 1 value	central accelero 1 value		
	11	central accelero 1 value	central accelero 1 value		
		central accelero 1 value	central accelero 1 value		
		central accelero 1 value	central acc. 1 (last acq.)		16
	17	central acc. 2 (first acq.)	central accelero 2 value		
		central accelero 2 value	central accelero 2 value		
	21	central accelero 2 value	central accelero 2 value		
		central accelero 2 value	central accelero 2 value		
		central accelero 2 value	central accelero 2 value		
		central accelero 2 value	central accelero 2 value		
		central accelero 2 value	central accelero 2 value		
	31	central accelero 2 value	central acc. 2 (last acq.)		32
	33	central acc. 3 (first acq.)	central accelero 3 value		
		central accelero 3 value	central accelero 3 value		
		central accelero 3 value	central accelero 3 value		
		central accelero 3 value	central accelero 3 value		
	41	central accelero 3 value	central accelero 3 value		
		central accelero 3 value	central accelero 3 value		
		central accelero 3 value	central accelero 3 value		
		central accelero 3 value	central acc. 3 (last acq.)		48
32	49/	16 words: T0/Ta G-switch 1&2 buffer (first acquisition at byte index 49)			/80
2	81	T0 G-switch Time-out counter			82
32	83	32 spare bytes			114

126 bytes

a = 0 chain A
a = 1 chain B

5.5 Report packet content

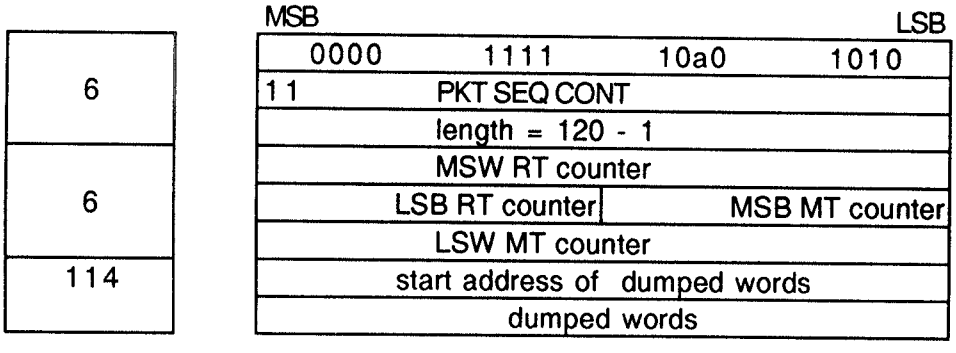


byte	byte index	MSB			LSB	byte index
6		0000	1111	10a0	1001	
		11	PKT SEQ CONT			
		length = 120 - 1				
6		MSW RT counter				
		LSB RT counter		MSB MT counter		
		LSW MT counter				
6	1	Prox. Sens. AGC voltage		TX secondary supply volt.		2
		battery 1 / 5 voltage		battery 2 / 4 voltage		
	5	battery 3 voltage		HPA power supply voltage		6
108	7	108 spare bytes				114

126 bytes

a = 0 chain A
a = 1 chain B

5.6 POSW dump packet content

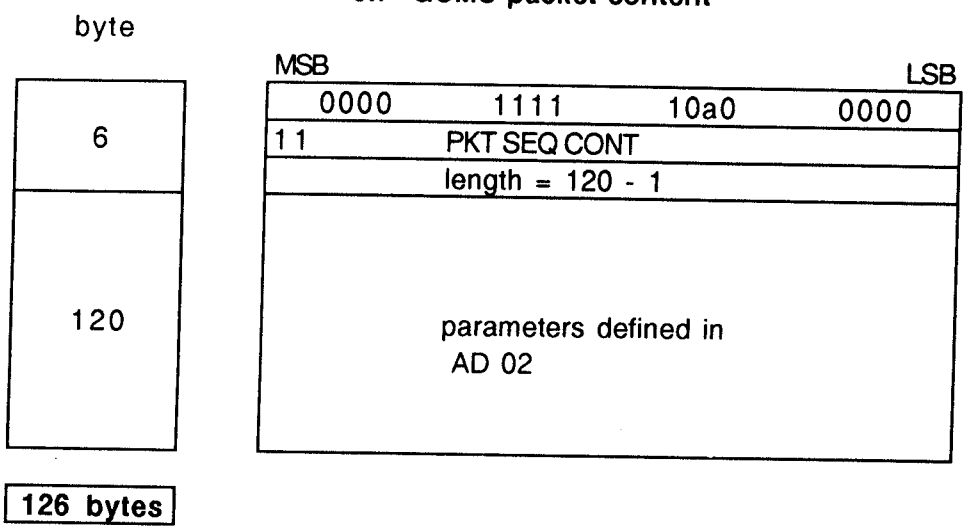


byte	MSB			LSB
6	0000	1111	10a0	1010
	11	PKT SEQ CONT		
	length = 120 - 1			
6	MSW RT counter			
	LSB RT counter		MSB MT counter	
	LSW MT counter			
114	start address of dumped words			
	dumped words			

126 bytes

a = 0 chain A
a = 1 chain B

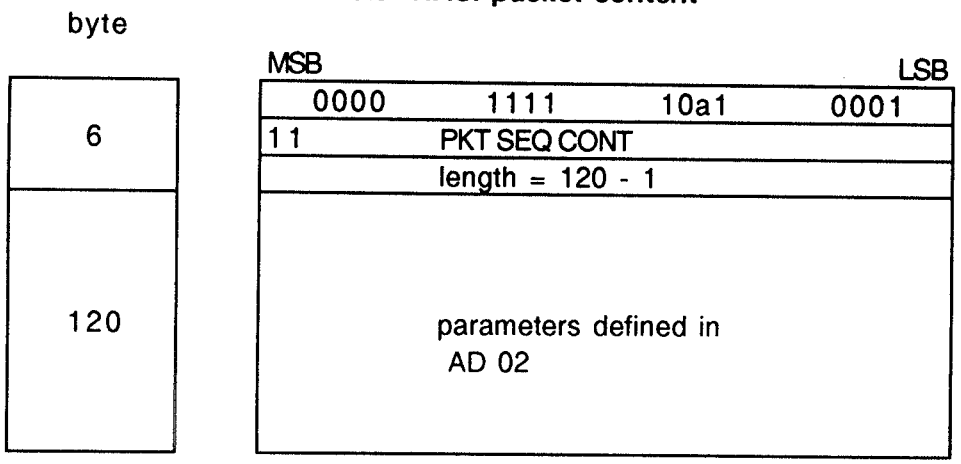
5.7 GCMS packet content



126 bytes

a = 0 chain A
a = 1 chain B

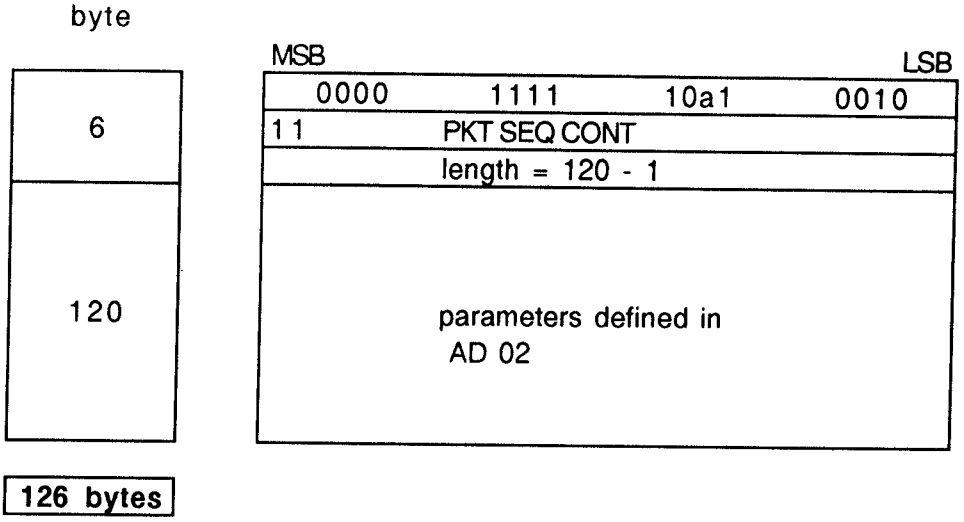
5.8 HASI packet content



126 bytes

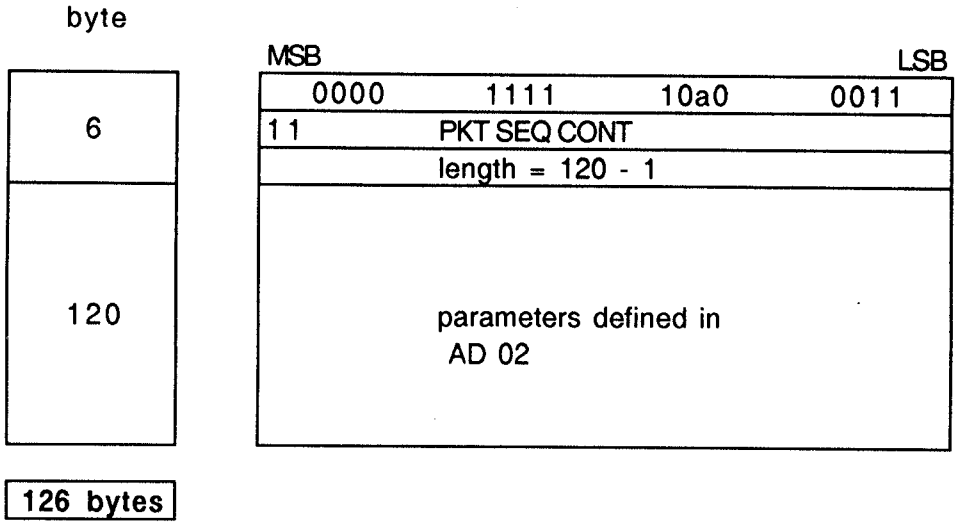
a = 0 chain A
a = 1 chain B

5.9 DISR packet content



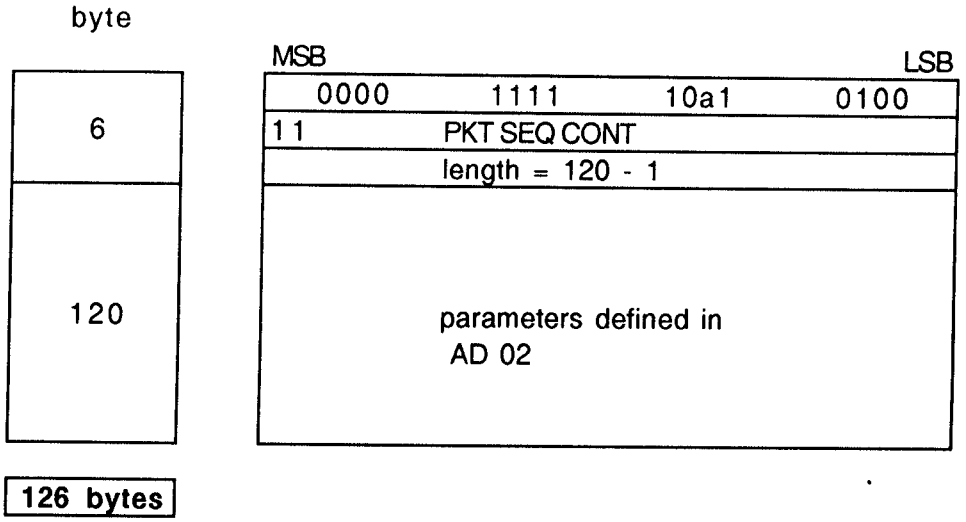
a = 0 chain A
a = 1 chain B

5.10 ACP packet content



a = 0 chain A
a = 1 chain B

5.11 SSP packet content



a = 0 chain A
a = 1 chain B

6. POLLING TABLES

(given for information only)

