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TITLE: OST/PT/ODT STRUCTURE DEFINITION (SP-16)

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ISSUE No.: 7

PREPARED BY: SHARAD TEAM

CHECKED BY: D. RAVASI

D. Ravasi

PROJECT LEADER: *P. Marchesi*
P. MARCHESI

DATE: 15/3/2004

PAPM: *X. P. Rusconi*
X. P. RUSCONI

DATE: 15/09/04

PROGRAM MANAGER: *X. E. Aliprandi*
X. E. ALIPRANDI

DATE: 15/9/2004

CONFIGURATION: L. E. RONDELLI

LR

DATE FOR APPROVAL:

16/9/04

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CHANGE RECORD

Issue	Date	Sheet	Description of Change	Release
1	JULY '03	ALL	FIRST ISSUE OF THE DOCUMENT	PDR/SRR
2	OCT '03	ALL	Upgrade of requirements according to issue 2 of [RD.1]	CDR
3	DEC '03	ALL	Upgrade of tables layout after HW / SW integration phase	EM CDR
4	MAR '04	ALL	Upgrade of TM/TC layout after MOM MIN/SHR/0116/ALS	SW CDR Close-out
5	MAY '04	ALL	Upgrade of PT for tracking purpose	
6	JUNE '04	SRQD.- 3.2/050	Updated default values for PT, Added DCG parameters, added DTC Alive period	
7	SEP. '04	ALL	Modification according to revision 2.4 of the software package	

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1. INTRODUCTION

This document presents the interfacing of DES towards its user. Scientists operate on DES passing through the MRO C&DH on which Telecommands shall be stored before their issuing to DES. Also TLM coming from DES, before arriving to Scientists, has an intermediate storage buffering into the MRO on-board Solid State Recorder.

1.1. PURPOSE

This document presents the structure of CMD TABLES used by Scientist to perform the DES Measurement Mode.

The document presents in chapter 3 the structure of:

- . Operational Sequence Table
- . Parameter Table
- . Orbital Data Table

2. APPLICABLE AND REFERENCE DOCUMENTS

2.1. APPLICABLE DOCUMENTS

[AD.1] Digital Electronic Section (DES) Requirement Specification,
SPE/SHR/0027/ALS

[AD.2] On-Board Digital Signal Processing, RQS/SHR/0014/ALS

2.2. REFERENCE DOCUMENTS

[RD.1] Software Requirements, TL19763

3. OPERATION TABLES

Two main operational scenarios are envisioned for SHARAD.

In the first scenario, the instrument does not perform any measurement and is able to receive commands from the S/C's C&DH. These commands will include the loading of all necessary values and parameters to perform one active pass within one orbit (SHARAD will mainly operate during night passes). Between these parameters is found the Operational Sequence Table, which, for each entry, specifies the diverse measurement to be performed during the active pass.

In relation to the time of overfly of a predefined location, the OST is enabled and the second scenario applies. In this scenario the OST is scanned, starting from a pre-defined time corresponding to a given overflight latitude, and data within each row are used to perform a given measurement mode of given duration and characteristics. During the OST processing, SHARAD will produce Science Data toward the S/C's SSR. At the end of the OST programming, SHARAD reverts to the first scenario and it is ready to accept programming for another pass.

3.1. OPERATIONAL SEQUENCE TABLE

SRQD.-3.1/010 Operational Sequence Table

[AD.1] SHR-DES-3.3.2-0300

The Operational Sequence Table, OST, shall contain SHARAD measurement modes programming for the active portion of an orbit. The execution of the OST coincides with performing radar operations.

Measurements shall be initiated by an ENABLE_OST Command and, thence, will proceed autonomously by means of automatic mode transitions following the timeline listed in the Operational Sequence Table.

Each line of the OST defines a single Operational Mode and the required parameters to permit its implementation.

EOR

SRQD.-3.1/020 Operational Sequence Default values

[AD.1] SHR-DES-3.3.2-0320

The current baseline foresees that no default values shall be stored for the OST. After SHARAD switch on the OST shall therefore result empty.

