

ASCAT Level 1: Product Format Specification

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Issue 6 Rev 7	11/12/05	EUM.SYS.DCR.05.0283	Sec 6: Corrected typo in Record format version number in table 16
Issue 6 Rev 8	03/04/06	EPS_DCR_EUM_761	<p>Sec 3.1: Remove DEBLOOMING_KERNELS GEADR subclass</p> <p>Sec 1.4: Add Auxiliary Data Inventory (EUM.EPS.SYS.LIS.00.002) as reference document</p> <p>Sec 3.1, 4.1: Add OSV and LSM GEADR subclasses, added information about actual implemented DEB file name</p>
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Issue 7 Rev 0	07/12/07	EPS AB DCR EUM 28	Sec 5, Sec 6 and Annex 2: Updated to be in line with changes in sections 3 and 4.
Issue 7 Rev 0	14/02/08	EPS AB DCR EUM 37	<p>Annex 2: Missing value convention for SPHR fields and size of SPHR records and correct typos in field names</p> <p>Section 6: Added version control for new SPHR</p>
Issue 7 Rev 0	19/02/08	EPS AB DCR EUM 37	Section 3.3. and 4.3: Remove references to old VIADRs (editorial)
v8A	30/04/08		<ul style="list-style-type: none"> - Signature table updated. - Table captions standardised (which also corrected missing entries in List of Tables) and references to sections, tables etc. automated. - Annex 1 & 2 re-titled Appendix A & B. - Several typos corrected.

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v8B	08/09/08		Appendix B: Added link to Annex file in Hummingbird.
v8C	27/04/10	ODT_DCR_155	Add record subclass info.
	23/02/11	ODT_DCR_234	Annex: Field description updates (see Annex for full details).
V9	02/07/12	TBC	<p>Input to ECPD #304:</p> <p>Chapters 3, 4 and 5: Added VEADR-XCL and VEADR-OSV to all products</p> <p>Chapters 3, 4 and 5: Removed GEADR-OSV from all products</p> <p>Chapters 3 and 5: updated of L1a flags and definition</p> <p>Chapters 4 and 5: Added VIADR-GRID for the ASCA_SZF products</p> <p>Chapters 4 and 5: Removed VEADR-DEB</p> <p>Section 4.6.3: updated of SZF product description</p> <p>Chapters 4 and 5: renamed MDR-1B-25KM, MDR-1B-50KM with MDR-1B-125 and MDR-1B-250</p> <p>Chapter 6: added new versions of SPHR, VIADR-VER, MDR-1B-FULL,MDR-1B-25KM (MDR-1B-125) and MDR-1B-50KM (MDR-1B-250), and new entry for VIADR-GRID</p> <p>Appendix A: Updated to reflect L1a flag changes and included explicit definition of all Boolean fields</p> <p>Appendix B: Clean-up of several field descriptions</p> <p>Appendix B: SPHR clean-up</p> <p>Appendix B: added VIADR-GRID</p> <p>Appendix B: MDR-1B-FULL: Full revision</p> <p>Appendix B: MDR-1A: Flag cleanup, removal of several unnecessary fields</p> <p>Appendix B: renamed MDR-1B-25KM, MDR-1B-50KM with MDR-1B-125 and MDR-1B-250 – addition/removal of fields</p>
V10	02/07/12	TBC	Updated signature table and distribution list. Updated link to Annex.
V10A	08/10/2014	AR_14637	Added significant bit to FLAGFIELD_RFR (PGP drops)

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1 INTRODUCTION

1.1 Purpose and Scope

This document is the Advanced Scatterometer (ASCAT) Level 1 Product Format Specification.

The generic product format specification used by this document is defined in the EPS Generic Product Format Specification [AD 1].

The current version of this document describes the ASCAT Level 1 Product Format Version 12. 0. This format version has been issued in order to provide a thorough revision of the SZF product formats, as well as to do a clean-up of auxiliary data records and other small pending issues.

1.2 Structure of the Document

The document is organised in three sections, including the introduction:

- Section 1 describes the scope of the document
- Section 2 contains general aspects of the ASCAT Level 1 product formats
- Sections 3 and 4 describe the instrument and level specific records for Level 1A and 1B products
- Section 5 details the occurrence rates of the various records within Level 1A or 1B product
- Section 6 provides a history of version numbers for the records defined within the document.
- Appendix A summarises the meaning of Boolean and enumerated field values
- Appendix B links to detailed tables describing the record formats

1.3 Applicable Documents

<i>No.</i>	<i>Document Name</i>	<i>EUMETSAT Reference</i>
AD 1	EPS Generic Product Format Specification	EPS/GGS/SPE/96167
AD 2	EPS Ground Segment ASCAT Product Generation Function Specification	EPS/SYS/SPE/990009

1.4 Reference Documents

<i>No.</i>	<i>Document Name</i>	<i>EUMETSAT Reference</i>
RD 1	ASCAT Measurement Data Interface Specification	MO-TN-DOR-SC-0015
RD 2	ASCAT TM/TC ICD	MO-IC-DOR-SC-0031
RD 3	Auxiliary Data Inventory	EUM.EPS.SYS.LIS.00.002

2 FORMAT OF ASCAT LEVEL 1 PRODUCTS

2.1 Overview

The product format for both ASCAT Level 1A and 1B products is based on the generic product format as described in [AD 1]. This document details the instrument-specific and level-specific additions required for ASCAT Level 1 products.

2.2 Generic Record Header Fields

All generic record header fields of the instrument/level specific records defined in this document shall have an INSTRUMENT_GROUP value of ASCAT [AD 1].

3 LEVEL 1A

ASCAT Level 1A corresponds to echo source packets and associated data, referenced to by the echo source packets localisation time (T_0 , See [AD 2]). The START/STOP times indicated in the MPHR and the corresponding VEADRs and VIADRs, are also referenced by the echo source packet localisation time T_0 .

3.1 Secondary Product Header Record

The Level 1a SPHR is detailed in 0 to this document. Note that the SPHR is common to both the Level 1a and Level 1b products and has a subclass ID value of one.

3.2 Global External Auxiliary Data Records

There is one subclass of GEADR for the ASCAT Level 1A Product.

<i>Subclass</i>	<i>Description</i>	<i>Subclass ID</i>
LSM	Land Sea Mask File (xxxx_LSM_xx_) [RD 3]	2

3.3 Global Internal Auxiliary Data Record

There is no GIADR defined for the Level 1a product.

3.4 Variable External Auxiliary Data Records

The following subclasses of VEADR are present for ASCAT Level 1A Product.