EPT 1 ACP 1 DISR 75 GCMS 15 HASI 14 SSP 3

n°	code	n°	code	n°	code	n°	code	n°	code	n°	code	n°	code	n°	code	n°	code
001	DISR	002	HASI	003	SSP	004	DISR	005	DISR	006	DISR	007	DISR	008	GCMS	009	HASI
010	DISR	011	DISR	012	DISR	013	DISR	014	DISR	015	GCMS	016	HASI	017	DISR	018	DISR
019	DISR	020	DISR	021	DISR	022	GCMS	023	HASI	024	DISR	025	DISR	026	DISR	027	DISR
028	DISR	029	GCMS	030	HASI	031	DISR	032	DISR	033	DISR	034	DISR	035	DISR	036	GCMS
037	HASI	038	DISR	039	SSP	040	DISR	041	DISR	042	DISR	043	GCMS	044	HASI	045	DISR
046	DISR	047	DISR	048	DISR	049	DISR	050	GCMS	051	HASI	052	DISR	053	DISR	054	DISR
055	DISR	056	DISR	057	GCMS	058	HASI	059	DISR	060	DISR	061	DISR	062	DISR	063	DISR
064	GCMS	065	HASI	066	DISR	067	DISR	068	DISR	069	DISR	070	DISR	071	GCMS	072	HASI
073	DISR	074	DISR	075	SSP	076	DISR	077	DISR	078	GCMS	079	HASI	080	DISR	081	DISR
082	DISR	083	DISR	084	DISR	085	GCMS	086	HASI	087	DISR	088	DISR	089	DISR	090	DISR
091	DISR	092	GCMS	093	HASI	094	DISR	095	DISR	096	DISR	097	DISR	098	DISR	099	GCMS
100	ACP	101	DISR	102	DISR	103	DISR	104	DISR	105	DISR	106	DISR	107	DISR	108	GCMS

EPT 2 ACP 2 DISR 74 GCMS 15 HASI 9 SSP 8

n°	code	n°	code	n°	code	n°	code	n°	code	n°	code	n°	code	n°	code	n°	code
001	GCMS	002	HASI	003	DISR	004	SSP	005	DISR	006	ACP	007	DISR	008	GCMS	009	DISR
010	DISR	011	DISR	012	DISR	013	DISR	014	HASI	015	GCMS	016	DISR	017	SSP	018	DISR
019	DISR	020	DISR	021	DISR	022	GCMS	023	DISR	024	DISR	025	DISR	026	HASI	027	DISR
028	DISR	029	GCMS	030	SSP	031	DISR	032	DISR	033	DISR	034	DISR	035	DISR	036	GCMS
037	DISR	038	HASI	039	DISR	040	DISR	041	DISR	042	DISR	043	GCMS	044	SSP	045	DISR
046	DISR	047	DISR	048	DISR	049	DISR	050	HASI	051	GCMS	052	DISR	053	DISR	054	DISR
055	DISR	056	DISR	057	SSP	058	GCMS	059	DISR	060	ACP	061	DISR	062	HASI	063	DISR
064	DISR	065	GCMS	066	DISR	067	DISR	068	DISR	069	DISR	070	SSP	071	DISR	072	GCMS
073	DISR	074	HASI	075	DISR	076	DISR	077	DISR	078	DISR	079	GCMS	080	DISR	081	DISR
082	DISR	083	SSP	084	DISR	085	DISR	086	HASI	087	GCMS	088	DISR	089	DISR	090	DISR
091	DISR	092	DISR	093	DISR	094	GCMS	095	DISR	096	SSP	097	DISR	098	HASI	099	DISR
100	DISR	101	GCMS	102	DISR	103	DISR	104	DISR	105	DISR	106	DISR	107	DISR	108	DISR

EPT 3 ACP 2 DISR 71 GCMS 15 HASI 9 SSP 11

n°	code	n°	code	n°	code	n°	code	n°	code	n°	code	n°	code	n°	code	n°	code
001	GCMS	002	HASI	003	DISR	004	DISR	005	DISR	006	ACP	007	DISR	008	GCMS	009	DISR
010	DISR	011	DISR	012	SSP	013	DISR	014	HASI	015	GCMS	016	DISR	017	DISR	018	DISR
019	DISR	020	DISR	021	SSP	022	GCMS	023	DISR	024	DISR	025	DISR	026	HASI	027	DISR
028	DISR	029	GCMS	030	SSP	031	DISR	032	DISR	033	DISR	034	DISR	035	DISR	036	GCMS
037	DISR	038	HASI	039	SSP	040	DISR	041	DISR	042	DISR	043	GCMS	044	DISR	045	DISR
046	DISR	047	DISR	048	SSP	049	DISR	050	HASI	051	GCMS	052	DISR	053	DISR	054	DISR
055	DISR	056	DISR	057	SSP	058	GCMS	059	DISR	060	ACP	061	DISR	062	HASI	063	DISR
064	DISR	065	GCMS	066	SSP	067	DISR	068	DISR	069	DISR	070	DISR	071	DISR	072	GCMS
073	DISR	074	HASI	075	SSP	076	DISR	077	DISR	078	DISR	079	GCMS	080	DISR	081	DISR
082	DISR	083	DISR	084	SSP	085	DISR	086	HASI	087	GCMS	088	DISR	089	DISR	090	DISR
091	DISR	092	DISR	093	SSP	094	GCMS	095	DISR	096	DISR	097	DISR	098	HASI	099	DISR
100	DISR	101	GCMS	102	SSP	103	DISR	104	DISR	105	DISR	106	DISR	107	DISR	108	DISR

7. TC PACKET STRUCTURE

Note 1 : TC packets have a maximum overall length of 256 bytes

Note 2 : On umbilical TC link (from PSA to CDMU),
TC packets are completed with "AAAA" hexa words,
in order to give them a constant length of 256 bytes.

7.1 EXPERIMENT TCs

byte

6
L - 2
2

(L+6) bytes

MSB			LSB
0001	s111	1 0	ID destination
11	PKT SEQ CONT		
length = L - 1			
data (L - 2 bytes)			
CRC word			

s = 0 : no secondary header in the packet
s = 1 : there is a secondary header in the packet
(bit "s" is defined at experiment level; see AD02)

DESTI-NATION	ID destination	
	channel A	channel B
GCMS	000000	100000
HASI	010001	110001
DISR	010010	110010
ACP	000011	100011
SSP	010100	110100

L is in bytes (L+6 < 256)

NOTE: DDB PACKET DEFINITION (same values as in § 8.7.1)

byte

6
6
2

MSB			LSB
0001	0111	1 0	ID destination
11	PKT SEQ CONT		
length = 7			
Flag F1 + Mission time			
Flag F2 + Altitude			
Spin		Mission phase	
CRC word			

ID destination	channel A	channel B
	001111	101111

This packet is generated by the CDMU and sent to each experiment through the ML16 hardware link used also for TCs

7.2 POSW DUMP TC

byte
6
2
4
2

MSB			LSB
0001	1111	10a0	0101
11	PKT SEQ CONT		
7			
0000	0000	0011	0000
number of packets		b000	0000
address of the first memory word to dump			
CRC word			

14 bytes

a = 0 chain A
a = 1 chain B

b = 0 dump the EEPROM
b = 1 dump the RAM

7.3 POSW INHIBITION TC

byte
6
2
2
2

0001	1111	10a0	0101
11	PKT SEQ CONT		
5			
0000	0000	1001	0000
0001	0001	0001	0001
CRC word			

12 bytes

a = 0 chain A
a = 1 chain B

Note : To help the reader to check his CRC algorithm, it is indicated that for this telecommand sent with a PKT SEQ CONT = 1, the CRC word shall be 316C for the chain A (a = 0) and 9690 for the chain B (the CRC value is in hexa)

7.4 CDMU DIRECT ON/OFF TCs

7.4.1 Duration : 13 ms

byte

6
2
4
2

MSB			LSB
0001	1111	10a0	0101
11	PKT SEQ CONT		
7			
0000	0000	0110	0000
0000	0000	0100	0000
0000	0000	00 TC @	
CRC word			

NOTE: "TC @" is given in § 2.1 "direct TC list"

14 bytes

a = 0 chain A
a = 1 chain B

7.4.2 Duration : 45 ms

byte

6
2
4
2

0001	1111	10a0	0101
11	PKT SEQ CONT		
7			
0000	0000	0110	0000
0000	0000	1000	0000
0000	0000	00 TC @	
CRC word			

NOTE: "TC @" is given in § 2.1 "direct TC list"

14 bytes

a = 0 chain A
a = 1 chain B

7.5 CDMU DIRECT ML 16 TCs

byte
6
2
4
2

MSB			LSB
0001	1111	10a0	0101
11	PKT SEQ CONT		
7			
0000	0000	0110	0000
0000	0000	1100	TC @
16 bits data of the memory load			
CRC word			

NOTE: "TC @" is given in § 2.1 "direct TC list"

14 bytes

a = 0 chain A
a = 1 chain B

7.6 POSW SUSPEND TC

byte
6
2
4
2

0001	1111	10a0	0101
11	PKT SEQ CONT		
7			
0000	0000	1100	0000
0000	0000	Byte not used by POSW	
Word not used by POSW			
CRC word			

14 bytes

a = 0 chain A
a = 1 chain B

7.7 POSW RESUME TC

byte	MSB			LSB
6	0001	1111	10a0	0101
2	11	PKT SEQ CONT		
	7			
4	0000	0000	1100	0000
	1b00	0000	MT count value MSB	
	MT counter value LSW			
2	CRC word			

14 bytes

a = 0 chain A
a = 1 chain B

b = 0 pre-To MTT to resume
b = 1 post-To MTT to resume

7.8 POSW ALTERATION TC

byte				
6	0001	1111	10a0	0101
	11	PKT SEQ CONT		
	5			
2	0000	0000	1010	0000
2	b000	0000	value of alteration	
2	CRC word			

12 bytes

a = 0 chain A
a = 1 chain B

b = 0 DDB spin to alter
b = 1 DDB mission phase to alter
value of alteration refer to S-ICD § A.3.6

A.3 Interface data for the POSW

nota: refer to [POSW_SRD] for the way of using these data

A.3.1 Telecommand packets identifiers

<1> The TC packets ID are given herebelow:
780h=>GCMS_A , 7A0h=>GCMS_B , 791h=>HASI_A , 7B1h=>HASI_B,
792h=>DISR_A , 7B2h=>DISR_B , 783h=>ACP_A , 7A3h=>ACP_B ,
794h=>SSP_A , 7B4h=>SSP_B , 785h=>CDMU_A , 7A5h=>CDMU_B

A.3.2 Telemetry packets identifiers

<1> The TM packets ID are given herebelow:
780h=>GCMS_A , 7A0h=>GCMS_B , 791h=>HASI_A , 7B1h=>HASI_B ,
792h=>DISR_A , 7B2h=>DISR_B , 783h=>ACP_A , 7A3h=>ACP_B ,
794h=>SSP_A , 7B4h=>SSP_B , 785h=>CDMU_A_HK1 , 7A5h=>CDMU_B_HK1 ,
786h=>CDMU_A_HK2 , 7A6h=>CDMU_B_HK2 , 797h=>CDMU_A_HK3 , 7B7h=>CDMU_B_HK3 ,
798h=>CDMU_A_HK4 , 7B8h=>CDMU_B_HK4 , 789h=>CDMU_A_REPORT, 7A9h=>CDMU_B_REPORT,
78Ah=>CDMU_A_DUMP, 7AAh=>CDMU_B_DUMP

A.3.3 Descent Data Broadcast packets identifiers

<1> The DDB packet ID are: 78Fh=>CDMU_A, 7AFh=>CDMU_B

A.3.4 Transfer frames identifiers

<1> The TM frame ID (also called Spacecraft ID) are: 0B7h=>CDMU_A, 0B9h=>CDMU_B

A.3.5 Telecommand type identifiers

<1> The TC type ID are given herebelow:
0011b=>DUMP_TC , 0101b=>PATCH_TC , 0110b=>DIRECT_TC
1001b=>INHIBITION_TC , 1010b=>ALTERATION_TC , 1100b=>SUSPEND_RESUME_TC,
1111b=>LOAD_MTT_TC

A.3.6 Descent Data Broadcast Mission Phase values

<1> The DDB Mission Phase values are given herebelow:
00h=>ENTRY_DESCENT , 03h=>GROUND_C_O , 0Ch=>GROUND_C_O_SUSPENDED
0Fh=>GROUND_C_O_DE_ACTIVATE , F3h=>FLIGHT_C_O , FCh=>FLIGHT_C_O_SUSPENDED
FFh=>FLIGHT_C_O_DE_ACTIVATE
comment the value for the case 'ENTRY_DESCENT' is the default value