EOR

Table entries	1	MODE SEL	PRIs CONFIGURATION	DCG CONFIGURATION	PROCESSING CONFIGURATION	OTHER PARAMETERS
	2	MODE SEL	PRIs CONFIGURATION	DCG CONFIGURATION	PROCESSING CONFIGURATION	OTHER PARAMETERS
	N-1	MODE SEL	PRIs CONFIGURATION	DCG CONFIGURATION	PROCESSING CONFIGURATION	OTHER PARAMETERS
	N	MODE SEL	PRIs CONFIGURATION	DCG CONFIGURATION	PROCESSING CONFIGURATION	OTHER PARAMETERS
	0					
	0					
	0					

Fig. 3.1-1 - Basic Operational Sequence Table Representation

SRQD.-3.1/030 Operational Sequence Table Entries Format

[AD.1] SHR-DES-3.4.4-0020

Each Operational Sequence Table entry (line) shall adhere to the format in Tab. 3.1-1 based on a line size of **128 bits**. Spare bits shall always be set to 0's. The same applies to bits whenever their usage is not applicable.

Each entry's field is described in the Tab. 3.1-1 (range values not shown shall be intended as Reserved, Don't Use).

EOR

Tab. 3.1-1 - Basic Operational Sequence Table Format

FIELD ID	DEFINITION	SIZE bits	RANGE	DESCRIPTION
PRI	Pulse Repetition Interval	4	0001 => 1428 μ s 0010 => 1492 μ s 0011 => 1290 μ s 0100 => 2856 μ s 0101 => 2984 μ s 0110 => 2580 μ s	PRI = 1 / PRF to be used for the entire duration of the selected Mode. Applies also to Test Mode depending on different sub-cases.
PH	Phase Compensation	4	0000 = No compensation 0001 = Radial velocity comp. 0010 = Surface Slope comp. 0011 = Radial velocity & Surface slope compensation	To select the DCG initial phase correction, according to the estimated surface slope and the satellite radial velocity.
Spare		2		
LENGTH	Data Take Length	22	Value shall be an integer (> 0) multiple of the Pre-summing value	Mode Duration in terms of number of PRI's. This value, multiplied by the PRI value, establishes the duration on the selected Mode.
MODE	Operational Mode	8	000 00000 = Wait Mode 001 00001 = SS Mode sub #1 ... 001 10101 = SS Mode sub #21 010 00001 = Cal Mode sub #1 ... 010 10101 = Cal Mode sub #21 011 00001 = Rcv Mode sub #1 ... 011 10101 = Rcv Mode sub #21 1XX XXXXX = Test Modes	To select the operational Mode/Sub-Mode combination. (See relevant sub-modes tables 3.1-2, 3.1-3, 3.1-4 for details)
MGC	Manual Gain Control	8	0x00 - 0xFF	Manual Gain Control, used to select the RX attenuation
CS	Compression Selection	1	0 = Static Compression 1 = Dynamic Compression	Bit Compression Algorithm selection
TR	Closed-loop Tracking	1	0 = disabled 1 = enabled	To enable or disable the Closed-loop Tracking
TS	Tracking Data Storage	1	0 = disabled 1 = enabled	To enable or disable the Closed-loop Tracking data packets acquisition
T_PRE	Tracking Pre-Summing	3	000 = 1 001 = 2 010 = 3 011 = 4 100 = 8 101 = 16 110 = 32 111 = 64	Number of pre-summed blocks to be summed before Tracking task.

TR_LOG	Tracking Logic Selection	1	0 = Logic based in threshold overshooting 1 = Logic based on COG	Selection of the logic for the range tracker discriminator
TH_LOG	Threshold Logic Selection	1	0 = Threshold evaluated on board 1 = Threshold programmed from ground	Selection of the logic for the threshold determination
N_SMPL	Samples Number	4	0000 = 1 0001 = 2 ... 1111 = 16	Number of the samples that shall overshoot the threshold.
Spare		1		
A_B	Alpha and Beta	2	00, 01, 10, 11	Selection of one out of four coefficient sets for Alfa/Beta filter
REF_BIT	Reference Bit	1	0 = Start with value from the previous mode 1 = Start from a new value	Bit to select the refresh logic of the tracking
THRE	Threshold	8	0x00 ... 0xFF	First order linear coefficient for the threshold value
INC_THR	Threshold Increment	8	0x00 ... 0xFF	First order linear coefficient for the Increment for the threshold value.
Spare		4		
EC_INIT	Initial Echo Value	3	000 ... 111	First order linear coefficient for the correction for the initial prediction of the first echo.
D_ECHO	Expected Echo Shift	3	000 ... 111	First order linear coefficient for the value to shift the echo position
D_LEFT	Window Left Shift	3	000 ... 111	First order linear coefficient for the value to shift the left side of the tracking window
D_RIGHT	Window Right Shift	3	000 ... 111	First order linear coefficient for the value to shift the right side of the tracking window
TOPO_V	Topography polynomial coefficients validity	16	0x00000 = all operative modes 0x00001 = 0x40000 =	Validity of the polynomial coefficient necessary to the WPF. 0x00000 allows using the same coefficients for the entire Mode: it may be especially used when WPF is not utilized to determine S/C to surface distance.
SLOPE_V	Slope polynomial coefficients validity	16	0x00000 = all operative modes 0x00001 = 0x40000 =	Validity of the polynomial coefficient necessary to the WPF. 0x00000 allows using the same coefficients for the entire Mode: it may be especially used when WPF is not utilized to determine S/C to surface distance.