<i>Subclass</i>	<i>Description</i>	<i>Subclass ID</i>
VEADR-PRC	Processing parameters file (ASCA_PRC_xx) [RD 3]	1
VEADR-INS	Instrument parameters file (ASCA_INS_xx) [RD 3]	2
VEADR-NTB	Normalisation Table (ASCA_NTB_xx) [RD 3]	3
VEADR-XCL	Antenna gain patterns file (ASCA_XCL_xx) [RD 3]	5
VEADR-OSV	Orbit State Vector prediction file (xxxx_OSV_xx) [RD 3]	6

Table 1: VEADR subclasses for ASCAT Level 1A Product

3.5 Variable Internal Auxiliary Data Records

The following subclasses of VIADR are present for ASCAT Level 1A Product.

<i>Subclass</i>	<i>Description</i>	<i>Subclass ID</i>
VIADR-OA	Orbit/attitude parameters	4
VIADR-VER	Processor and auxiliary file versions used	6

Table 2: VIADR subclasses for ASCAT Level 1A Product

The contents and format of VIADR-OA and VIADR-VER are detailed in Appendix A of this document.

3.6 Measurement Data Records

A Level 1A MDR contains one ASCAT measurement source packet plus other associated data, i.e., geometry, applicable reference functions, quality flags and qualifiers and interpolated telemetry. There is one subclass of MDR for the Level 1A product.

<i>Subclass</i>	<i>Description</i>	<i>Subclass ID</i>
MDR-1A	Level 1A measurement and associated data	0

The contents and format of MDR-1A are detailed in Appendix B to this document.

The contents of the Quality Flags and Qualifiers fields in MDR-1A are explained in the following paragraphs. The meaning of each bit flag is described in Appendix A.

The 8-bit string FLAGFIELD_RF1, associated with a source packet echo line, contains flags related to the quality of the reference functions applicable to a source packet echo line. Its structure is as follows:

<i>Bit</i>	<i>Contents</i>	<i>Possible values</i>
0	F_NOISE	0 or 1
1	F_PG	0 or 1
2	V_PG	0 or 1
3	F_FILTER	0 or 1
4	V_FILTER	0 or 1
5	Spare	0
6	Spare	0
7	Spare	0

Table 3: Structure of FLAGFIELD_RF1

The 8-bit string FLAGFIELD_RF2, associated with a source packet echo line, contains further flags related to the quality of the reference functions applicable to a source packet echo line. Its structure is as follows:

<i>Bit</i>	<i>Contents</i>	<i>Possible values</i>
0	F_PGP	0 or 1
1	F_NP	0 or 1
2	F_PGP_DROP	0 or 1
3	Spare	0
4	Spare	0
5	Spare	0
6	Spare	0
7	Spare	0

Table 4: Structure of FLAGFIELD_RF2

The 8-bit string FLAGFIELD_PL, associated with a source packet echo line, contains flags related to platform orbit/attitude. Its structure is as follows:

<i>Bit</i>	<i>Contents</i>	<i>Possible values</i>
0	F_ORBIT	0 or 1
1	F_ATTITUDE	0 or 1
2	F_OMEGA	0 or 1
3	F_MAN	0 or 1
4	F_OSV	0 or 1
5	Spare	0
6	Spare	0
7	Spare	0

Table 5: Structure of FLAGFIELD_PL

The 8-bit string FLAGFIELD_GEN1 contains flags related to other qualifiers associated with the source packets echo lines, as well as five general quality-derived flags. Its structure is as follows:

<i>Bit</i>	<i>Contents</i>	<i>Possible values</i>
0	F_E_TEL_PRES	0 or 1
1	F_E_TEL_IR	0 or 1
2	F_CE	0 or 1
3	V_CE	0 or 1
4	F_OA	0 or 1
5	F_TEL	0 or 1
6	F_REF	0 or 1
7	Spare	0

Table 6: Structure of FLAGFIELD_GEN1

The 8-bit string FLAGFIELD_GEN2 contains flags related to other qualifiers associated with the source packet individual echo samples. Its structure is as follows:

<i>Bit</i>	<i>Contents</i>	<i>Possible values</i>
0	F_S_A	0 or 1
1	F_LAND	0 or 1
2	F_GEO	0 or 1
3	F_SIGN	0 or 1
4	Spare	0
5	Spare	0
6	Spare	0
7	Spare	0

Table 7: Structure of FLAGFIELD_GEN2

4 LEVEL 1B

There are three ASCAT Level 1B products:

- Level 1B Full
- Level 1B 12.5 km
- Level 1B 25 km

ASCAT Level 1B Full data correspond to the σ_0 values generated from individual echo samples within an echo line in a source packet, together with associated data, referenced by the echo source packet localisation time (T_0 , See [AD 2]). The START/STOP times indicated in the MPHRS and the corresponding VEADRS and VIADRS, are also referenced by the echo source packet localisation time T_0 . The MDR sequence in the ASCAT Level 1B Full product matches that of the corresponding input Level 1A product.

ASCAT Level 1B 12.5 and 25 km data correspond to re-sampled (spatially averaged) σ_0 values, on a 12.5 and 25 km grid, respectively. The product is organised as successive lines of nodes along track, referenced to by the orbit time that corresponds to that line of nodes. See [AD 2]. The START/STOP times indicated in the MPHRS and the corresponding VEADRS and VIADRS, are also referenced with respect to that time.

4.1 Secondary Product Header Record

The Level 1B SPHR is detailed in Appendix B to this document. Note that the SPHR is common to both the Level 1a and Level 1b products and has a subclass ID value of 1.

4.2 Global External Auxiliary Data Records

There is one subclass of GEADR for the ASCAT Level 1B Product.

<i>Subclass</i>	<i>Description</i>	<i>Subclass ID</i>
LSM	Land Sea Mask File (xxxx_LSM_xx_) [RD 3]	2

4.3 Global Internal Auxiliary Data Record

There is no GIADR defined for the Level 1b product.

4.4 Variable External Auxiliary Data Records

The following subclasses of VEADR are present for ASCAT Level 1B Product.

<i>Subclass</i>	<i>Description</i>	<i>Subclass ID</i>
VEADR-PRC	Processing parameters file (ASCA_PRC_xx) [RD 3]	1
VEADR-INS	Instrument parameters file (ASCA_INS_xx) [RD 3]	2
VEADR-NTB	Normalisation Table (ASCA_NTB_xx) [RD 3]	3
VEADR-XCL	Antenna gain patterns file (ASCA_XCL_xx) [RD 3]	5
VEADR-OSV	Orbit State Vector prediction file (xxxx_OSV_xx) [RD 3]	6

Table 8: VEADR subclasses for ASCAT Level 1B Products

4.5 Variable Internal Auxiliary Data Records

The following subclasses of VIADR are present for ASCAT Level 1B Product.

<i>Subclass</i>	<i>Description</i>	<i>Subclass ID</i>
VIADR-OA	Orbit/attitude parameters	4
VIADR-VER	Processor and auxiliary file versions used	6
VIADR-GRID	Only used in SZF products	8

Table 9: VIADR subclasses for ASCAT Level 1B Products

The contents and format of VIADR-OA, VIADR-VER and VIADR-GRID are detailed in Appendix B to this document.