A.3.7 Data for the Experiments Polling Tables

<1> The data for the Experiments Polling Table 1 (EPT1) are given herebelow:
001=>DISR, 002=>HASI, 003=>SSP , 004=>DISR, 005=>DISR, 006=>DISR,
007=>DISR, 008=>GCMS, 009=>HASI, 010=>DISR, 011=>DISR, 012=>DISR, 013=>DISR
014=>DISR, 015=>GCMS, 016=>HASI, 017=>DISR, 018=>DISR, 019=>DISR, 020=>DISR
021=>DISR, 022=>GCMS, 023=>HASI, 024=>DISR, 025=>DISR, 026=>DISR, 027=>DISR
028=>DISR, 029=>GCMS, 030=>HASI, 031=>DISR, 032=>DISR, 033=>DISR,
034=>DISR, 035=>DISR, 036=>GCMS, 037=>HASI, 038=>DISR, 039=>SSP , 040=>DISR
041=>DISR, 042=>DISR, 043=>GCMS, 044=>HASI, 045=>DISR, 046=>DISR, 047=>DISR
048=>DISR, 049=>DISR, 050=>GCMS, 051=>HASI, 052=>DISR, 053=>DISR, 054=>DISR
055=>DISR, 056=>DISR, 057=>GCMS, 058=>HASI, 059=>DISR, 060=>DISR,
061=>DISR, 062=>DISR, 063=>DISR, 064=>GCMS, 065=>HASI, 066=>DISR, 067=>DISR
068=>DISR, 069=>DISR, 070=>DISR, 071=>GCMS, 072=>HASI, 073=>DISR, 074=>DISR
075=>SSP , 076=>DISR, 077=>DISR, 078=>GCMS, 079=>HASI, 080=>DISR, 081=>DISR
082=>DISR, 083=>DISR, 084=>DISR, 085=>GCMS, 086=>HASI, 087=>DISR,
088=>DISR, 089=>DISR, 090=>DISR, 091=>DISR, 092=>GCMS, 093=>HASI, 094=>DISR
095=>DISR, 096=>DISR, 097=>DISR, 098=>DISR, 099=>GCMS, 100=>ACP , 101=>DISR
102=>DISR, 103=>DISR, 104=>DISR, 105=>DISR, 106=>DISR, 107=>DISR, 108=>GCMS

7.9 POSW PATCH TC

byte
6
2
6
L - 12
2
2

(L+6) bytes
(< 256)

MSB			LSB
0001	1111	10a0	0101
11	PKT SEQ CONT		
	length = L - 1		
0000	0000	0101	0000
00 offset in EEPROM to load the patch			
RAM start addr. that patch is destined for			
RAM end address that patch is destined for			
Patch words			
Patch CRC check-sum			
CRC word			

L is in bytes

a = 0 chain A
a = 1 chain B

7.10 SASW DUMP TC

byte
6
2
4
2

14 bytes

0001	1111	10a0	1100
11	PKT SEQ CONT		
	7		
0000	0000	0011	0000
number of packets		b000	0000
address of the first memory word to dump			
CRC word			

a = 0 chain A
a = 1 chain B

b = 0 dump the EEPROM
b = 1 dump the RAM

7.11 SASW inhibition TC

byte
6
2
2
2

12 bytes

MSB			LSB
0001	1111	10a0	1100
11	PKT SEQ CONT		
	5		
0000	0000	1001	0000
0001	0001	0001	0001
CRC word			

a = 0 chain A
a = 1 chain B

7.12 PSA direct ON/OFF TC

byte				
6	0001	1111	10a0	1100
	11	PKT SEQ CONT		
		5		
2	0000	0000	0110	0000
2	0000	0000	0000	TC @
2		CRC word		

a = 0 chain A
a = 1 chain B

14 bytes

NOTE: "TC @" is given in § 2.1 "direct TC list"

7.13 SASW alteration TC

byte	MSB			LSB
6	0001	1111	10a0	1100
	11	PKT SEQ CONT		
		5		
2	0000	0000	1010	0000
2	0000	0000	000 b	!b b !b a
2		CRC word		

a = 0 chain A
a = 1 chain B

12 bytes

NOTE: !b = binary complement of bit "b"

b=0 : selection of the receiver basic frequency
b = 1 : selection of the receiver Doppler shifted frequency

7.14 SASW PATCH TC

byte	MSB			LSB
6	0001	1111	10a0	1100
2	11	PKT SEQ CONT		
	length = L - 1			
6	0000	0000	0101	0000
	000	offset in EEPROM area to load patch		
	RAM start address that patch is destined for			
	RAM end address that patch is destined for			
L - 12	Patch words			
2	Patch CRC check-sum			
2	CRC word			

a = 0 chain A
a = 1 chain B

(L+6) bytes
(< 256)
L is in bytes

7.15 POSW LOAD MTT TC

byte	MSB			LSB
6	0001	1111	10a0	0101
2	11	PKT SEQ CONT		
	length = 59			
8	0000	0000	1111	0000
	(A1) 8 MTT descriptor addresses (1 byte each) (A8)			
48	8 MTT descriptors (3 words each)			
2	CRC word			

a = 0 chain A
a = 1 chain B

66 bytes

8. DETAILED DEFINITION OF TMs

(for information only)

8.1 BILEVEL STATUS

REF TM	0 LEVEL	1 LEVEL
D1 006 B	correct	failed
D1 007 B	failed	correct
D1 010 B	TA not detected	TA detected
D2 006 B	correct	failed
D2 007 B	failed	correct
D2 010 B	TA not detected	TA detected
D6 007 B	MTU 1 non powered	MTU 1 is powered
D6 008 B	MTU 2 non powered	MTU 2 is powered
E6 004 B	TUSO not locked	frequency stable
E6 008 B	TUSO not locked	frequency stable
E7 003 B (*)	RUSO not locked	frequency stable
P3 004 to 016 B	squib not selected	squib selected
P4 004 to 016 B	squib not selected	squib selected
P5 036 to 049 B	current limiter off	current limiter on
P5 064 to 077 B	current limiter off	current limiter on
R1 006 B	TCXO off or invalid	TCXO valid
R2 006 B	TCXO off or invalid	TCXO valid
R5 015 B	correct (chain A)	error (chain B)
R6 013 B	error (chain A)	correct (chain B)

(*) NOTE :	This TM is acquired as an analog byte by PSA The threshold is to be applied on ground equipment:
for E7 003 B :	0 state: byte < 0D hexa 1 state: byte > 3C hexa (ADC calibration is FFh = 10.24 Volts)

8.2 ANALOG TMs

Conversion algorithm between the physical measured value and the reported TM byte:

ADC calibrations:	- for CDMU: FFh = 5.12 Volts (± 1 %) - for PSA: FFh = 10.24 Volts

Let "S" be the scale factor from the column "CURVE" in the following tables:

physical value = TM voltage / S

For Probe TMs: physical value = (byte value / 256) * 5.12 / S
For PSE TMs: physical value = (byte value / 256) * 10.24 / S

NOTE: For P5 002A to P5 007A (battery voltage), when a section is powered by Orbiter, the corresponding TM shows a voltage increasing with PCDU temperature. The equivalent Battery voltage doubles for every 10°C increment up to around 10 V at 55 °C

ANALOG TMs (§8.2 CONT'D)

NOTE: The following calibration are typical design values:
see ADP of each unit for precise calibrations.

REF TM	CURVE (TM volt./parameter)	NOMINAL DIGITAL VALUE (at ± 2 LSB) MIN (≥ 0)	MAX (≤255)
D1 002 A	0.683 V/V	153 (4,48 V)	180 (5.27 V)
D1 003 A	1 V/V	226	228 (227=4.548 V)
D1 004 A	1 V/V	15-1	15+1 (15=300 mV)
D1 005 A	1 V/V	25-1	25+1 (25=500 mV)
D2 002 A	0.683 V/V	153	180
D2 003 A	1 V/V	226	228 (227=4.548 V)
D2 004 A	1 V/V	15-1	15+1 (15=300 mV)
D2 005 A	1 V/V	25-1	25+1 (25=500 mV)
D3 005 A	1 V/V	30 (0.6 V)	160 (3.2 V)
D4 005 A	1 V/V	50 (0.1 V)	160 (3.2 V)
D7 001 to 006 A	0.512 V/g	0	255
D8 001 & 002 A	42.67 V/g	0	255
D8 004 & 005 A	42.67 V/g	0	255
P5 002 to 007 A	0.0813 V/V +/-0.5 %	108 (35 V)	239 (78 V)
P5 008 & 013 A	1.0 V/A +/- 5 %	0	115 (2.3 A) with 5 BDR
P5 009 to 012 A	1.0 V/A +/- 5 %	0	105 (2.1 A) with 5 BDR
P5 020 & 021 A	0.165 V/V +/-0.9%	227 (27.5 V)	238 (28.9 V)
P5 022 to 035 A (1)	5V +/-10% for I=I limit	0 (0 % of I limit)	250 (100% I limit)
P5 050 to 063 A (1)	5V +/-10% for I=I limit	0 (0 % of I limit)	250 (100% I limit)
R1 002 A	see annex: curve (10)	*depend on TX unit: see annex*	
R1 003 A	see annex: curve (5)	see curves (for 65°C)	see curves (for -30°C)
R1 004 A	0.4 V/V	240 - 11 (11.4 V)	240 + 11 (12.5 V)
R1 007 A	0.5 V/V	187 - 9 (7.1 V)	187 + 9 (7.8 V)
R2 002 A	see annex: curve (10)	*depend on TX unit: see annex*	
R2 003 A	see annex: curve (5)	see curves (for 65°C)	see curves (for -30°C)
R2 004 A	0.4 V/V	240 - 11	240 + 11
R2 007 A	0.5 V/V	187 - 9	187 + 9
R3 002 A	0.382 V/V	PSA: 103 (10.8 V)	127 (13.2 V)
R4 002 A	0.382 V/V	PSA: 103	127
R5 007 A	0.91 V/V	PSA: 107 (4.7 V)	120 (5.3 V)
R5 008 A	0.4 V/V	PSA: 113 (11.3 V)	127 (12.7 V)
R6 007 A	0.91 V/V	PSA: 107 (4.7 V)	120 (5.3 V)
R6 008 A	0.4 V/V	PSA: 113 (11.3 V)	127 (12.7 V)

ma 1V for next issue

NOTE (1):
- See PCDU log book for each model to get more precise values;
- calibration is different for the TM P5 026 A: the sum of GCMS 2 nominal and redundant currents is reported

REF TM (note 2)	CURVE (TM volt./parameter)	DIGITAL VALUE (at ± 2 LSB) nominal MEAN value	NEVER EXCEED value
E6 001 A	see annex: curve (4)	160 (113°C +3/-1)	237 (120°C)
E6 002 & 003 A	see annex: curve (3)	165 (75°C +3/-1)	235 (80°C)
E6 005 A	see annex: curve (4)	160 (113°C +3/-1)	237 (120°C)
E6 006 & 007 A	see annex: curve (3)	165 (75°C +3/-1)	235 (80°C)
E7 001 A	see annex: curve (4)	PSA: 80 (113°C +3/-1)	118 (120°C)
E7 002 A	see annex: curve (3)	PSA: 82 (75°C +3/-1)	117 (80°C)
E7 004 A	see annex: curve (3)	PSA: 62 (72°C +3/-1)	117 (80°C)

NOTE (2): See Experiment TM/TC data table for details
Only the "NEVER exceed "values shall be monitored at DASA

8.3 RELAY STATUS

REF TM	0 LEVEL	1 LEVEL
D1 011 R	acceleration below 12 m/s2	accelerat. above 25 m/s2
D1 012 R	acceleration below 55 m/s2	acceleration above 62 m/s2
D2 011 R	acceleration below 12 m/s2	accelerat. above 25 m/s2
D2 012 R	accoleration below 55 m/s2	acceleration above 62 m/s2
E2 003 R	launch position	boom deployed
E2 004 R	launch position	boom deployed
P3 001 R	both relays open	at least one relay closed
P3 002 R	closed (= power ON)	open
P3 003 R	all relays open	at least one relay closed
P4 002 R	closed (= power ON)	open
P5 001 R	all relays open	at least one relay closed
P5 014 to 016 R	closed (= power ON)	open
P5 018 & 019 R	closed (= power ON)	open
P5 078 & 079 R	closed (= power ON)	open
P5 081 R	closed (= power ON)	open
P5 082 R	all relays open	at least one relay closed
R1 005 R	TCXO selected	TUSO selected
R2 005 R	TCXO selected	nothing selected
R5 013 R	RUSO not powered	RUSO powered
R5 014 R	RUSO selected	TCXO selected
R6 014 R	TCXO not selected	TCXO selected