Tab. 3.1-2 – Subsurface Sounding sub-modes

SUBSURFACE SOUNDING			
MODE code	Sub-mode	Pre-sum	Resolution
001 00001	SS#1	32	8
001 00010	SS#2	28	6
001 00011	SS#3	16	4
001 00100	SS#4	8	8
001 00101	SS#5	4	6
001 00110	SS#6	2	4
001 00111	SS#7	1	8
001 01000	SS#8	32	6
001 01001	SS#9	28	4
001 01010	SS#10	16	8
001 01011	SS#11	8	6
001 01100	SS#12	4	4
001 01101	SS#13	2	8
001 01110	SS#14	1	6
001 01111	SS#15	32	4
001 10000	SS#16	28	8
001 10001	SS#17	16	6
001 10010	SS#18	8	4
001 10011	SS#19	4	8
001 10100	SS#20	2	6
001 10101	SS#21	1	4

Tab. 3.1-3 – Receive Only sub-modes

RECEIVE ONLY			
MODE code	Sub-mode	Pre-sum	Resolution
011 00001	RO#1	32	8
011 00010	RO#2	28	6
011 00011	RO#3	16	4
011 00100	RO#4	8	8
011 00101	RO#5	4	6
011 00110	RO#6	2	4
011 00111	RO#7	1	8
011 01000	RO#8	32	6
011 01001	RO#9	28	4
011 01010	RO#10	16	8
011 01011	RO#11	8	6
011 01100	RO#12	4	4
011 01101	RO#13	2	8
011 01110	RO#14	1	6
011 01111	RO#15	32	4
011 10000	RO#16	28	8
011 10001	RO#17	16	6
011 10010	RO#18	8	4
011 10011	RO#19	4	8
011 10100	RO#20	2	6

011 10101	RO#21	1	4
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Tab. 3.1-4 – Calibration sub-modes

CALIBRATION			
MODE code	Sub-mode	Pre-sum	Resolution
010 00001	CAL#1	32	8
010 00010	CAL#2	28	6
010 00011	CAL#3	16	4
010 00100	CAL#4	8	8
010 00101	CAL#5	4	6
010 00110	CAL#6	2	4
010 00111	CAL#7	1	8
010 01000	CAL#8	32	6
010 01001	CAL#9	28	4
010 01010	CAL#10	16	8
010 01011	CAL#11	8	6
010 01100	CAL#12	4	4
010 01101	CAL#13	2	8
010 01110	CAL#14	1	6
010 01111	CAL#15	32	4
010 10000	CAL#16	28	8
010 10001	CAL#17	16	6
010 10010	CAL#18	8	4
010 10011	CAL#19	4	8
010 10100	CAL#20	2	6
010 10101	CAL#21	1	4

3.2. PARAMETERS TABLE

SRQD.- 3.2/010 Parameters Table

[AD.1] SHR-DES-3.3.2-0400

The Parameters Table shall contain all SHARAD's operational parameters organised for a random access. Each parameter is identified by an identification number and it is associated one, or more, values. Value types shall be chosen in a predefined category.

EOR

SRQD.- 3.2/020 Parameters Table Categories

[AD.1] SHR-DES-3.3.2-0410

The Parameters Table shall be used to store the following parameter categories:

- . Topography polynomial coefficients
- . Surface Slope polynomial coefficients
- . Starting Latitude for each of the above coefficients.
- . OST starting Time Tag value.
- . Additional parameters related to measurements.
- . Additional parameters related to instrument operations (configuration values).