4.6 Measurement Data Record

4.6.1 Record Subclasses

<i>Subclass</i>	<i>Description</i>	<i>Subclass ID</i>
MDR-1B-FULL	Only used in SZF products	3
MDR-1B-125	Only used in SZR products	1
MDR-1B-250	Only used in SZO products	2

Table 10: MDR subclasses for ASCAT Level 1B Products

The contents and format of MDR-1B-125, MDR-1B-250 and MDR-1B-FULL are detailed in 0 to this document.

4.6.2 Level 1B Full-Resolution Product

The ASCAT instrument fires sequentially six antennas, which produce measurements along six different footprints (beams) on the Earth surface. See [AD 2] for more details on the ASCAT measuring geometry). Every ASCAT source packet in Level 1A contains 256 detected power echoes along the antenna elevation angle which, after internal calibration, normalisation and localisation, give 256 geographically-localised σ_0 values at full resolution, per beam. In this context, full resolution refers to the resolution provided by the measurement system, which is limited by the antenna diffraction effects across beam, and by the range discrimination along beam.

The Level 1B full-resolution MDRs follow the same sequence and are organised as the Level 1A MRDs, i.e., according to the original echo source packets localisation time (T_0 . See [AD 2]). Each MDR contains a subset of the 256 geographically-localised σ_0 values, plus associated data. The number of σ_0 values included in the Level 1B full-resolution product is 192, and this number is common for all beams. These 192 values are selected from the original 256, as those covering the nominal 500 km ASCAT swaths for the re-sampled products. See Section 5.

The contents of the Quality Flags and Qualifiers fields in MDR-1B-FULL are equivalent to those in MDR-1A. See Section. 3.4.

4.6.3 Level 1B 12.5 km and 25 km Products

The Level 1B 12.5 km and 25 km product data is organised:

- by lines of nodes along the swath
- by nodes across the swath
- by σ_0 within a node

Each MDR contains data of the three types, defining fields of three different dimensions. Associated data of the same dimensions, related for example to geometry or quality flags, are also included in the MDR.

The position of the nodes in these products does not correspond to the original measuring footprint. The data are a result of spatial re-sampling; hence the geographical location of each node is defined in that process.

Along the swath, lines of nodes are generated with a fixed time interval, which corresponds to a distance in kilometres of approximately 12.5 km or 25 km. The exact spacing between lines depends on the orbit height, which varies slightly around the orbit and between orbits.

Across the swath, lines of nodes are generated on a fixed distance in kilometres of 12.5 km or 25 km. This results in 82 nodes (41 per swath) for the 12.5 km product and 42 nodes (21 per swath) for the 25 km product. Every line of nodes contains data from both swaths, ordered from left swath to right swath and from left to right within the swaths, if one moves in the direction of the instrument.

The number of σ_0 values in an ASCAT Level 1B product node is three, as the name *triplet* indicates.

5 OCCURRENCE INFORMATION

5.1 Level 1A

<i>Record</i>	<i>Occurrence</i>
MPHR	Once per product
SPHR	Once per product
GEADR-LSM	Once per product
VIADR-OA, -VER	Occurs at least once. Re-occurs each time the applicability of the information changes within the product
VEADR-PRC, -INS, -NTB, -XCL, -OSV	Occurs at least once. Re-occurs each time the applicability of the information changes within the product
MDR-1A	Once per measurement source packet

Table 11: Occurrence information for Level 1A records

5.2 Level 1B-Full

<i>Record</i>	<i>Occurrence</i>
MPHR	Once per product
SPHR	Once per product
GEADR-LSM	Once per product
VIADR-OA, -VER, -GRID	Occurs at least once. Reoccurs each time the applicability of the information changes within the product.
VEADR-PRC, -INS, -NTB, -XCL, -OSV	Occurs at least once. Re-occurs each time the applicability of the information changes within the product
MDR-1B-FULL	Once per every antenna beam firing sequence

Table 12: Occurrence information for Level 1B-Full records

5.3 Level 1B-12.5 km

<i>Record</i>	<i>Occurrence</i>
MPHR	Once per product
SPHR	Once per product
GEADR-LSM	Once per product
VIADR-OA, -VER	Occurs at least once. Re-occurs each time the applicability of the information changes within the product.
VEADR-PRC, -INS, -NTB, -XCL, -OSV	Occurs at least once. Re-occurs each time the applicability of the information changes within the product
MDR-1B-125	Once per every 12.5 km grid line of nodes

Table 13: Occurrence information for Level 1B-12.5 km records

5.4 Level 1B-25 km

<i>Record</i>	<i>Occurrence</i>
MPHR	Once per product
SPHR	Once per product
GEADR-LSM	Once per product
VIADR-OA, -VER	Occurs at least once. Re-occurs each time the applicability of the information changes within the product.
VEADR-PRC, -INS, -NTB, -XCL, -OSV	Occurs at least once. Re-occurs each time the applicability of the information changes within the product
MDR-1B-250	Once per every 25 km grid line of nodes

Table 14: Occurrence information for Level 1B-25 km records

6 RECORD FORMAT VERSION CONTROL

This section provides version numbers for the records defined within this document.

<i>Record Subclass</i>	<i>Format Version Number</i>	<i>Issue Defined</i>
SPHR	2	9.0
	1	7.0
VIADR-OA	2	6.4
	1	6.3 (CDR)
VIADR-VER	2	9.0
	1	7.0
VIADR-GRID	1	9.0
MDR-1A	4	9.1
	3	6.5
	2	6.4
	1	6.3 (CDR)
MDR-1B-FULL	4	9.0
	3	6.6
	2	6.4
	1	6.3 (CDR)
MDR-1B-250	3	9.0
	2	6.4
	1	6.3 (CDR)
MDR-1B-125	3	9.0
	2	6.4
	1	6.3 (CDR)

Table 15: Record Format Version Numbers

The product format version summarising the latest baseline corresponds to 12.0. This number is reflected in the following MPHR fields of all ASCAT Level 1 products:

- PRODUCT_MAJOR_VERSION = 12
- PRODUCT_MINOR_VERSION = 00

APPENDIX A: MEANING OF VALUES IN BOOLEAN AND ENUMERATED FIELDS

<i>Record</i>	<i>Field</i>	<i>value = 0</i>	<i>value = 1</i>
MDR-1A MDR-1B-50KM MDR-1B-25KM MDR-1B-FULL	DEGRADED_INST_MDR	Nominal	Degraded
MDR-1A MDR-1B-50KM MDR-1B-25KM MDR-1B-FULL	DEGRADED_PROC_MDR	Nominal	Degraded
MDR-1A	AS_DES_PASS	Ascending pass	Descending pass
MDR-1A	LEFT_RIGHT_SWATH	Left Swath	Right Swath
MDR-1B-50KM MDR-1B-25KM	SWATH_INDICATOR	Left Swath	Right Swath
MDR-1B-50KM MDR-1B-25KM	F_KP	Kp estimate at nominal quality	Kp estimate at non-nominal quality
MDR-1B-FULL	AS_DES_PASS	Ascending pass	Descending pass
MDR-1A MDR-1B-FULL	FLAGFIELD_RF1: F_NOISE	If noise packets sequence nominal	If noise packets interpolated during processing
MDR-1A MDR-1B-FULL	FLAGFIELD_RF1: F_PG	Nominal PGP	Degraded PGP
MDR-1A MDR-1B-FULL	FLAGFIELD_RF1: V_PG	Valid PGP	Not valid PGP
MDR-1A MDR-1B-FULL	FLAGFIELD_RF1: F_FILTER	Nominal hrx	Degraded hrx
MDR-1A MDR-1B-FULL	FLAGFIELD_RF1: V_FILTER	Valid hrx	Not valid hrx
MDR-1A MDR-1B-FULL	FLAGFIELD_RF2: F_NP	Valid noise power	Degraded noise power

<i>Record</i>	<i>Field</i>	<i>value = 0</i>	<i>value = 1</i>
MDR-1A MDR-1B-FULL	FLAGFIELD_RF2: F_PGP	Valid PGP	Degraded PGP
MDR-1A MDR-1B-FULL	FLAGFIELD_RF2: F_PGP_DROP	Continuous PGP	Drop in PGP
MDR-1A MDR-1B-FULL	FLAGFIELD_PL: F_ORBIT	Accurate NTB orbit height prediction	Inaccurate NTB orbit height prediction
MDR-1A MDR-1B-FULL	FLAGFIELD_PL: F_ATTITUDE	Nominal attitude (yaw steering)	Non-nominal attitude
MDR-1A MDR-1B-FULL	FLAGFIELD_PL: F_OMEGA	Correct instrument parameter configuration	Instrument parameter configuration mismatch
MDR-1A MDR-1B-FULL	FLAGFIELD_PL: F_MAN	No manoeuvre	Manoeuvre
MDR-1A MDR-1B-FULL	FLAGFIELD_PL: F_OSV	OSV file available to the processing	OSV file not available
MDR-1A MDR-1B-FULL	FLAGFIELD_GEN1: F_E_TEL_PRES	Interpolated HKTM telemetry present	Interpolated HKTM telemetry missing
MDR-1A MDR-1B-FULL	FLAGFIELD_GEN1: F_TEL_IR	All interpolated HKTM telemetry parameters within prescribed thresholds	Some interpolated HKTM telemetry parameters put of prescribed thresholds
MDR-1A MDR-1B-FULL	FLAGFIELD_GEN1: F_CE	If F_NOISE & F_PG & F_FILTER are 0	If F_NOISE or F_PG or F_FILTER are 1
MDR-1A MDR-1B-FULL	FLAGFIELD_GEN1: V_CE	If F_NOISE & V_PG & V_FILTER are 0	If F_NOISE or V_PG or V_FILTER are 1
MDR-1A MDR-1B-FULL	FLAGFIELD_GEN1: F_OA	If F_ORBIT & F_ATTITUDE & F_OMEGA & F_MAN are 0	If F_ORBIT or F_ATTITUDE or F_OMEGA or F_MAN are 1
MDR-1A MDR-1B-FULL	FLAGFIELD_GEN1: F_TEL	If F_E_TEL_PRES and F_TEL_IR are 0	If F_E_TEL_PRES or F_TEL_IR are 1

<i>Record</i>	<i>Field</i>	<i>value = 0</i>	<i>value = 1</i>
MDR-1A MDR-1B-FULL	FLAGFIELD_GEN1: F_REF	If F_PGP and F_NP are 0.	If F_PGP or F_NP are 1.
MDR-1A MDR-1B-FULL	FLAGFIELD_GEN2: F_S_A	If no risk of solar array panel reflections interference .	If risk of solar array panel reflections interference.
MDR-1A MDR-1B-FULL	FLAGFIELD_GEN2: F_LAND	no land	land
MDR-1A MDR-1B-FULL	FLAGFIELD_GEN2: F_GEO	If geolocation algorithm covered.	If geolocation algorithm failed.
MDR-1A MDR-1B-FULL	FLAGFIELD_GEN2: F_SIGN	If sigma0 in linear units is positive.	If sigma0 in linear units is negative and value in dB has been calculated from its unsigned value.

Table 16: Meaning of Boolean field values

<i>Record</i>	<i>Field</i>	<i>Meaning</i>
MDR-1B-250 MDR-1B-125	F_USABLE	0 = GOOD 1 = USABLE 2 = NON USABLE See [AD 2]
MDR-1B-FULL	BEAM_NUMBER	0 = (value reserved) 1 = Left Fore Antenna 2 = Left Mid Antenna 3 = Left Aft Antenna 4 = Right Fore Antenna 5 = Right Mid Antenna 6 = Right Aft Antenna

Table 17: Meaning of enumerated field values

APPENDIX B: DETAILED SPECIFICATION OF ASCAT LEVEL 1 DATA RECORDS

In the Annex that follows this page, detailed format specifications are included for all these Variable Internal and Measurement Data Records in ASCAT Level 1 products:

- SPHR
- VIADR-OA
- VIADR-VER
- VIADR-GRID
- MDR-1A
- MDR-1B-250
- MDR-1B-125
- MDR-1B-FULL

The Annex is also available as a separate spreadsheet.

This Document	
Title	ASCAT LEVEL 1 PRODUCT FORMAT SPECIFICATION TABLES
Reference Number	EPS/MIS/SPE/97233
Change Record	
Issue 4 Draft A	Removed Detailed Navigation section from SPHR-1A
	Ensured that 256 words of echo at 2 bytes per word were reflected in product size.
Issue 4 Draft B	Major re-write of all records
Issue 4 Draft C	ADD Full-res MDR and ADR sheets
Issue 5 Revision 0	Issue for CGS PDR
Issue 5 Revision 1	Revised Issue for CGS PDR
Issue 5 Revision 2	Moved all ADR fields into relevant MDR
Issue 6 Revision 0 FOR INTERNAL REVIEW 08-02-02	Issue for Internal Review prior to CDR release
Issue 6 Revision 1 28-02-02	Internal review comments implemented Note: There are still TBDs and TBCs to be solved in next issues of document, related to : instrument parameters (input from instrument provider), configuration aspects (pending finalisation of prototyping) and with the transponders development (input from transponders provider). They affect mostly VIADRs and will be resolved in due course.
Issue 6 Revision 1 12-03-02	VIADR-1A and -1B deleted because of the removal of the end of dup degraded product processing and distribution (System Forum Decision, issue 1859). Main/continuation region and data absence/presence flags deleted for same reason
Issue 6 Revision 2 18-04-02	VIADR_PP: added X_ORBIT and X_ATTITUDE VIADR_IP: changed dimensions of A_TX
Issue 6 Revision 3 13-06-02	VIADR_PP: added THETA_LOOK_MID VIADR_PP: added DELTA_T_FLN VIADR_PP: added GAP_GAIN_RANGE_PEAK VIADR_PP: re-definition of AGPO_PASS_SET VIADR_PP: added AGPO_T_SET VIADR_IP: added GUARD_TIME_G4 VIADR_IP: deleted Z_RAN (same as T_RL) VIADR-IP added GUARD_TIME_G4_CAL VIADR-DUMP: Dump identification modified MDR-1A, MDR-1B-Full: Dump identification in associated data dropped The above, plus other modifications concerning scales, units or field sizes shown by shading affected fields
Issue 6 Revision 4 20-12-02	VIADR-IP: OMEGA_FIR, Z_FIR and X_FIR deleted and replaced by a flag FIR_FUNC