8.4 TEMPERATURE

REF TM	CURVE	NOMINAL VALUE	
		MIN	MAX
D1 008 T	note 1	ambiant T° +5° C	(+/- 5° C)
D1 009 T	note 1	ambiant T° +5° C	(+/- 5° C)
D2 008 T	note 1	ambiant T° +5° C	(+/- 5° C)
D2 009 T	note 1	ambiant T° +5° C	(+/- 5° C)
D5 001 to 004 T	note 1	- 80°C	+ 90°C
D5 005 to 010 T	note 1	- 30°C	+ 70°C
D5 011 to 016 T	note 1	- 80°C	+ 90°C
D5 017 to 022 T	note 1	- 30°C	+ 70°C
D5 023 to 024 T	note 1	- 80°C	+ 90°C
M1 001 to 004 T	see annex: curve (2)	- 80°C	+ 90°C
R3 003 T	see annex: curve (8)	- 40°C	+ 70°C
R4 003 T	see annex: curve (8)	- 40°C	+ 70°C
R5 010 T	see annex: curve (6)	20 LSB (0.82 V; 60°C)	111 LSB (4.46 V)
R5 011 T	see annex: curve (9)	deleted	
R6 010 T	see annex: curve (6)	20 LSB (0.82 V; 60°C)	111 LSB (4.46 V)
R6 011 T	see annex: curve (9)	deleted	
T 001 T	see annex: curve (2)	- 30°C	+ 70°C
T 002 T	see annex: curve (2)	- 30°C	+ 70°C

note 1: see calibration curve (1), given in annex (byte value)

8.5 DS 16 telemetries

D3 001 S, D3 002 S, D4 001 S & D4 002 S Proximity sensor monitoring

TM ref.	sub ref	description	length	position	value description	sub MNEMO
D3 001 S	A	altitude data	15	15-01	LSB = 1 meter	RAUAALTIN
	B	lock status	1	00	0: locked; 1: unlocked	RAUALOCKN
D3 002 S	A	altitude data	15	15-01	LSB = 1 meter	RAUAALTIR
	B	lock status	1	00	0: locked; 1: unlocked	RAUALOCKR
D4 001 S	A	altitude data	15	15-01	LSB = 1 meter	RAUBALTIN
	B	lock status	1	00	0: locked; 1: unlocked	RAUBLOCKN
D4 002 S	A	altitude data	15	15-01	LSB = 1 meter	RAUBALTIR
	B	lock status	1	00	0: locked; 1: unlocked	RAUBLOCKR

D6 001 to 006 S coast timer value

1LSB = 32 s; min = 0 s

NOTE : For experiment status (following DS 16), see the experiment TM/TC data table (AD 02)

E1 002 S & E1 003 S	GCMS status
E2 002 S & E2 005 S	HASI status
E3 002 S & E3 003 S	DISR status
E4 002 S & E4 005 S	ACP status
E5 002 S & E5 003 S	SSP status

8.6 DATA READY

REF TM	0 LEVEL	1 LEVEL
E1 005 to 006 D	exp. not ready	experiment ready
E2 007 to 008 D	exp. not ready	experiment ready
E3 005 to 006 D	exp. not ready	experiment ready
E4 007 to 008 D	exp. not ready	experiment ready
E5 005 to 006 D	exp. not ready	experiment ready

8.7 SOFTWARE PARAMETERS

8.7.1 POSW parameters

8.7.1.1 8bits parameters

CDMU init status

TM ref.	sub ref	description	length	position	value description
S1 010 H or S2 010 H	A	OBDH health	1	7	1: healthy 0: unhealthy
	B	DMA health	1	6	
	C	RAM health	1	5	
	D	PROM health	1	4	
	E	EEPROM health	1	3	
	F	CDMU clean power up	1	2	1: 'clean' power up
	G	spare	1	1	-
	H	spare	1	0	-

Control port

TM ref.	sub ref	description	length	position	value description
S1 013 H or S2 013 H	A	spare	1	7	-
	B	spare	1	6	-
	C	Processor valid port	1	5	0: not valid
	D	CDMU chain status	1	4	0: chain A; 1: chain B
	E	TM FIFO full	1	3	0: full
	F	TM FIFO empty	1	2	0: empty
	G	TC FIFO full	1	1	0: full
	H	TC FIFO empty	1	0	0: empty

DDB spin S1 011 H or S2 011 H:

8 bits: 1LSB= 0.10 rpm = 0.0105 rad/s; 0 to 25.5 rpm

DDB mission phase

TM ref.	sub ref	description	length	position	value description
S1 012 H or S2 012 H	-	DDB mission phase	8	-	00h: entry descent 03h: ground c. o. 0Ch: ground c. o. suspended 0Fh: ground c.o. de activate F3h: flight c. o. FCh: flight c. o. suspended FFh: flight c. o. de activate

8.7.1.2 16 bits parameters

T0 G-switch Time-out A counter (S1 025 W & S2 025 W)

16 bits; 1 LSB = 1 cut = 0.125 seconds;
0000h: entry not detected by T0 G-switches (12 m/s2 falling threshold not passed)
t = 19 s: entry detected first by T0 g-switch back-up
0 < t <19 s: if frozen, T0 detected from CASU data

T0/Ta G-switch 1&2 buffer

TM ref.	sub ref	description	length	position	value description
S1 024 W or S2 024 W	A	oversampled D'x' 011 R (T0/Ta G-switch 1 stat.)	8	15 to 8	*(bit 15 = first acquired status)* 00h: 8 meas. below 12 m/s2 FFh: 8 meas. above 25 m/s2 other: transient: switching if frequent: failed
	B	oversampled D'x' 012 R (T0/Ta G-switch 2 stat.)	8	7 to 0	*(bit 7 = first acquired status)* 00h: 8 meas. below 54 m/s2 FFh: 8 meas. above 62 m/s2 other: -transient: switching if frequent: failed

DDB altitude + F2; DDB time + F1

TM ref.	sub ref	description	length	position	value description	sub MNEMO
S1 013 W	A	DDB altitude	15	14-00	LSB = 10 meters	PDDBALTIA
	B	DDB flag F2	1	15	0: RAU altit; 1: TAT altit	PDDBF2A
S1 014 W	A	DDB time	14	13-00	bits 17-04 of MT counter	PDDBTIMEA
	B	DDB flag F1	2	15-14	01: beforeT0; 10: after T0	PDDBF1A
S2 013 W	A	DDB altitude	15	14-00	LSB = 10 meters	PDDBALTIB
	B	DDB flag F2	1	15	0: RAU altit; 1: TAT altit	PDDBF2B
S2 014 W	A	DDB time	14	13-00	bits 17-04 of MT counter	PDDBTIMEB
	B	DDB flag F1	2	15-14	01: beforeT0; 10: after T0	PDDBF1B

NOTE: DDB time LSB is 2 sec.

SRS word (change of PYRO selection relay status) : bit = 1: squib has been selected since the last acquisition of SRS

TM ref.	position	MSB description		position	LSB description	
S1 015 W or S2 015 W (MSB from HK1 Probe status 3)	15	PDD	LSB from HK1 Probe status 2 byte	07	GCMS in	bits (11) to (08) are not to be used
	14	PAR J1		06	GCMS out	
	13	PAR J2		05	BC1	
	12	PAR J3		04	BC2	
	(11)	*HASI 1N PCDU output*		03	BC3	
	(10)	*SSP N PCDU output*		02	FS1	
	(09)	*DISR 2N PCDU output*		01	FS2	
	(08)	*ACP 2N PCDU output*		00	FS3	

CPU fault register (compliant MIL-STD 1750-A)

TM ref.	sub ref	description	length	position	value description
S1 016 W or S2 016 W	A	memory protect error	1	15	each bit: 0: OK, 1: fault
	B	DMA protect error	1	14	
	C	memory parity error	1	13	
	D	I/O parity error	1	12	
	E	DMA parity error	1	11	
	F	ext.ad.err/bus timeout	1	10	
	G	I/O transfer error	1	09	
	H	user fault	1	08	
	I	ext.ad.err/bus timeout	1	07	
	J	illegal instruction opcode	1	06	
	K	priviledged instruction	1	05	
	L	unimplemented ad. state	1	04	
	M	> reserved <	1	03	-
	N	fail code	3	02-00	0: OK; >0: fault

POSW health MSW

TM ref.	sub ref	description	length	position	value description
S1 023 W or S2 023 W	A	init mode	1	15	each bit: 0: healthy; 1: unhealthy
	B	RTI interrupt processing	1	14	
	C	RTI detection	1	13	
	D	MIssion time increment.	1	12	
	E	tr. frame to TM FIFO	1	11	
	F	T0 algorithm processing	1	10	
	G	Mission time resetting	1	09	
	H	MTT table switch	1	08	
	I	Altit. algor. descent pr.	1	07	
	J	T0 detection handshake	1	06	
	K	MTT table processing	1	05	
	L	Spin algorithm process.	1	04	
	M	Altimeter algorithm pr.	1	03	
	N	DDB data col.& TC form.	1	02	
	O	DDB emission	1	01	
	P	housekeeping acquisition	1	00	

POSW health LSW

TM ref.	sub ref	description	length	position	value description
S1 022 W or S2 022 W	A	TM packet algorithm	1	15	each bit: 0: healthy; 1: unhealthy
	B	HK packet issue & clear	1	14	
	C	Exper.packet acquisition	1	13	
	D	Report packet generation	1	12	
	E	tr.frame to TM RAM	1	11	
	F	TC processing	1	10	
	G	HK dump packet issue	1	09	
	H	EDAC 2 errors monitor.	1	08	
	I	POSW performance proc.	1	07	
	J	Interrupt re-enabling	1	06	
	K	Watchdog timer resett.	1	05	
	L	Interrupt mask applic.	1	04	
	M	CUT overrun	1	03	
	N	Cyclic scheduler	1	02	
	O	T0 actions	1	01	
	P	interrupt routines	1	00	

8.7.2 SASW parameters

8.7.2.1 8 bits parameters

PSA INIT STATUS

TM ref.	sub ref	description	length	position	value description
A1 008 H or A2 008 H	A	DMA	1	7	0: unhealthy; 1: healthy
	B	PROM	1	6	
	C	RAM	1	5	
	D	EEPROM	1	4	
	E	BIU RAM	1	3	
	F	spare	1	2	-
	G	spare	1	1	-
	H	spare	1	0	-

status EDAC register LSB

TM ref.	sub ref	description	length	position	value description
A1 007 H or A2 007 H	A	non used	6	2-7	-
	B	memory double error	1	1	0: none
	C	memory single error	1	0	0: none

= 256 — 1111 1111 | 1111 1100 — F F | F C — = 252 → ok

252 = FC = 1111 1100 = No Error
253 = FD = 1111 1101 = Memory Single Error
254 = FE = 1111 1110 = Memory Double Error

8.7.2.2 16 bits parameters

CPU fault register (compliant MIL-STD 1750-A)

TM ref.	sub ref	description	length	position	value description
A1 001 W or A2 001 W	A	memory protect error	1	15	each bit: 0: OK, 1: fault
	B	DMA protect error	1	14	
	C	memory parity error	1	13	
	D	I/O parity error	1	12	
	E	DMA parity error	1	11	
	F	ext.ad.err/bus timeout	1	10	
	G	I/O tranfer error	1	09	
	H	user fault	1	08	
	I	ext.ad.err/bus timeout	1	07	
	J	illegal instruction opcode	1	06	
	K	priviledged instruction	1	05	
	L	unimplemented ad. state	1	04	
	M	> reserved <	1	03	-
	N	fail code	3	02-00	0: OK; >0: fault

SASW health status MSW

TM ref.	sub ref	description	length	position	value description
A1 004 W or A2 004 W	A	SASW initialisation	1	15	each bit: 0: healthy; 1: unhealthy
	B	CPU initialisation	1	14	
	C	MEM OPS initialisation	1	13	
	D	BIU Handler initialisation	1	12	
	E	PROBE FRAMES init.	1	11	
	F	DMA init	1	10	
	G	TM OUTPUT init.	1	09	
	H	TC init.	1	08	
	I	HK TM init.	1	07	
	J	BIU RTI arrived	1	06	
	K	BIU HK	1	05	
	L	gen. HK TM packet	1	04	
	M	Handle TC	1	03	
	N	Detect BIU DTSTART	1	02	
	O	BIU DTSTART	1	01	
	P	Controller loop	1	00	

SASW health status LSW

TM ref.	sub ref	description	length	position	value description
A1 003 W or A2 003 W	A	BIU int. status register	1	15	each bit: 0: healthy; 1: unhealthy
	B	FDI int. status register	1	14	
	C	DMA int. status register	1	13	
	D	internal status register	1	12	
	E	ADA start up init.	1	11	
	F	startup wait for timer B	1	10	
	G	start up patch RAM	1	09	
	H	start up extra activities	1	08	
	I	set BIU reg.	1	07	
	J	init mission	1	06	
	K	record stack HWM	1	05	
	L	record CUT free time	1	04	
	M	control mask int.	1	03	
	N	spare	1	02	-
	O	spare	1	01	-
	P	spare	1	00	-

PSA receiver HK word 1

TM ref.	sub ref	description	length	position	value description
R5 001 S or R6 001 S	A	HK word identifier	3	15-13	always 000
	B	subcarrier lock status	1	12	1: locked
	C	FFT result	1	11	1: FFT threshold passed
	D	sel. frequency channel	1	10	1: Doppler freq. selected
	E	carrier lock status	1	09	1: locked
	F	Viterbi data decoder st.	1	08	0: status not OK (1)
	G	NCO control word LSB	8	07-00	bits 7-0 (1 LSB=0.0484Hz) (2) (3)

(1) This bit is meaningful only when RSW=6 (R5 003S-D or R6 003S-D):
For the other RSW values, it shows "0" (default value)

DONE

PSA receiver HK word 2

R5003A 6
R6003A

TM ref.	sub ref	description	length	position	value description
R5 002 S or R6 002 S	A	HK word identifier	3	15-13	always 001
	B	synchro marker status	1	12	1: locked
	C	background RAM test	1	11	1: passed
	D	processor test	1	10	1: passed
	E	receiver PROM test	1	09	1: passed
	F	receiver RAM test	1	08	1: passed
	G	NCO control w. (byte 2)	8	07-00	bits 15-08 (2) (3)

PSA receiver HK word 3

TM ref.	sub ref	description	length	position	value description
R5 003 S or R6 003 S	A	HK word identifier	3	15-13	always 010
	B	PSA identifier	1	12	0: PSA A; 1: PSA B
	C	software squelch status	1	11	1: active
	D	RSW status	3	10-08	see AD01 page B.18 (4)
	E	digital AGC word LSB	8	07-00	see HK word 4 (3)

(3) The AGC & NCO values are meaningful only when RSW status = 6 ;
For other values, the AGC word value may show jumps.