EOR

SRQD.- 3.2/030 Parameters Table Value Types

[AD.1] SHR-DES-3.3.2-0420

The Parameter Table values shall belong to one of the following types:

8 bit integer	(8INT)
16 bit integer	(16INT)
32 bit integer	(32INT)
32 bit float	(32FLT)
32 bit x N float array	(32ARR)
48 bit time tag	(TTIME)

EOR

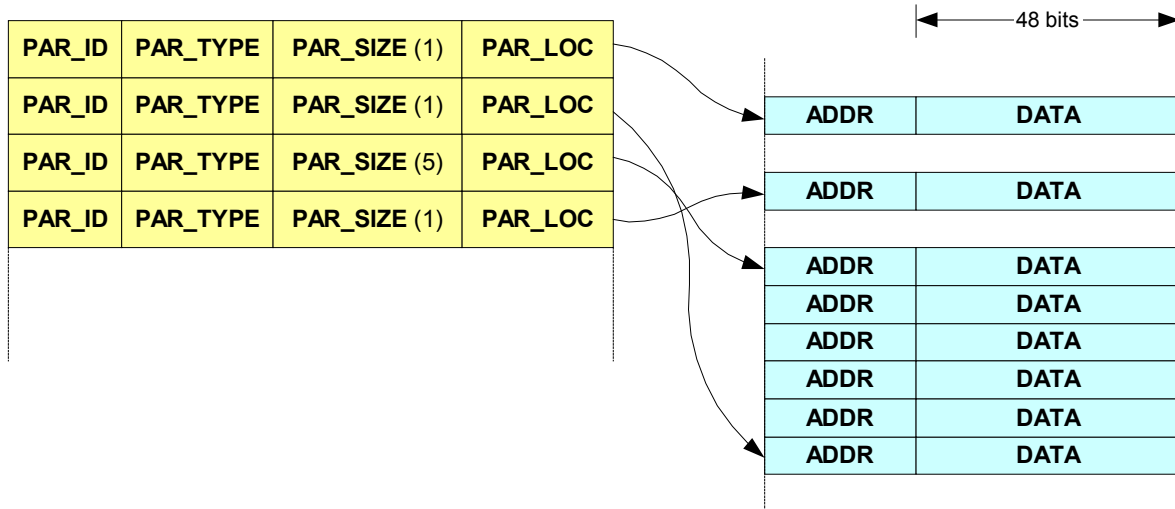


Fig. 3.2-1 - Basic Parameters Table Representation

SRQD.- 3.2/040 Parameters Table Default Values

[AD.1] SHR-DES-3.3.2-0440

After SHARAD switch on, Parameter Table values shall be assigned the default values according to their definition

EOR

SRQD.- 3.2/050 Parameters Table Content

[AD.1] SHR-DES-3.4.4-0030

The Parameter Table shall provide an index based storage space for the parameters listed in Tab. 3.2.1. Each parameter identified so far is described within the table itself or it is discussed elsewhere in this document.

For parameters listed in Tab. 3.2.1, range values not shown shall be intended as Reserved, Don't Use. Values are right aligned (values start from the LSB of each location).