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	<p>VIADR-PP: AGPO-associated parameters refined VIADR-IP: chirp-related parameters modified The above, plus other modifications concerning scales, units or field sizes shown by shading affected fields</p>
Issue 6 Revision 5 31/03/04	<p>VIADR-IP: offset column corrected. Record format not changed, but correct record size now given. VIADR-PP: offset column corrected. Record format not changed, but correct record size now given. MDR-1A: RX_FILTER_SHAPE SF changed from 4 to 6 and field type changed from u-integer4 to integer4 VIADR-PP: Added fields TEL_R_T_ANT_01 to TEL_R_T_ANT_12 and TEL_R_T_SFE_01 to TEL_R_T_SFE_06</p>
Issue 6 Revision 6 25/11/05	MDR-1B-FULL: Dimensions of flags corrected.
Issue 6 Revision 7 11/12/05	No changes (Note that the change tracking, i.e., highlighting of the changed fields in different colors, is set w.r.t the latest different version, i.e., 6.5).
Issue 6 Revision 8 03/04/06	No changes
Issue 7 Revision 0 28/02/08	<p>Removed the following records: VIADR-TR, -PP, -IP, -DUMP Added the following records: SPHR</p>
Version 8A 16/06/08	Migrated into Hummingbird. Contents identical with issue 7.0.
Version 8B 08/09/08	No changes to annex
Version 8C 23/02/11	ODT DCR 234
	All MDR records: Added Description note on azimuth angle range for those fields including azimuth angle. This is because some fields use the standard 0...360 degree range, while others use -180...+180.
Version 9 22/06/2012	<p>SPHR: Clean-up due to L1A and L1B flag changes VIADR-VER: Replacement of DEB fields with XCL fields VIADR-GRID: Added</p> <p>MDR-1A: Removal of FLAGFIELD_SIN, GROUND_RANGE, Right_LEFT_SWATH, DISC_SAMPLE_INDEX, DISC_FREQ, NORMAL_FACTORS_(DPITCH/DROLL/DYAW)_NOM; change of field type for TRF_P; renamed FLAG_FIELD_SIN and FLAG_FIELD_RF; added LAND_FRAC, BEAM_NUMBER, DEGRADED_INST_MDR and DEGRADED_PROC_MDR</p> <p>MDR-1B FULL Complete re-write</p> <p>MDR-1B 50km: Replaced with MDR-1B 250; added ABS_LINE_NUMBER, AS_DES_PASS, NUM_VAL_TRIP, F_REF, DEGRADED_INST_MDR and DEGRADED_PROC_MDR; removed ATMOSPHERIC_HEIGHT, ATMOPHERIC_LOSS, NODE_NUM and F_EXT_FIL; cleaned-up several field descriptions, for user friendliness</p> <p>MDR-1B 25km: Replaced with MDR-1B 250; added ABS_LINE_NUMBER, AS_DES_PASS, NUM_VAL_TRIP, F_REF, DEGRADED_INST_MDR and DEGRADED_PROC_MDR; removed ATMOSPHERIC_HEIGHT, ATMOPHERIC_LOSS, NODE_NUM and F_EXT_FIL; cleaned-up several field descriptions, for user friendliness</p>

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Version 9A 18/09/2012	Miliseconds corrected to milliseconds in field description in SPHR
	Added N_F_SIGN to SPHR and removed NODE-NUM from SZO, to align with SZR
Version 9B 2/05/2013	Version change of control document from EPS.MSI.SPE.97223 to EUM/RSP/SPE/13/702073
	Changedd description of azimuth angle to include "with respect to North" qualifier
Version 10 2/05/2013	DM Tool added new version number. No changes from above
Version 10A 27/05/2013	Detailed description of azimuth angle fields clarified

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 Worksheet: SPHR

FIELD	DESCRIPTION	SF	UNITS	EQUIVALENT TYPE	ENCODE CHARS	FIE LD	OFFSET
RECORD_HEADER	Generic Record Header - NOTE: This is binary!	NA	NA	REC_HEAD	20	20	0
L1A Product Details							
N_L1A_MDR	Total number of MDRs in the L1A product	0	count	U-INTEGER	8	41	20
N_L1A_MDR_B0	Number of MDRs in the L1A product corresponding to Beam 0	0	count	U-INTEGER	8	41	61
N_L1A_MDR_B1	Number of MDRs in the L1A product corresponding to Beam 1	0	count	U-INTEGER	8	41	102
N_L1A_MDR_B2	Number of MDRs in the L1A product corresponding to Beam 2	0	count	U-INTEGER	8	41	143
N_L1A_MDR_B3	Number of MDRs in the L1A product corresponding to Beam 3	0	count	U-INTEGER	8	41	184
N_L1A_MDR_B4	Number of MDRs in the L1A product corresponding to Beam 4	0	count	U-INTEGER	8	41	225
N_L1A_MDR_B5	Number of MDRs in the L1A product corresponding to Beam 5	0	count	U-INTEGER	8	41	266
N_GAPS	Number of data gaps	0	count	U-INTEGER	8	41	307
TOTAL_GAPS_SIZE	Total gap size in milliseconds	0	ms	U-INTEGER	8	41	348
N_HKTM_PACKETS_RECEIVED	Number of HKTM telemetry packets received within the sensing time of the product	0	count	U-INTEGER	8	41	389
L1A/L1B SZF Product Quality							
N_F_ECHO	Number of instances where the flag F_ECHO is 1	0	count	U-INTEGER	8	41	Deleted
N_M_ECHO	Number of instances where the flag M_ECHO is 1	0	count	U-INTEGER	8	41	Deleted
N_C_ECHO	Number of instances where the flag C_ECHO is 1	0	count	U-INTEGER	8	41	Deleted
N_I_ECHO	Number of instances where the flag I_ECHO is 1	0	count	U-INTEGER	8	41	Deleted
N_F_NOISE	Number of instances where the flag F_NOISE is 1	0	count	U-INTEGER	8	41	430
N_M_NOISE	Number of instances where the flag M_NOISE is 1	0	count	U-INTEGER	8	41	Deleted
N_C_NOISE	Number of instances where the flag C_NOISE is 1	0	count	U-INTEGER	8	41	Deleted
N_I_NOISE	Number of instances where the flag I_NOISE is 1	0	count	U-INTEGER	8	41	Deleted
N_F_PG	Number of instances where the flag F_PG is 1	0	count	U-INTEGER	8	41	471
N_V_PG	Number of instances where the flag V_PG is 1	0	count	U-INTEGER	8	41	512
N_F_EXT_PG	Number of instances where the flag F_EXT_PG is 1	0	count	U-INTEGER	8	41	Deleted
N_F_FILTER	Number of instances where the flag F_FILTER is 1	0	count	U-INTEGER	8	41	553
N_V_FILTER	Number of instances where the flag V_FILTER is 1	0	count	U-INTEGER	8	41	594
N_F_PGP	Number of instances where the flag F_PGP is 1	0	count	U-INTEGER	8	41	635
N_F_NP	Number of instances where the flag F_NP is 1	0	count	U-INTEGER	8	41	676
N_F_EXT_FILTER	Number of instances where the flag F_EXT_FILTER is 1	0	count	U-INTEGER	8	41	Deleted