(4) If a spurious tone exists within the receiver bandwidth, the receiver status may go to state 5 even if the Probe is "OFF" (with Probe switched on, the status goes to 6, but no data can be acquired

DONE

PSA receiver HK word 4

TM ref.	sub ref	description	length	position	value description
R5 004 S or R6 004 S	A	HK word identifier	3	15-13	always 011
	B	bit synchroniser	1	12	1: locked
	C	NCO control w. MSbits	4	11-08	bits 19-16 (range ±25kHz) (2) (3)
	D	digital AGC word MSB	8	07-00	see curve (7) in annex (3)

(2) The negative values of NCO control word are coded in 2's complement

BIU fail register

TM ref.	sub ref	description	length	position	value description
A1 010 W or A2 010 W	A	BIU self test result	1	15	1: failure
	B	BIU watch dog	1	14	1: expired
	C	BIU write protection	1	13	1: violation
	D	discrete command bit 1	1	12	1: BIU has been reset
	-	(don't care)	12	11-00	-

9. TC CONSTRAINTS & VERIFICATION

The TC verification is described in the TC list.

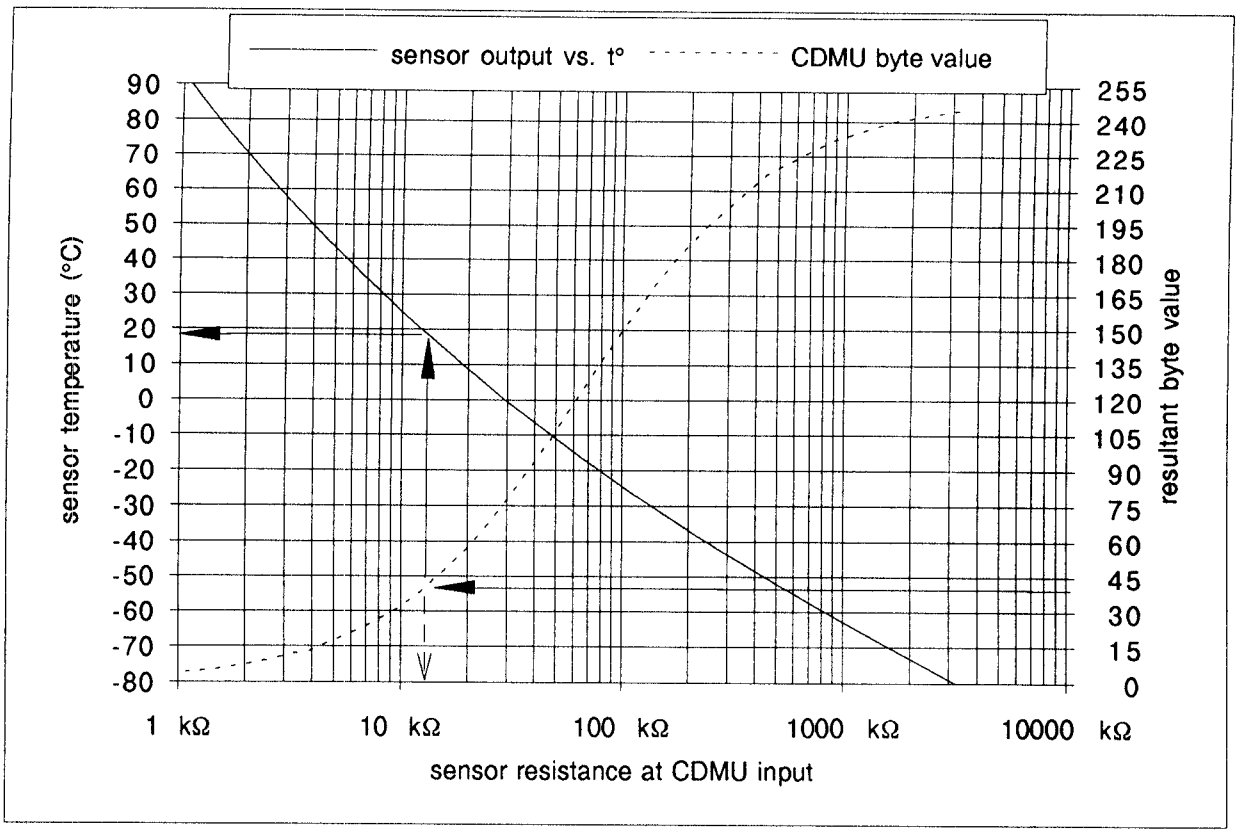
The TC constraints are reported in the HUYGENS user manual.

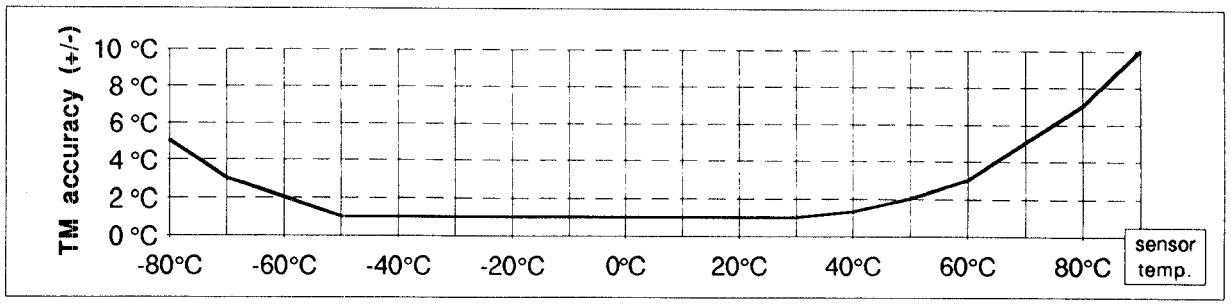
ANNEX:

CALIBRATION CURVES FOR TELEMETRIES

sensor (°C) temperature	thermistor value	byte value	sensor (°C) temperature	thermistor value	byte value
-80	3200 kΩ	245	15	15,0 kΩ	46
-70	**1600 kΩ**	**240**	20	12,2 kΩ	38
-60	**830 kΩ**	**231**	25	10,0 kΩ	32
-50	**441 kΩ**	**217**	**30**	**8,19 kΩ**	**27**
-40	240 kΩ	195	35	6,76 kΩ	23
-35	179 kΩ	182	40	5,60 kΩ	19
-30	**135 kΩ**	**167**	45	4,67 kΩ	16
-25	103 kΩ	151	**50**	**3,90 kΩ**	**13**
-20	78,5 kΩ	135	55	3,28 kΩ	12
-15	60,6 kΩ	119	60	2,77 kΩ	10
-10	**47,2 kΩ**	**104**	65	2,34 kΩ	8
- 5	37,0 kΩ	89	**70**	**1,99 kΩ**	**7**
0	**29,0 kΩ**	**76**	75	1,70 kΩ	6
5	23,3 kΩ	65	**80**	**1,46 kΩ**	**5**
10	**18,7 kΩ**	**55**	90	1,08 kΩ	4

The YELLOW SPRING 44006 sensor calibration is given in column "thermistor value".
The CDMU sensing curve (see EICD p.3.6.14) is given in column "byte value" by the formula
byte =7.5volt /((1/ 200kΩ +1/ resistance(t°))*100kΩ + 1) *256/5.12volt





Calibration curve (1) for temperature TMs: D1 008 T to D5 024 T

TM ref. / TM descript.	M1 001 T t°1 SEPS A	M1 002 T t°2 SEPS A	M1 003 T t°3 SEPS B	M1 004 T t°4 SEPS C
sensor S/N	JZ 83	JZ 91	JZ 89	JZ 90
-80 °C	341,3 Ω	340,9 Ω	343,6 Ω	340,3 Ω
-60 °C	382,1 Ω	381,7 Ω	384,7 Ω	381,0 Ω
-40 °C	422,6 Ω	422,1 Ω	425,5 Ω	421,4 Ω
-20 °C	462,8 Ω	462,2 Ω	466,0 Ω	461,4 Ω
0 °C	502,6 Ω	502,0 Ω	506,1 Ω	501,2 Ω
20 °C	542,1 Ω	541,5 Ω	545,9 Ω	540,6 Ω
40 °C	581,5 Ω	580,7 Ω	585,5 Ω	579,8 Ω
60 °C	620,5 Ω	619,7 Ω	624,8 Ω	618,7 Ω
80 °C	659,3 Ω	658,5 Ω	663,9 Ω	657,4 Ω
100 °C	697,9 Ω	697,0 Ω	702,7 Ω	695,9 Ω

TM ref. / TM descript.	T 001 T PCDU temp. 1	T 002 T PCDU temp. 2
sensor S/N	JZ 93	JZ 92
-80 °C	342,2 Ω	343,4 Ω
-60 °C	383,1 Ω	384,5 Ω
-40 °C	423,7 Ω	425,2 Ω
-20 °C	463,9 Ω	465,7 Ω
0 °C	503,9 Ω	505,6 Ω
20 °C	543,6 Ω	545,4 Ω
40 °C	583,0 Ω	584,9 Ω
60 °C	622,2 Ω	624,2 Ω
80 °C	661,1 Ω	663,2 Ω
100 °C	700,0 Ω	702,0 Ω

The above values are for FM Probe

Thermistors used are Platinium ones (ROSEMOUNT modol 118 BJA 500 A)

For M1 001 T to M1 004 T,
T 001 T & T 002 T
Calibration curve (2)

Polynomial expression for EM		
0,007003	* Vt **5	
- 0,0827	* Vt **4	
+ 0,3652	* Vt **3	
- 0,5118	* Vt **2	
+ 3,077	* Vt	
+64,42	= T°	