EOR

Tab. 3.2-1 - Basic Parameters Table Representation

Id	Rel address	Parameter name	Default	Range	Type	Description
0	000	PT_OSTSTARTSEC	0	0 : FFFFFFFF	U32	OST starting time tag (seconds)
1	001	PT_OSTSTARTFRCT	0	0 : FFFF	U16	OST starting time tag (fractions)
2	002	PT_ODTSTARTSEC	0	0 : FFFFFFFF	U32	ODT beginning time tag.
3	003	PT_ODTSTARTFRCT	0	0 : FFFF	U16	ODT beginning time tag.
4	004	PT_ODTSTEP	1	0 : FF	U8	Time interval in seconds between subsequent ODT values.
5	005	PT_ALIVE_PERIOD	5	0 : FF	U8	SHARAD ALIVE discrete TC period
6	006	PT_MONSAMPLE	1	0 : FF	U8	Time interval in seconds for monitoring the engineering parameters (the modify shall be used after restart).
7	007	PT_ENGTLM	5	0 : FF	U8	Time interval in seconds for generating ENG_TLM frames toward the SSR.
8	008	PT_SPARE				
9	009	PT_HKTLM	0x8F	NA	BF	Enabled HK TM Bit 0: TLM_ENG (1=Enabled, 0=Disabled) Bit 1: TLM_CMD (1=Enabled, 0=Disabled) Bit 2: TLM_LOG (1=Enabled, 0=Disabled) Bit 3: TLM_DMP (1=Enabled, 0=Disabled) Bit 4: CMD_LOG (1=Enabled, 0=Disabled) Bit 4 to 6: Unused, set to 0. Bit 7: TLM_BUFFER (1=Enabled, 0=Disabled)
10	00A	PT_MAXOST	100	0 : FF	U8	Maximum number of OST lines
11	00B	PT_MAX_TIMEJUMP	60	0 : FFFFFFFF	U32	Maximum time jump for Time Update CMD
12	00C	PT_CH1LLIM	0x08	0 : FF	U8	Lower monitoring limit for ch. 1
13	00D	PT_CH1ULIM	0x7F	0 : FF	U8	Upper monitoring limit for ch. 1
14	00E	PT_CH2LLIM	0x70	0 : FF	U8	Lower monitoring limit for ch. 2
15	00F	PT_CH2ULIM	0x8F	0 : FF	U8	Upper monitoring limit for ch. 2
16	010	PT_CH3LLIM	0x8F	0 : FF	U8	Lower monitoring limit for ch. 3
17	011	PT_CH3ULIM	0xAA	0 : FF	U8	Upper monitoring limit for ch. 3
18	012	PT_CH4LLIM	0x75	0 : FF	U8	Lower monitoring limit for ch. 4
19	013	PT_CH4ULIM	0xAC	0 : FF	U8	Upper monitoring limit for ch. 4
20	014	PT_CH5LLIM	0x19	0 : FF	U8	Lower monitoring limit for ch. 5
21	015	PT_CH5ULIM	0xFF	0 : FF	U8	Upper monitoring limit for ch. 5
22	016	PT_CH6LLIM	0x0F	0 : FF	U8	Lower monitoring limit for ch. 6
23	017	PT_CH6ULIM	0xF6	0 : FF	U8	Upper monitoring limit for ch. 6
24	018	PT_CH7LLIM	0x00	0 : FF	U8	Lower monitoring limit for ch. 7
25	019	PT_CH7ULIM	0xFF	0 : FF	U8	Upper monitoring limit for ch. 7

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26	01A	PT_CH8LLIM	0x00	0 : FF	U8	Lower monitoring limit for ch. 8
27	01B	PT_CH8ULIM	0xE5	0 : FF	U8	Upper monitoring limit for ch. 8
28	01C	PT_WU1ACTDEL	20	0 : 0x418937	U32	Warm Up 1 activation delay [s]
29	01D	PT_WU1DEACTDEL	5	0 : 0x418937	U32	Warm Up 1 de-activation delay [s]
30	01E	PT_WU2ACTDEL	40	0 : 0x418937	U32	Warm Up 2 activation delay [s]
31	01F	PT_WU2DEACTDEL	10	0 : 0x418937	U32	Warm Up 2 de-activation delay [s]
32	020	PT_SPARE				
33	021	PT_F_CONV	26666667	1 : 0xFFFFFFFF	U32	Conversion Factor [Hz]
34	022	PT_PRF_1	1/1428e-6		F	Nominal_1 PRF [Hz]
35	023	PT_PRF_2	1/1492e-6		F	Nominal_2 PRF [Hz]
36	024	PT_PRF_3	1/1290e-6		F	Nominal_3 PRF [Hz]
37	025	PT_SPARE				
38	026	PT_PRF_HALF_1	1/2856e-6		F	Nominal_Half_1 PRF [Hz]
39	027	PT_PRF_HALF_2	1/2984e-6		F	Nominal_Half_2 PRF [Hz]
40	028	PT_PRF_HALF_3	1/2580e-6		F	Nominal_Half_3 PRF [Hz]
41	029	PT_SPARE				
42	02A	PT_WPF_VALUE	64		F	NWpf
43	02B	PT_T0	1e-5		F	Correction [s]
44	02C	PT_C	299792.458		F	Light Speed [km/s]
45	02D	PT_LAMBDA_20M	14.99		F	Wave length [m]
46	02E	PT_SPARE				
47	02F	PT_RX_MIN_N1	105e-6		F	RX window Lower Limit for Nominal_1 PRF [s]
48	030	PT_RX_MAX_N1	1243e-6		F	RX window Upper Limit for Nominal_1 PRF [s]
49	031	PT_RX_MIN_N2	105e-6		F	RX window Lower Limit for Nominal_2 PRF [s]
50	032	PT_RX_MAX_N2	1307e-6		F	RX window Upper Limit for Nominal_2 PRF [s]
51	033	PT_RX_MIN_N3	105e-6		F	RX window Lower Limit for Nominal_3 PRF [s]
52	034	PT_RX_MAX_N3	1105e-6		F	RX window Upper Limit for Nominal_3 PRF [s]
53	035	PT_RX_MIN_N4	1523e-6		F	RX window Lower Limit for Nominal_Half_1 PRF [s]
54	036	PT_RX_MAX_N4	2671e-6		F	RX window Upper Limit for Nominal_Half_1 PRF [s]
55	037	PT_RX_MIN_N5	1587e-6		F	RX window Lower Limit for Nominal_Half_2 PRF [s]
56	038	PT_RX_MAX_N5	2799e-6		F	RX window Upper Limit for Nominal_Half_2 PRF [s]
57	039	PT_RX_MIN_N6	1385e-6		F	RX window Lower Limit for Nominal_Half_3 PRF [s]
58	03A	PT_RX_MAX_N6	2395e-6		F	RX window Upper Limit for Nominal_Half_3 PRF [s]
59	03B	PT_SPARE				
60	03C	PT_START_TLP			F	First data set used for data processing (first of 60 copies)
61	03D	PT_S0			F	
62	03E	PT_S1			F	
63	03F	PT_S2			F	
64	040	PT_S3			F	
65	041	PT_S4			F	
66	042	PT_S5			F	
67	043	PT_S6			F	
68	044	PT_S7			F	
69	045	PT_TOP0			F	
70	046	PT_TOP1			F	
71	047	PT_TOP2			F	
72	048	PT_TOP3			F	
73	049	PT_TOP4			F	
74	04A	PT_TOP5			F	
75	04B	PT_TOP6			F	
76	04C				F	
...					F	
1019	3FB					
1020	3FC	PT_SPARE				
1021	3FD	PT_WAVEFORM_MODE_DCG	0x00000000		U32	DCG Configuration parameters
1022	3FE	PT_INITIAL_WAVEFORM_DCG	0x00800000		U32	
1023	3FF	PT_WAVEFORM_NUMBER_DCG	0x00400000		U32	
1024	400	PT_WAVEFORM_CONTROL_DCG	0x00C2C000		U32	
1025	401	PT_DITHERING_CONTROL_DCG	0x00D20000		U32	
1026	402	PT_START_FREQ_MSW_DCG	0x00D8000A		U32	
1027	403	PT_START_FREQ_LSW_DCG	0x00C80000		U32	
1028	404	PT_SLOPE_MSW_DCG	0x00D07FFF		U32	