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FIELD	DESCRIPTION	SF	UNITS	EQUIVALENT TYPE	ENCODE CHARS	FIE LD	OFFSET
N_F_TEL_FILTER	Number of instances where the flag F_TEL_FILTER is 1	0	count	U-INTEGER	8	41	Deleted
N_F_ORBIT	Number of instances where the flag F_ORBIT is 1	0	count	U-INTEGER	8	41	717
N_F_ATTITUDE	Number of instances where the flag F_ATTITUDE is 1	0	count	U-INTEGER	8	41	758
N_F_OMEGA	Number of instances where the flag F_OMEGA is 1	0	count	U-INTEGER	8	41	799
N_F_MAN	Number of instances where the flag F_MAN is 1	0	count	U-INTEGER	8	41	840
N_F_DSL	Number of instances where the flag F_DSL is 1	0	count	U-INTEGER	8	41	Deleted
N_F_OSV	Number of instances where the flag F_OSV is 1	0	count	U-INTEGER	8	41	881
N_F_E_TEL_PRES	Number of instances where the flag F_E_TEL_PRES is 1	0	count	U-INTEGER	8	41	922
N_F_E_TEL_IR	Number of instances where the flag F_E_TEL_IR is 1	0	count	U-INTEGER	8	41	963
N_F_CE	Number of instances where the flag F_CE is 1	0	count	U-INTEGER	8	41	1004
N_V_CE	Number of instances where the flag V_CE is 1	0	count	U-INTEGER	8	41	1045
N_F_OA	Number of instances where the flag F_OA is 1	0	count	U-INTEGER	8	41	1086
N_F_TEL	Number of instances where the flag F_TEL is 1	0	count	U-INTEGER	8	41	1127
N_F_REF	Number of instances where the flag F_REF is 1	0	count	U-INTEGER	8	41	1168
N_F_SA	Number of instances where the flag F_SA is 1	0	count	U-INTEGER	8	41	1209
N_F_LAND	Number of instances where the flag F_LAND is 1	0	count	U-INTEGER	8	41	1250
N_F_GEO	Number of instances where the flag F_GEO is 1	0	count	U-INTEGER	8	41	1291
N_F_SIGN	Number of instances where the flag F_SIGN is 1	0	count	U-INTEGER	8	41	1332
L1b SZO/R product details Note: If the SPHR is part of a L1A product, the field values in this section will be filled in with the value 99999999							
N_L1B_MDR	Total number of MDRs in the L1B product	0	count	U-INTEGER	8	41	1373
N_EMPTY_S0_TRIP	Number of fully empty s0 triplets	0	count	U-INTEGER	8	41	1414
N_L1B_MDR_F	Number of s0 FORE valid values	0	count	U-INTEGER	8	41	1455
N_EMPTY_S0_TRIP_F	Number of s0 FORE default values	0	count	U-INTEGER	8	41	1496
N_L1B_MDR_M	Number of s0 MID valid values	0	count	U-INTEGER	8	41	1537
N_EMPTY_S0_TRIP_M	Number of s0 MID default values	0	count	U-INTEGER	8	41	1578
N_L1B_MDR_A	Number of s0 AFT valid values	0	count	U-INTEGER	8	41	1619
N_EMPTY_S0_TRIP_A	Number of s0 AFT default values	0	count	U-INTEGER	8	41	1660
L1b product quality Note: If the SPHR is part of a L1A product, the field values in this section will be filled in with the value 99999999							
N_F_KP_F	Number of instances where the flag F_KP is set to 1 for FORE s0s	0	count	U-INTEGER	8	41	1701
N_F_USABLE_F	Number of instances where the flag F_USABLE is set to 2 for FORE s0s	0	count	U-INTEGER	8	41	1742