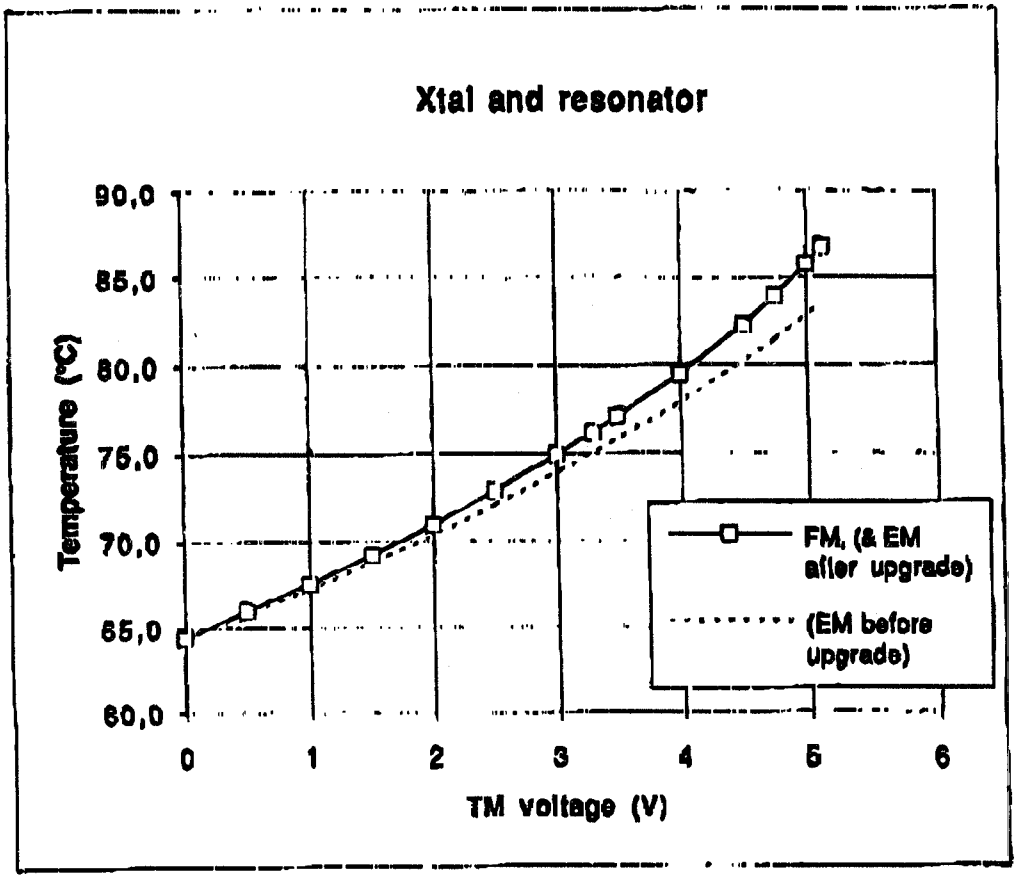
Polynomial expression for FM		
0,01066	* Vt **5	
- 0,1157	* Vt **4	
+ 0,4699	* Vt **3	
- 0,6055	* Vt **2	
+ 3,347	* Vt	
+64,42	= T°	

Xtal + resonator		
TM voltage: Vt (volts)	Temperature (°C)	
	EM (before upgrade) (given for info only)	EM, FM, QFS
0,0		64,4
0,5	65,9	66,0
1,0	67,8	67,5
1,5	68,8	69,2
2,0	70,3	70,9
2,5	72,1	72,9
3,0	73,9	74,9
3,3	75,1	76,2
3,5	75,8	77,1
4,0	77,9	79,5
4,5	80,2	82,3
4,75	81,5	83,9
5,0	82,9	85,8
5,12	83,6	86,8
5,1		86,6

NOTE:

E6 002 A , E6 003 A, E6 006 A & E6 007 A: - TUSO TMs are acquired by CDMU (full scale for 5.12 V): the TM voltage is Vt = TM byte value / 256 * 5.12

E7 002 A & E7 004 A: - RUSO TMs are acquired by PSA (full scale for 10.24 V): the TM voltage is Vt = TM byte value / 256 * 10.24



Calibration curve (3)

Polynomial expression (EM before upgrade)	
0,002227	* Vt **5
- 0,02409	* Vt **4
+ 0,1125	* Vt **3
- 0,0459	* Vt **2
+ 3,092	* Vt
+101,68	= T°

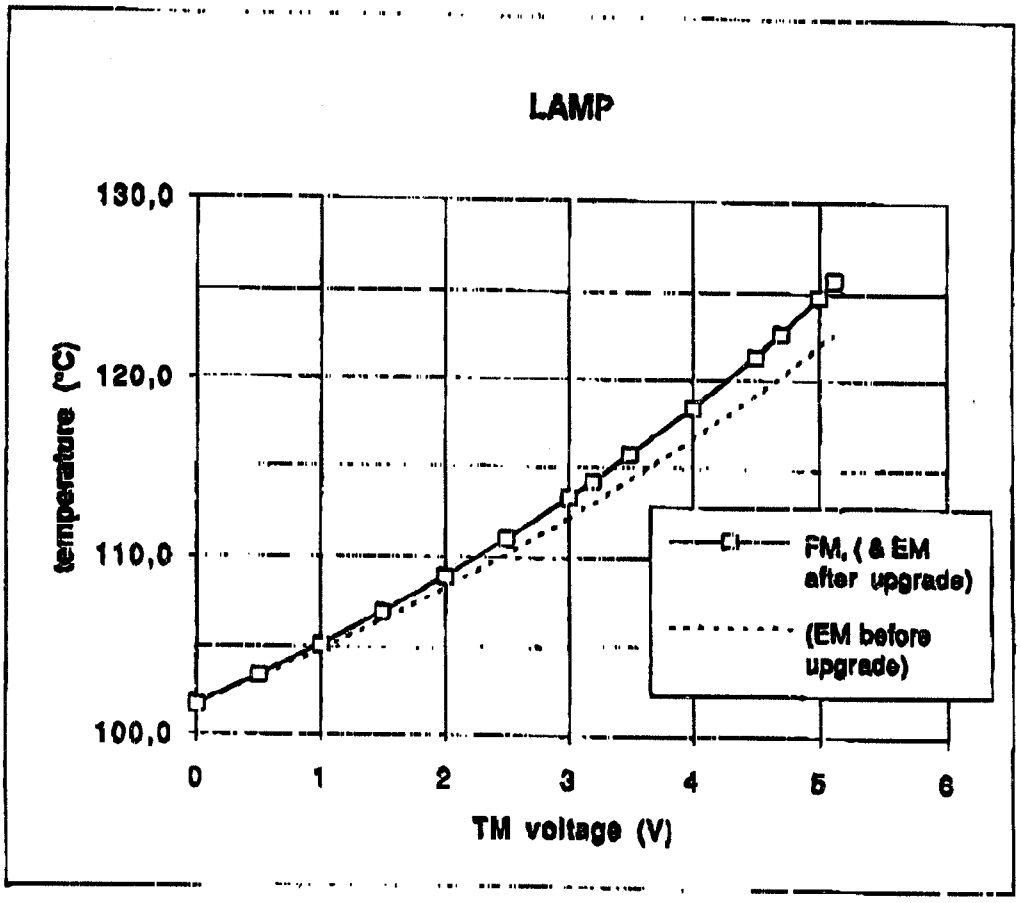
Polynomial expression (EM,FM)	
0,00339	* Vt **5
- 0,0337	* Vt **4
+ 0,1448	* Vt **3
- 0,0543	* Vt **2
+ 3,369	* Vt
+101,68	= T°

lamp		
TM voltage: Vt (volts)	Temperature (°C)	
	EM (before upgrade) (given for info only)	EM, FM, QFS
0,0 0		101,7
0,5 25	103,2	103,4
1,0 50	104,8	105,1
1,5 75	106,5	106,9
2,0 100	108,3	108,9
2,5 125	110,2	111,0
3,0 150	112,2	113,3
3,2 160	113,0	114,2
3,5 175	114,3	115,7
4,0	116,6	118,4
4,5	119,1	121,3
4,7 235	120,2	122,7
5,0	122,0	124,8
5,12	122,7	125,7
5,1 255		125,5

NOTE:

E6 001 A & E6 005 A: - TUSO TMs are acquired by CDMU (full scale for 5.12 V): the TM voltage is Vt = TM byte value / 256 * 5.12

E7 001 A: - RUSO TMs are acquired by PSA (full scale for 10.24 V): the TM voltage is Vt = TM byte value / 256 * 10.24

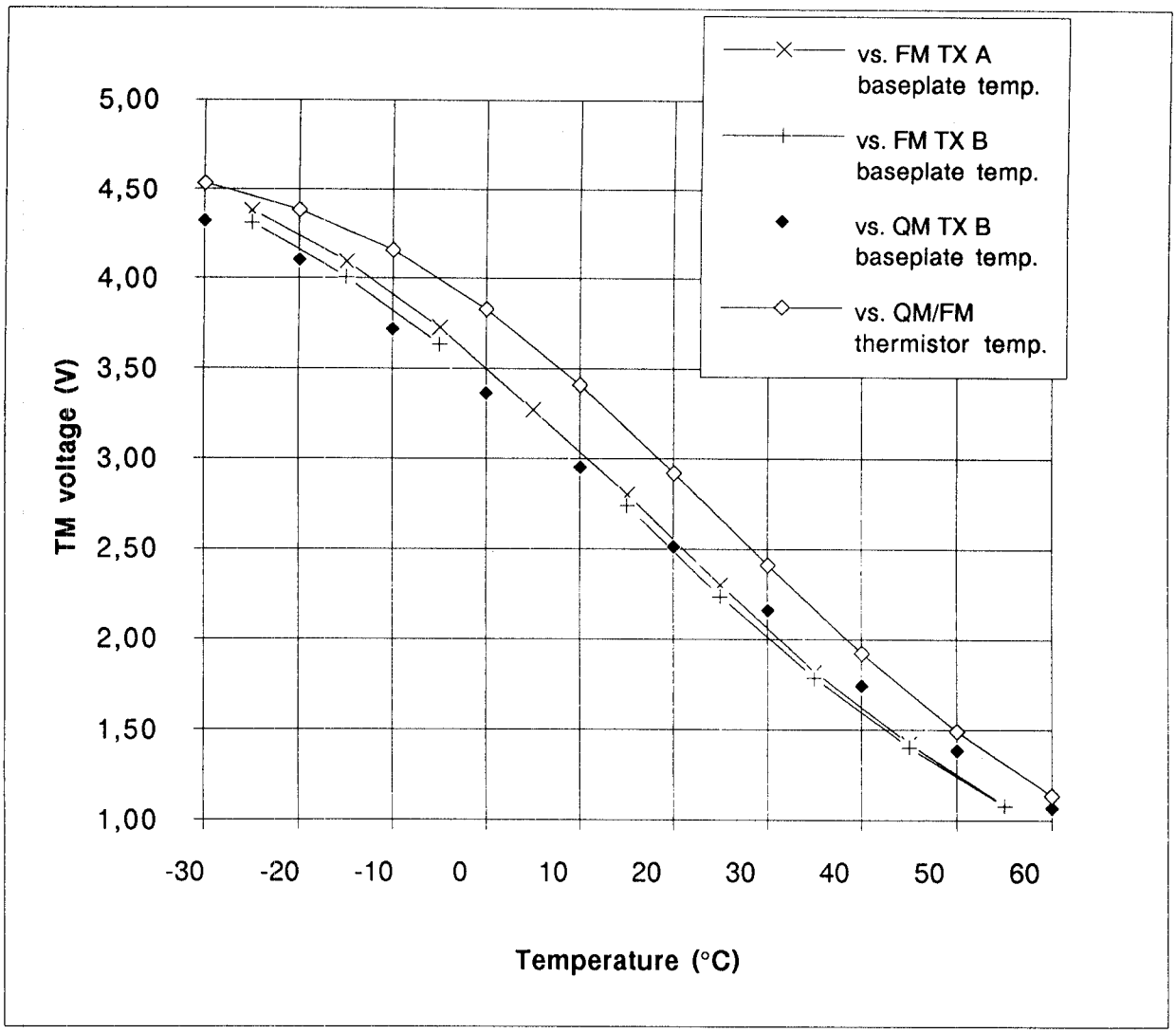


Calibration curve (4)

temperature (°C)	TM volt. TX B QM
60	1,068
50	1,385
40	1,741
30	2,16
20	2,51
10	2,95
0	3,365
-10	3,718
-20	4,10
-30	4,32

temperature (°C)	TM voltage (V)		TX A byte value
	TX A FM	TX B FM	
55	1,082	1,078	54
45	1,421	1,401	71
35	1,82	1,784	91
25	2,30	2,235	115
15	2,80	2,735	140
5	3,271		164
-5	3,724	3,632	186
-15	4,09	4,003	205
-25	4,381	4,308	219