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1029	405	PT_SLOPE_LSW_DCG	0x00C019D3		U32	
1030	406	PT_DURATION_MSW_DCG	0x00DC0000		U32	
1031	407	PT_DURATION_LSW_DCG	0x00CC2560		U32	
1032	408	PT_PHASE_MSW_DCG	0x00D40000		U32	
1033	409	PT_PHASE_LSW_DCG	0x00C40000		U32	
1034	40A	PT_TRK_NTRK_1	0x41A		U32	Closed Loop Tracking step for Nominal_1 PRF ##SHR-PROC-3.1.9-0010
1035	40B	PT_TRK_NTRK_2	0x3ED		U32	Closed Loop Tracking step for Nominal_2 PRF
1036	40C	PT_TRK_NTRK_3	0x48A		U32	Closed Loop Tracking step for Nominal_3 PRF
1037	40D	PT_TRK_NTRK_4	0x20D		U32	Closed Loop Tracking step for Nominal_Half_1 PRF
1038	40E	PT_TRK_NTRK_5	0X1F6		U32	Closed Loop Tracking step for Nominal_Half_2 PRF
1039	40F	PT_TRK_NTRK_6	0x245		U32	Closed Loop Tracking step for Nominal_Half_3 PRF
1040	410	PT_TRK_C_LOL_INI	-6		I32	Initial value for C_loI parameter ##SHR-PROC-3.1.9-0020
1041	411	PT_TRK_S_M	1024	0 : 2047	U16	Initial Offset position ##SHR-PROC-3.1.9-0020
1042	412	PT_TRK_EC_INI_0	0	-2047 : 2046	I16	Initialization Value for echo correction 0
1043	413	PT_TRK_EC_INI_1	-4	-2047 : 2046	I16	Initialization Value for echo correction 1
1044	414	PT_TRK_FS	(80E6)/3		F	Sampling Frequency. Type float [Hz]
1045	415	PT_TRK_LWIND_INI	530		U32	
1046	416	PT_TRK_RWIND_INI	530		U32	
1047	417	PT_SPARE				
1048	418	PT_TRK_MIN_WIND	0	0 : 2047	U16	
1049	419	PT_TRK_MAX_WIND	2047	0 : 2047	U16	
1050	41A	PT_ALPHA00	0.56		F	Alpha filter coefficient, set 00
1051	41B	PT_BETA00	0.09		F	Beta filter coefficient, set 00
1052	41C	PT_ALPHA01	1		F	Alpha filter coefficient, set 01
1053	41D	PT_BETA01	0		F	Beta filter coefficient, set 01
1054	41E	PT_ALPHA10	0.4		F	Alpha filter coefficient, set 10
1055	41F	PT_BETA10	0.2		F	Beta filter coefficient, set 10
1056	420	PT_ALPHA11	0.3		F	Alpha filter coefficient, set 11
1057	421	PT_BETA11	0.3		F	Beta filter coefficient, set 11
1058	422	PT_TRK_INC_THR_0	0		F	#SHR-PROC-3.1.9.1-0020
1059	423	PT_TRK_INC_THR_1	10		F	
1060	424	PT_TRK_TH_0	0		F	
1061	425	PT_TRK_TH_1	0		F	
1062	426	PT_TRK_CO_W_TH	0		I32	
1063	427	PT_TRK_AD_W_TH	1300		I32	
1064	428	PT_TRK_DI_W_TH	250		I32	
1065	429	PT_SPARE				
1066	42A	PT_SPARE				
1067	42B	PT_SPARE				
1068	42C	PT_SPARE				
1069	42D	PT_SPARE				
1070	42E	PT_TRK_MAX_W_TH	1800		I32	#SHR-PROC-3.1.9.2-0010
1071	42F	PT_TRK_MIN_W_TH	650		I32	
1072	430	PT_TRK_DEL_EC_0	0		I32	#SHR-PROC-3.1.9.3-0020
1073	431	PT_TRK_DEL_EC_1	20		I32	
1074	432	PT_TRK_DEL_L_0	0		I32	
1075	433	PT_TRK_DEL_L_1	75		I32	
1076	434	PT_TRK_LEFT_MIN	130		I32	
1077	435	PT_TRK_DEL_R_0	0		I32	
1078	436	PT_TRK_DEL_R_1	75		I32	
1079	537	PT_TRK_RIGHT_MIN	130		I32	
1080	438	PT_SPARE				
1081	439	PT_TRK_LEFT_MAX	600		I32	
1082	43A	PT_TRK_RIGHT_MAX	600		I32	
1083	43B	PT_TRK_DEL_LOL	2		I32	
1084	43C	PT_TRK_MAX_POS	60		I32	
1085	43D	PT_TRK_MIN_POS	900		I32	
1086	43E	PT_SPARE				