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 Worksheet: SPHR

FIELD	DESCRIPTION	SF	UNITS	EQUIVALENT TYPE	ENCODE CHARS	FIE LD	OFFSET
AVG_F_F_F	Averaged value of F_F for FORE s0s	0	%	U-INTEGER	8	41	Deleted
AVG_F_V_F	Averaged value of F_V for FORE s0s	0	%	U-INTEGER	8	41	Deleted
AVG_F_OA_F	Averaged value of F_OA for FORE s0s	0	%	U-INTEGER	8	41	Deleted
AVG_F_SA_F	Averaged value of F_SA for FORE s0s	0	%	U-INTEGER	8	41	Deleted
AVG_F_TEL_F	Averaged value of F_TEL for FORE s0s	0	%	U-INTEGER	8	41	Deleted
AVG_F_EXT_FIL_F	Averaged value of F_EXT_FIL for FORE s0s	0	%	U-INTEGER	8	41	Deleted
AVG_F_LAND_F	Averaged value of F_LAND for FORE s0s	0	%	U-INTEGER	8	41	Deleted
N_F_F_F	Number of instances where F_F is greater than 0 for FORE s0s	0	count	U-INTEGER	8	41	1783
N_F_V_F	Number of instances where F_V is greater than 0 for FORE s0s	0	count	U-INTEGER	8	41	1824
N_F_OA_F	Number of instances where F_OA is greater than 0 for FORE s0s	0	count	U-INTEGER	8	41	1865
N_F_SA_F	Number of instances where F_SA is greater than 0 for FORE s0s	0	count	U-INTEGER	8	41	1906
N_F_TEL_F	Number of instances where F_TEL is greater than 0 for FORE s0s	0	count	U-INTEGER	8	41	1947
N_F_REF_F	Number of instances where F_REF is greater than 0 for FORE s0s	0	count	U-INTEGER	8	41	1988
N_F_LAND_F	Number of instances where F_LAND is greater than 0 for FORE s0s	0	count	U-INTEGER	8	41	2029
N_F_KP_M	Number of instances where the flag F_KP is set to 1 for MID s0s	0	count	U-INTEGER	8	41	2070
N_F_USABLE_M	Number of instances where the flag F_USABLE is set to 2 for MID s0s	0	count	U-INTEGER	8	41	2111
AVG_F_F_M	Averaged value of F_F for MID s0s	0	%	U-INTEGER	8	41	Deleted
AVG_F_V_M	Averaged value of F_V for MID s0s	0	%	U-INTEGER	8	41	Deleted
AVG_F_OA_M	Averaged value of F_OA for MID s0s	0	%	U-INTEGER	8	41	Deleted
AVG_F_SA_M	Averaged value of F_SA for MID s0s	0	%	U-INTEGER	8	41	Deleted
AVG_F_TEL_M	Averaged value of F_TEL for MID s0s	0	%	U-INTEGER	8	41	Deleted
AVG_F_EXT_FIL_M	Averaged value of F_EXT_FIL for MID s0s	0	%	U-INTEGER	8	41	Deleted
AVG_F_LAND_M	Averaged value of F_LAND for MID s0s	0	%	U-INTEGER	8	41	Deleted
N_F_F_M	Number of instances where F_F is greater than 0 for MID s0s	0	count	U-INTEGER	8	41	2152
N_F_V_M	Number of instances where F_V is greater than 0 for MID s0s	0	count	U-INTEGER	8	41	2193
N_F_OA_M	Number of instances where F_OA is greater than 0 for MID s0s	0	count	U-INTEGER	8	41	2234
N_F_SA_M	Number of instances where F_SA is greater than 0 for MID s0s	0	count	U-INTEGER	8	41	2275
N_F_TEL_M	Number of instances where F_TEL is greater than 0 for MID s0s	0	count	U-INTEGER	8	41	2316
N_F_REF_M	Number of instances where F_REF is greater than 0 for MID s0s	0	count	U-INTEGER	8	41	2357
N_F_LAND_M	Number of instances where F_LAND is greater than 0 for MID s0s	0	count	U-INTEGER	8	41	2398

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FIELD	DESCRIPTION	SF	UNITS	DIM1	DIM2	DIM3	TYPE	TYPE SIZE	FIELD SIZE	OFFSET
RECORD_HEADER	Generic Record Header			1	1	1	REC_HEAD	20	20	0
PROCESSOR_VERSION1	PPF major release number	n/a	n/a	1	1	1	enumerated	1	1	20
PROCESSOR_VERSION2	PPF release number	n/a	n/a	1	1	1	enumerated	1	1	21
PROCESSOR_VERSION3	PPF patch number	n/a	n/a	1	1	1	enumerated	1	1	22
PRC_VERSION1	ASCA_PRC_xx_Major Version	n/a	n/a	1	1	1	enumerated	1	1	23
PRC_VERSION2	ASCA_PRC_xx_Minor Version	n/a	n/a	1	1	1	enumerated	1	1	24
INS_VERSION1	ASCA_INS_xx_Major Version	n/a	n/a	1	1	1	enumerated	1	1	25
INS_VERSION2	ASCA_INS_xx_Minor Version	n/a	n/a	1	1	1	enumerated	1	1	26
NTB_VERSION1	ASCA_NTB_xx_Major Version	n/a	n/a	1	1	1	enumerated	1	1	27
NTB_VERSION2	ASCA_NTB_xx_Minor Version	n/a	n/a	1	1	1	enumerated	1	1	28
XCL_VERSION1	ASCA_XCL_xx_Major Version	n/a	n/a	1	1	1	enumerated	1	1	29
XCL_VERSION2	ASCA_XCL_xx_Minor Version	n/a	n/a	1	1	1	enumerated	1	1	30
TOTAL SIZE										31

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 Worksheet: VIADR-OA

FIELD	DESCRIPTION	SF	UNITS	DIM1	DIM2	DIM3	TYPE	TYPE SIZE	FIELD SIZE	OFFSET
RECORD_HEADER	Generic Record Header			1	1	1	REC_HEAD	20	20	0
AC.UTC_TIME	Ascending node UTC time	n/a	UTC	1	1	1	long cds time	8	8	20
AC.SV.POSITION	State vector at Ascending Node - Position	4	k m	3	1	1	integer8	8	24	28
AC.SV.VELOCITY	State vector at Ascending Node - Velocity	4	m/s	3	1	1	integer8	8	24	52
ATT.YS.LAW	Attitude Yaw Steering Law: Amplitude parameters: Cx (pitch), Cy (roll) and Cz (yaw)	6	radians	3	1	1	integer4	4	12	76
ATT.DIST.LAW	Attitude Distortion Law parameters, DIM1 is for 3 different coefficients, DIM3 is for 4 different values per coefficient, DIM2 is for three different attitude angles	6	n/a	3	3	4	integer4	4	144	88
TOTAL SIZE										232

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 Worksheet: VIADR-GRID

FIELD	DESCRIPTION	SF	UNITS	DIM1	DIM2	DIM3	TYPE	TYPE SIZE	FIELD SIZE	OFFSET
RECORD_HEADER	Generic Record Header			1	1	1	REC_HEAD	20	20	0
UTC_LINE_NODES	UTC time of reference line of nodes along the swath grid	n/a	UTC	1	1	1	short cds time	6	6	20
ABS_LINE_NUMBER	Absolute (unique) number for a reference line of nodes along the swath, generated every 6.25 km or, more accurately, 0.9375 s. Each line has 162 points, 81 across the left swath, 81 across the right swath. The time associated with each row corresponds to (ABS_LINE_NUMBER * 0.9375) seconds after 2000/01/01 00:00:00	0	count	1	1	1	integer4	4	4	26
LATITUDE_LEFT	Latitude values (-90 to 90 deg) for 81 points spaced by 6.25km across the left swath.	6	deg	81	1	1	integer4	4	324	30
LONGITUDE_LEFT	Longitude values (0 to 360 deg) for 81 points spaced by 6.25km across the left swath.	6	deg	81	1	1	integer4	4	324	354
LATITUDE_RIGHT	Latitude values (-90 to 90 deg) for 81 points spaced by 6.25km across the right swath.	6	deg	81	1	1	integer4	4	324	678
LONGITUDE_RIGHT	Longitude values (0 to 360 deg) for 81 points spaced by 6.25km across the right swath.	6	deg	81	1	1	integer4	4	324	1002
TOTAL SIZE										1326

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 ASCAT_Level_1_Product_Format_Specification_-_Annex[1].xls
 Worksheet: MDR-1A