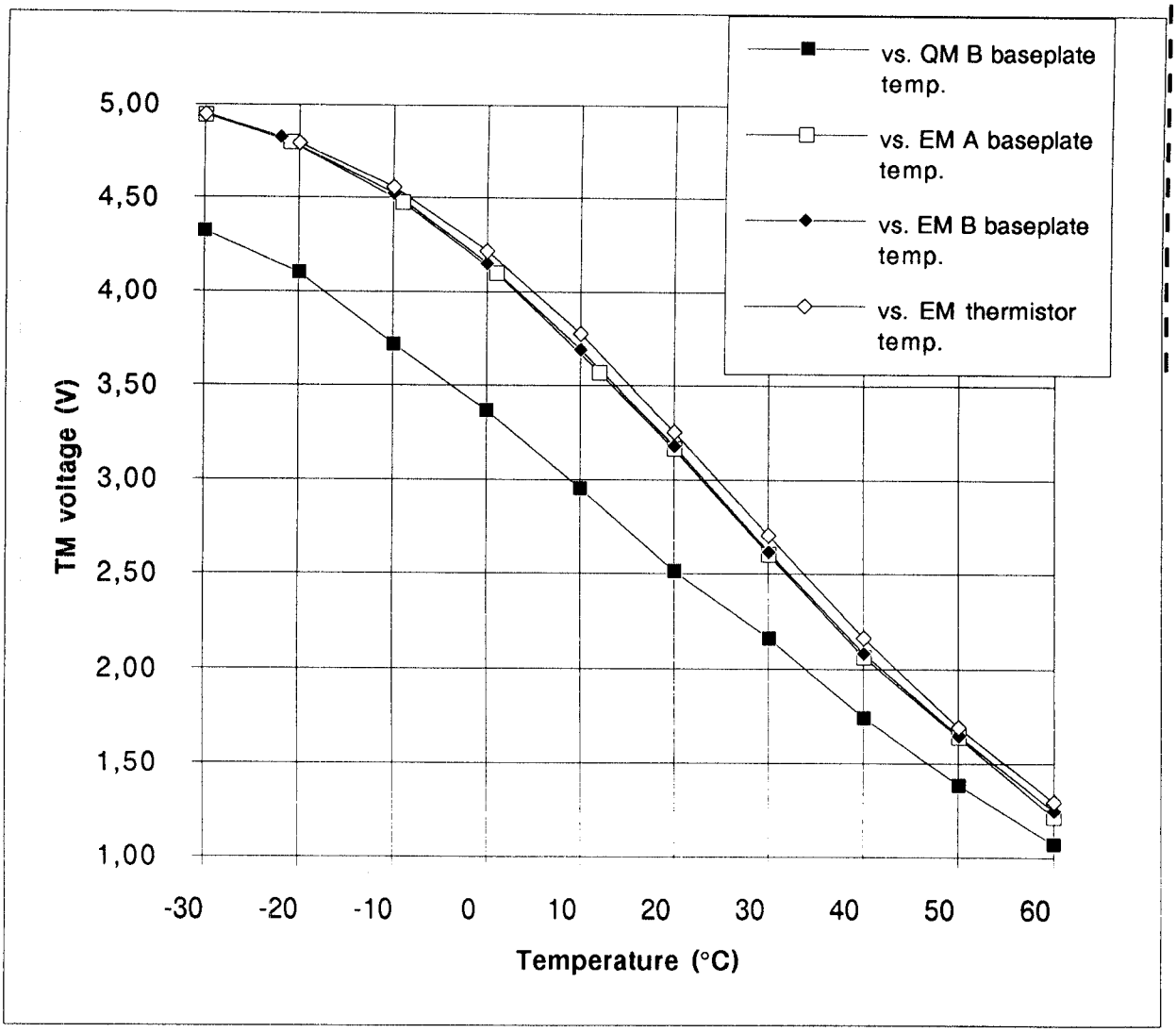
TX TM voltages are taken from PDRS ADP: they are given versus TX baseplate temperature, This calibration is entirely linked to the ALENIA set-up and test conditions.
For QM/FM, the ADP values were measured in thermal vacuum with HPA "on".
The real internal TX temperature is given by the theoretical TM voltage computed from design and RTH44 thermistor spec. (next page), with a +/- 1°C accuracy, with formula:
QM/FM TM voltage =12 Volts / (7.87kΩ*(1/ RTH44(sensor t°) +1/ 5.11kΩ)+1)



Calibration curve (5.1) : FM TXs, TMs R1 003 A and R2 003A

EM TX A		RTH44 sensor	EM TX B		TX A byte
Temperature	TM voltage(V)	specification	Temperature	TM voltage (V)	value
60	1,215	0,982 kΩ	60	1,245	61
50	1,639	1,428 kΩ	50	1,646	82
40	2,063	2,122 kΩ	40	2,085	103
30	2,6	3,225 kΩ	30	2,615	130
20	3,162	5,018 kΩ	20	3,176	158
12	3,567	8,027 kΩ	10	3,688	178
1	4,095	13,24 kΩ	0	4,152	205
- 9	4,471	22,56 kΩ	-10	4,523	224
-21	4,797	39,85 kΩ	-22	4,823	240
-30	4,944	73,21 kΩ	-30	4,951	247

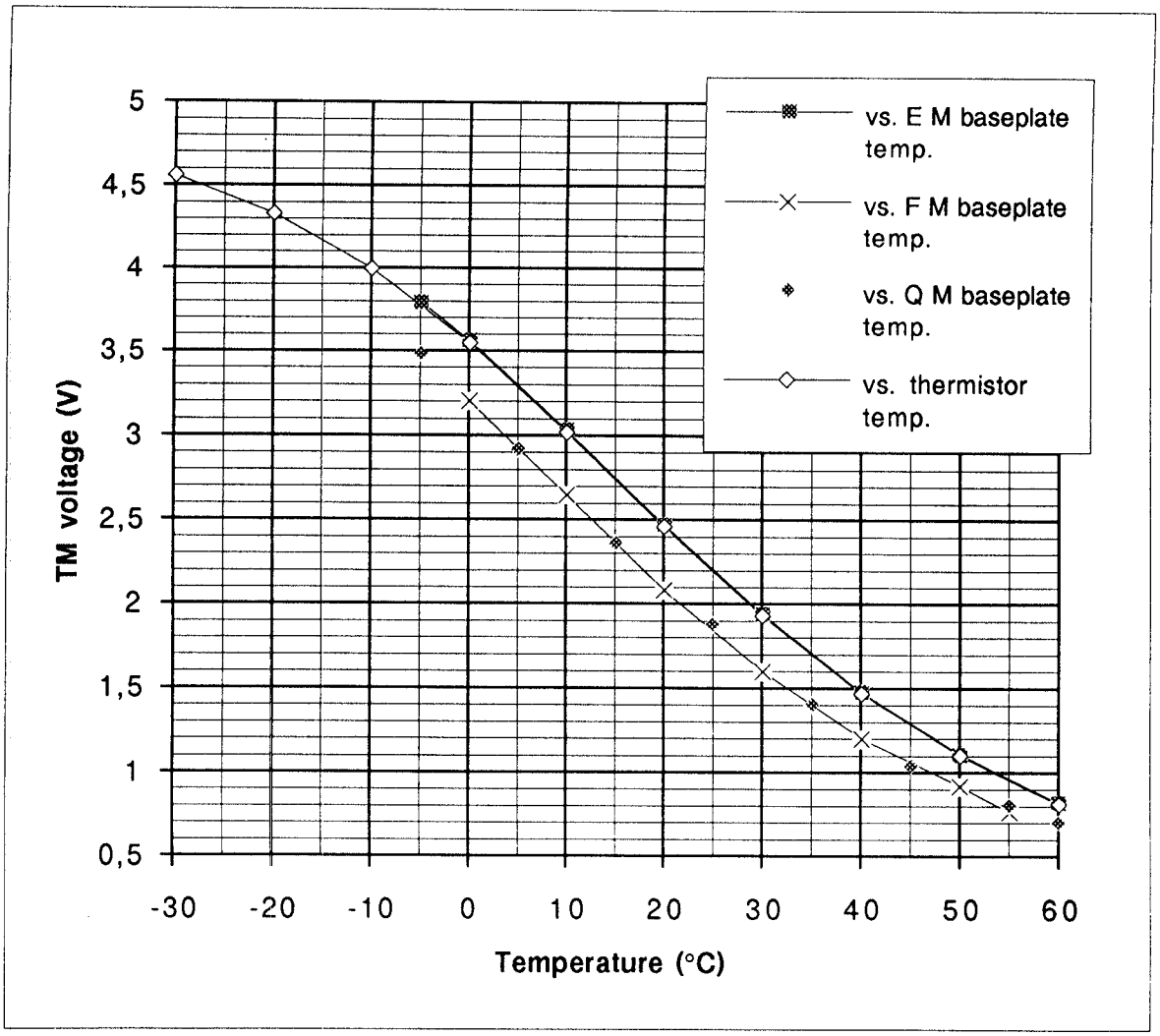
TX TM voltages are taken from PDRS ADP: they are given versus TX baseplate temperature,
This calibration is entirely linked to the ALENIA set-up and test conditions.
For EM, the ADP values were measured at ambiant air pressure.
The real internal TX temperature is given by the theoretical TM voltage computed
from design and RTH44 thermistor specification, with a +/- 1°C accuracy, with formula:
EM TM voltage =12 Volts /(6.81kΩ*(1/ RTH44(sensor t°)+1/ 5.11kΩ)+1)



Calibration curve (5.2) : EM TXs, TMs R1 003 A and R2 003A

Temperature (°C)	EM TM voltage (V)	EM Byte (decimal)	FM A TM Byte (dec.)	FM B TM Byte
-5	3,794	95		
0	3,559	89	80	80
10	3,03	76	65	65
20	2,47	62	52	54
30	1,94	49	40	40
40	1,478	37	30	30
50	1,104	28	23	23
55			19	20
60	0,817	20		
	NOTE:	TM voltage = TM byte /256 * 10,24 V		

PSA TM voltages are taken from PDRS ADP: they are given versus PSA baseplate temperatur
This calibration is entirely linked to the ALENIA set-up and test conditions.
The ADP data were measured at 1 bar pressure for EM and vacuum for QM/FM.
The real internal PSA TCXO temperature is given by the theoretical TM voltage computed fro
design and RTH44 thermistor spec. (previous page) with a +/- 1°C accuracy, with formula:
PSA TM voltage = 12 volts/ (12.1kΩ*(1/ RTH44(sensor t°) +1/ 8.25kΩ)+1)



(For R5 010 T & R6 010 T)

Calibration curve (6) : PSA TCXO temperature TM

The AGC calibration at system level (i.e. for the integrated chain) shall be taken from the specific TM/TC database corresponding to the actual Probe System configuration.

These data depend of the RFE, PSA units and harness mounted for the relevant Probe configuration.

The calibration curve is so measured directly on the Probe System, during PDRS integration and ISST by DSS.

AGC calibration from ALENIA ADPs cannot be used directly for Probe level calibration.

For R5 003 S // R5 004 S
and R6 003 S // R6 004 S

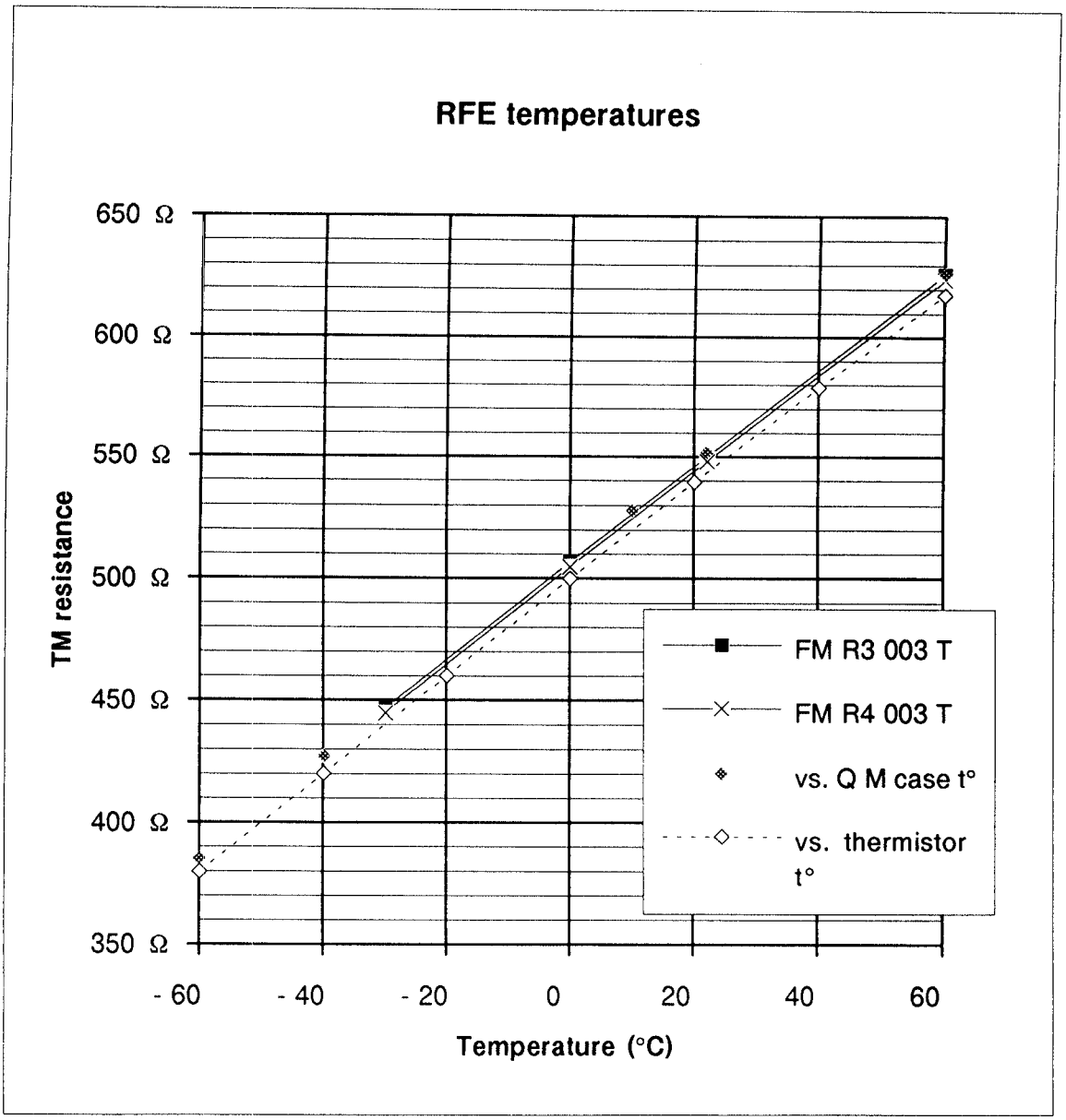
Calibration curve (7) : PSA digital AGC

temperature °C	E M (ADP) R 3/4 003 T	thermistor specification	Q M (ADP) R 3/4 003 T	F M (ADP)	
				R3 003 T	R4 003 T
- 60		379,72 Ω	385 Ω		
- 40	430 Ω	420,08 Ω	427 Ω		
- 30				447 Ω	445 Ω
0		500 Ω		507 Ω	505 Ω
10	530 Ω		528 Ω		
22	553 Ω	539,5 Ω (20°)	552 Ω	550 Ω	548 Ω
60	627 Ω	617,64 Ω	626 Ω	626 Ω	624 Ω

ADP values are given versus RFE case temperature.