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1087	43F	PT_TRK_DEL_OCOG_MAX	66.6666		F	
1088	440	PT_TRK_N_T_DATA	0			##SHR-PROC-3.1.9.3-0040
1089	441	PT_SPARE				
1090	442	PT_TRK_REF_A1	1		F	Coefficient A1 for Reference Function generation
1091	443	PT_TRK_REF_A2	-3.6960e11		F	Coefficient A2 for Reference Function generation
1092	444	PT_TRK_REF_A3	7.5e-8		F	Coefficient A3 for Reference Function generation
1093	445	PT_TRK_REF_TAU0	566.66667		F	Coefficient TAU0 for Reference Function generation
1094	446	PT_SPARE				
1095	447	PT_TRK_REF_R0			F	Run Time Generated array for reference function, Real part
1096	448	PT_TRK_REF_R1			F	
...					F	
3143	C47	PT_TRK_REF_R2047			F	
3144	C48	PT_TRK_REF_I0			F	Run Time Generated array for reference function, Imaginary part
3145	C49	PT_TRK_REF_I1			F	
...					F	
5191	1447	PT_TRK_REF_I2047			F	
5192 5200	1448 1450	PT_SPARE				

Type	Meaning
U8	Unsigned int 8 bit
U16	Unsigned int 16 bit
U32	Unsigned int 32 bit
I32	Signed int 32 bit
I16	Signed int 16 bit
F	Float 32 bit
BF	Bit field

3.3. ORBITAL DATA TABLE

SRQD.- 3.3/010 Orbital Data Table

[AD.1] SHR-DES-3.3.2-0500

The Orbital Data Table shall contain orbit-related parameters required for the open-loop tracking of the radar sounding process. Data for the ODT are generated on Ground and provided to the instrument as part of the programming for each active orbital pass.