As RFE dissipates little power, case and internal temperatures are almost the same.

So ADP values are in accordance with real sensor calibration at less than a 3 °C difference.

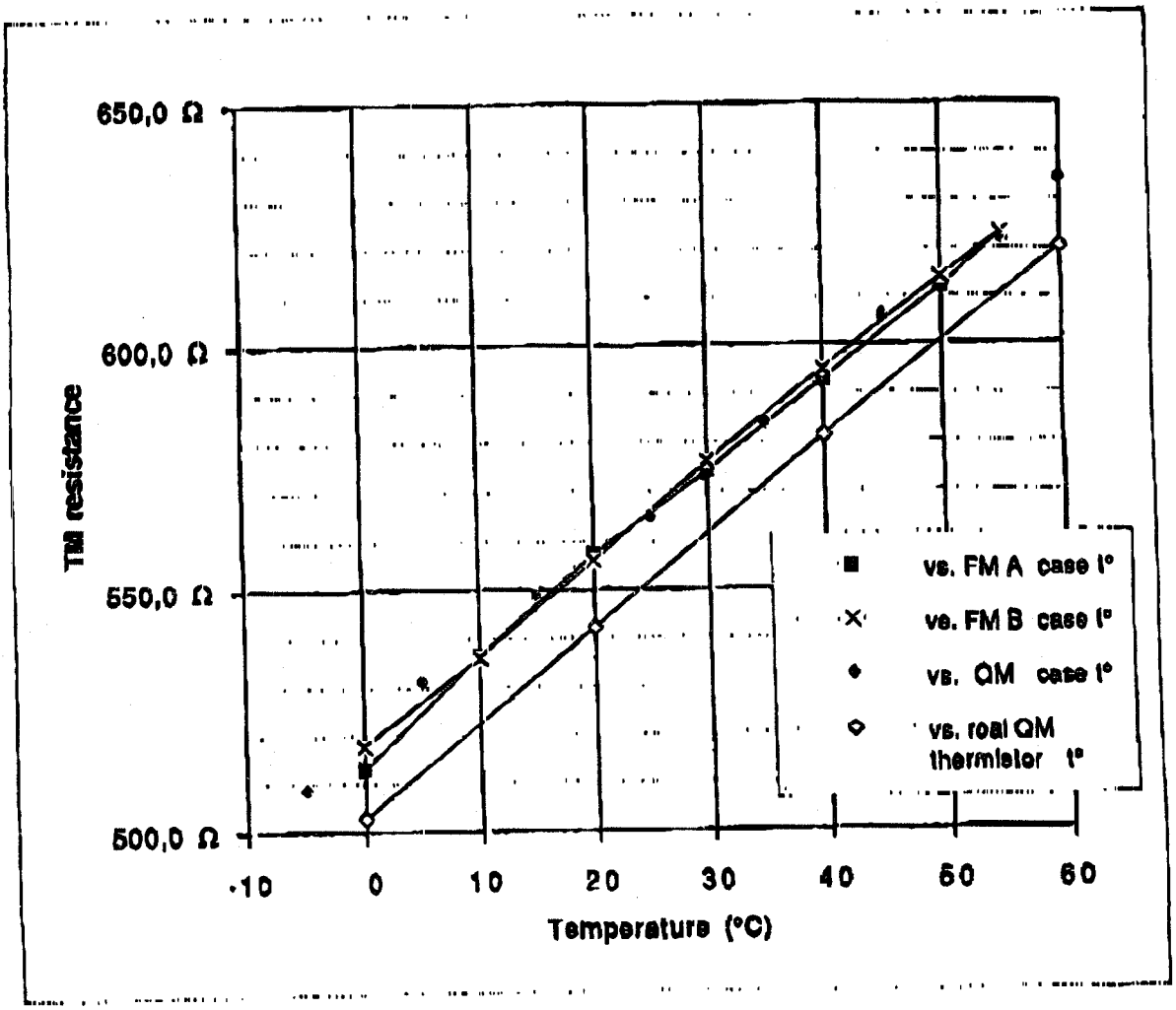


(For R3 003 T & R4 003 T)

Calibration curve (8) : RFE (LNA) temperatures

temperature °C	QM PSA	QM thermistor real calibration	temperature °C	FM PSA A R5 011 T	FM PSA B R6 011 T
-5	509 Ω	502,8	0	513,0 Ω	518 Ω
5	531 Ω		10	536,4 Ω	536 Ω
15	549 Ω	542,1	20	557,2 Ω	556 Ω
25	565 Ω		30	574,0 Ω	576 Ω
35	584 Ω	581,3	40	592,8 Ω	595 Ω
45	606 Ω		50	612,0 Ω	614 Ω
55	622 Ω		55	623,0 Ω	623 Ω
60	634 Ω	620,2	60		

PSA TM voltages are taken from PDRS ADP: they are given versus PSA baseplate temperature.
This calibration is entirely linked to the ALENIA set-up and test conditions.
The ADP data were measured during thermal vacuum cycling for QM/FM.
The real internal PSA sensor temperature is given by the 118AKT2 thermistor specification:
See curve (2) on page A3 (average accuracy of +/- 2°C) and actual QM thermistor a.m. data.



Calibration curve (9) : PSA thermistor (R5 011 T & R6 011 T)

TX unit	temperature	TX output power (HPA "ON")		TM voltage
(vacuum)	-25 °C	41,02 dBm	12,6 W	1,384 V
FM A TX	22 °C	40,66 dBm	11,6 W	1,459 V
S/N 004	55 °C	40,23 dBm	10,5 W	1,472 V
(vacuum)	-25 °C	41,34 dBm	13,6 W	2,130 V
FM B TX	22 °C	40,83 dBm	12,1 W	2,180 V
S/N 005	55 °C	40,33 dBm	10,8 W	2,190 V
(vacuum)	-30 °C	41,44 dBm	13,9 W	1,430 V
QM TX	22 °C	41,00 dBm	12,6 W	1,480 V
S/N 003	60 °C	40,39 dBm	10,9 W	1,470 V
(1 bar)	-30 °C	42,20 dBm	16,6 W	2,267 V
EM A TX	20 °C	41,80 dBm	15,1 W	2,392 V
S/N 001	60 °C	41,50 dBm	14,1 W	2,499 V
(1 bar)	-30 °C	41,04 dBm	12,7 W	2,129 V
EM B TX	20 °C	40,79 dBm	12,0 W	2,186 V
S/N 002	60 °C	40,59 dBm	11,5 W	2,190 V

Table of ADP measurements (thermal vacuum for QM/FM, 1 bar for EM)

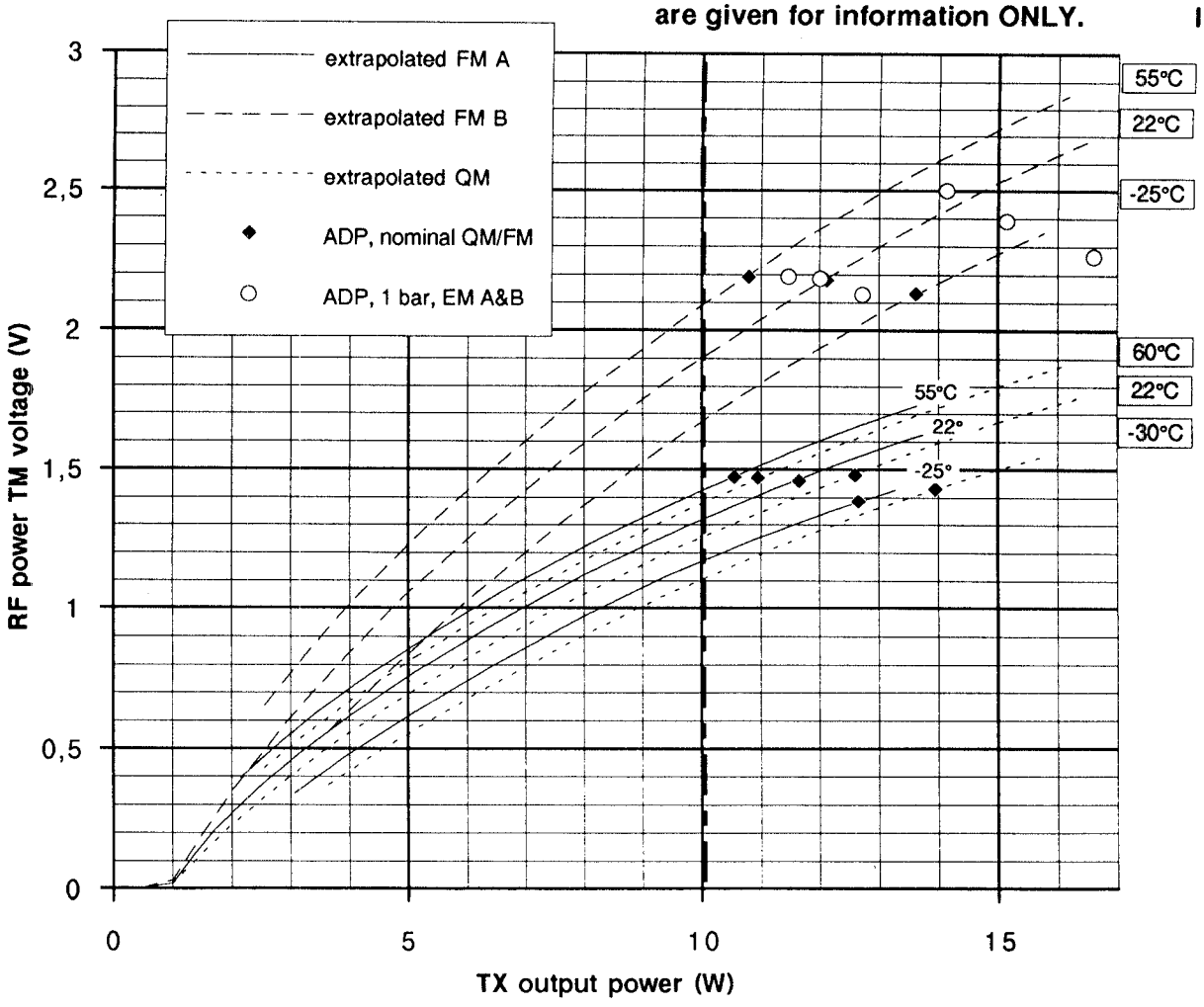
The nominal TM **range** is +/- 5 % of these points.

The byte value is: TM voltage / 5.12 * 256

The nominal power TM are not supplied for **1 bar pressure** in QM/ FM ADPs

It has been determined an approximated shape (≈ detector diode scaled characteristic) for calibration curves in thermal vacuum from TX ALENIA NCRs and TM circuit simulation. The accuracy of these curves may be +/- 0.1 volts on TM voltage.
*(for Power > 1W, Vtm ≈ a*root(Power) + b*temp. + c)*

The following extrapolated calibration curves **are given for information ONLY.**



Calibration curve (10) : TX RF power TM (R1 002 A & R2 002 A)