EOR

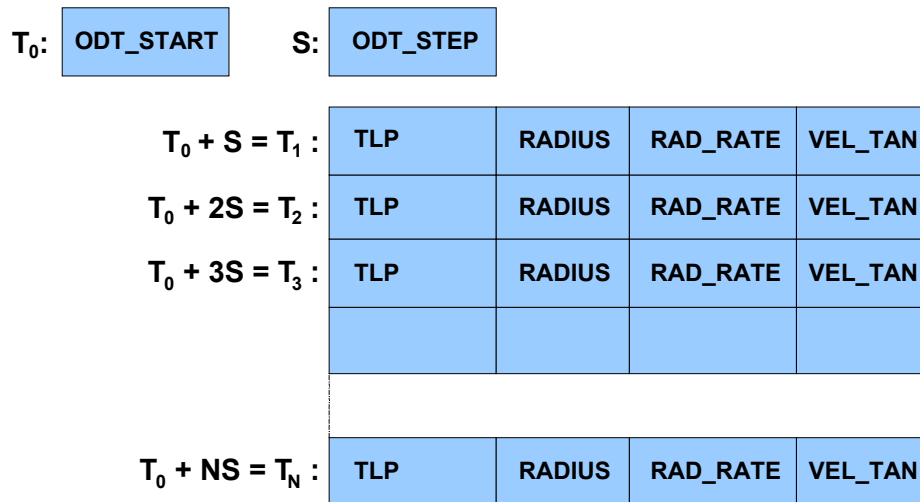


Fig. 3.3-1 - Basic Orbital Table Representation

SRQD.- 3.3/020 Orbital Data Table Default Values

[AD.1] SHR-DES-3.3.2-0520

At SHARAD switch on, the Orbital Data table shall entirely set to zero.

EOR

SRQD.- 3.3/030 Orbital Data Table Format

[AD.1] SHR-DES-3.4.4-0510
 [AD.2] SHR-PROC-3.1.8-0002

The Orbital Data Table shall contain the following 32 bit floating point values:

- S/C Track Length Position (TLP) [Latitude (on Mars aeroid)]
- S/C Radius (distance from Mars' centre)
- S/C Radius Rate
- S/C Tangential Velocity

Each value is defined as function of time and from an initial reference time, ODT_START, and with a fixed step, ODT_STEP, measured in seconds.

For a correct interpretation of the data an additional parameter provide the knowledge if the segment of the orbit of interest is defined after an Ascending or a Descending Node, ODT_ANODE. See Fig 3.3-2.

EOR

Note: Track Length Position (TLP) is an equivalent measure of the Spacecraft position along the ground track, in an arbitrary unit named Track Length Unit (TLU). The TLU will be selected conveniently and coherently with the polynomial coefficients. A hypothesis of TLU could be the distance from a reference point (i.e. equatorial or the initial of the orbit track) covered by the spacecraft and projected on a meridian. If TLU coincides with a meridian, an ambiguity problem in latitude, could be present.

PT		ORBITAL DATA TABLE			
ODT_START	48 bit	TLP	RADIUS	RADIUS_RATE	TANG_VEL
ODT_STEP	8 bit	TLP	RADIUS	RADIUS_RATE	TANG_VEL
ODT_ANODE	8 bit	TLP	RADIUS	RADIUS_RATE	TANG_VEL
	
		32 bit	32 bit	32 bit	32 bit

Fig. 3.3-1 - Orbital Table Format

4. EEPROM LAYOUT

The following tables describe the layout of the EEPROM and of the DATA RAM:

Partition	Address	Description
EEPROM A	0x00000000	Interrupt Table
	0x00000100	Boot / Loader Code
	0x00001FFF	Boot checksum
	0x00002000	Program Code
	0x0000DFFF	Program checksum
	0x0000E000	Parameter Table
	0x0000F000	Copy of Boot / Loader code (1 [^] part)
EEPROM B	0x00010000	Interrupt Table
	0x00010100	Boot / Loader Code
	0x00011FFF	Boot checksum
	0x00012000	Program Code
	0x0001DFFF	Program checksum
	0x0001E000	Parameter Table
	0x0001F000	Copy of Boot / Loader code (2 [^] part)

Data RAM	0x00000000	
	0x00026000	Parameter Table
	0x00027450	OST
	0x0002784C	ODT
	0x0002C84C	