FIELD	DESCRIPTION	SF	UNITS	DIM1	DIM2	DIM3	TYPE	TYPE SIZE	FIELD SIZE	OFFSET
RECORD_HEADER	Generic Record Header			1	1	1	REC_HEAD	20	20	0
Quality of MDR has been degraded from nominal due to a processing degradation.										
DEGRADED_INST_MDR	Quality of MDR has been degraded from nominal due to an instrument degradation.	n/a	n/a	1	1	1	boolean	1	1	20
DEGRADED_PROC_MDR	Quality of MDR has been degraded from nominal due to a processing degradation.	n/a	n/a	1	1	1	boolean	1	1	21
ASCAT Measurement source packet										
PH	Packet Primary Header		see RD-1	3	1	1	bitst(16)	2	6	22
SH	Secondary Header		see RD-1	1	1	1	bitst(64)	8	8	28
SBT_TIMETAG	SBT at Time Tag		see RD-1	1	1	1	bitst(48)	6	6	36
PRI_COUNT_TIMETAG	PRI Count at Time Tag		see RD-1	1	1	1	bitst(16)	2	2	42
TAG_FIELD	Tag Field		see RD-1	1	1	1	bitst(8)	1	1	44
GP_FLAG	Ground Processor Flags		see RD-1	1	1	1	bitst(8)	1	1	45
PRI_COUNT	PRI Count		see RD-1	1	1	1	bitst(16)	2	2	46
OB_SW_CONFIG	On Board Software Configuration		see RD-1	1	1	1	bitst(16)	2	2	48
OB_PARA_CONFIG	On Board Parameter Configuration		see RD-1	1	1	1	bitst(16)	2	2	50
SPARE	Spare		see RD-1	1	1	1	bitst(16)	2	2	52
INST_CONFIG	Instrument Configuration		see RD-1	1	1	1	bitst(16)	2	2	54
SFE_TEMP	SFE Temperatures 1-6		see RD-1	6	1	1	bitst(16)	2	12	56
ANT_TEMP	Antenna Temperatures 1-12		see RD-1	12	1	1	bitst(16)	2	24	68
RECEIVER_GAIN	Receiver Gain		see RD-1	1	1	1	bitst(16)	2	2	92
OUT_OF_RANGE_COUNT	Out-of-range Count		see RD-1	1	1	1	bitst(16)	2	2	94
INT_TRANS_POWERS	Integrated Transmitted Powers 1-4		see RD-1	4	1	1	bitst(16)	2	8	96
INT_REFL_POWERS	Integrated Reflected Powers 1-4		see RD-1	4	1	1	bitst(16)	2	8	104
INT_CAL_POWERS	Integrated Calibration Powers 1-4		see RD-1	4	1	1	bitst(16)	2	8	112
CAL_POWERS	Calibration Powers 1-4		see RD-1	2	3	4	bitst(16)	2	48	120
ECHO_DATA	Echo data		see RD-1	256	1	1	bitst(16)	2	512	168
PACKET_ERROR_CTRL_FIELD	Packet Error Control Field		see RD-1	1	1	1	bitst(16)	2	2	680
ASOCIATED DATA										
General appended data										
UTC_SOURCE_PACKET	UTC time associated to source packet (T_E)	0	UTC	1	1	1	long cds time	8	8	682
ORBIT_NUMBER	Orbit number	0	count	1	1	1	u-integer4	4	4	690
AS_DES_PASS	Ascending/descending pass indicator	n/a	n/a	1	1	1	boolean	1	1	694
LEFT_RIGHT_SWATH	Left/Right Swath indicator	n/a	n/a	1	1	1	boolean	1	1	Deleted
BEAM_NUMBER	Antenna Beam number	n/a	n/a	1	1	1	enumerated	1	1	695

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 ASCAT_Level_1_Product_Format_Specification_-_Annex[1].xls
 Worksheet: MDR-1A

FIELD	DESCRIPTION	SF	UNITS	DIM1	DIM2	DIM3	TYPE	TYPE SIZE	FIELD SIZE	OFFSET
Appended geometry information										
UTC_LOCALISATION	UTC time associated to the echo data (localisation time T_0)	0	UTC	1	1	1	long cds time	8	8	696
LATITUDE	Geodetic Latitude	6	deg	256	1	1	integer4	4	1024	704
LONGITUDE	East Longitude (0-360 deg)	6	deg	256	1	1	integer4	4	1024	1728
TRF_P	Terrestrial Reference Frame coordinates x, y and z	3	km	256	3	1	integer4	4	3072	2752
GROUND_RANGE	Ground range	1	km	256	1	1	u-integer2	2	512	Deleted
LAND_FRAC	Estimation of the land fraction in the measurement	2	n/a	256	1	1	u-integer2	2	512	5824
INCIDENCE_ANGLE	Incidence angle	2	deg	256	1	1	u-integer2	2	512	6336
AZIMUTH_ANGLE	Azimuth angle of the up-wind direction for a given antenna beam (range: -180 to +180, where minus is west and plus is east with respect to North)	2	deg	256	1	1	integer2	2	512	6848
DISC_FREQ	Discriminator Frequency	2	KHz	256	1	1	u-integer2	2	512	Deleted
DISC_SAMPLE_INDEX	Discriminator Sample Index	0	count	256	1	1	enumerated	1	256	Deleted
Applicable reference functions										
RX_FILTER_SHAPE	Rx Filter shape function	6	n/a	256	1	1	integer4	4	1024	7360
NOISE_POWER	Noise Power value	4	n/a	1	1	1	u-integer4	4	4	8384
POWER_GAIN_PRODUCT	Power Gain Product value	4	n/a	1	1	1	u-integer4	4	4	8388
NORMAL_FACTORS_NOM	Normalisation Factors for nominal satellite pointing at that orbit time	2	Watt	256	1	1	u-integer4	4	1024	8392
NORMAL_FACTORS_DROLL_NOM	Normalisation Factors roll derivative for nominal satellite pointing at that orbit time	2	Watt/deg	256	1	1	integer4	4	1024	Deleted
NORMAL_FACTORS_DPITCH_NOM	Normalisation Factors pitch derivative for nominal satellite pointing at that orbit time	2	Watt/deg	256	1	1	integer4	4	1024	Deleted
NORMAL_FACTORS_DYAW_NOM	Normalisation Factors yaw derivative for nominal satellite pointing at that orbit time	2	Watt/deg	256	1	1	integer4	4	1024	Deleted
Quality Flags & Qualifiers										
FLAGFIELD_RF1	Flag field related to the quality of reference functions - bits defined in PFS Doc	n/a	n/a	1	1	1	bitst(8)	1	1	9416
FLAGFIELD_RF2	Flag field related to the quality of reference functions - bits defined in PFS Doc	n/a	n/a	1	1	1	bitst(8)	1	1	9417

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 Worksheet: MDR-1A

FIELD	DESCRIPTION	SF	UNITS	DIM1	DIM2	DIM3	TYPE	TYPE SIZE	FIELD SIZE	OFFSET
FLAGFIELD_PL	Flag field related to platform orbit/attitude quality - bits defined in PFS Doc	n/a	n/a	1	1	1	bitst(8)	1	1	9418
FLAGFIELD_GEN1	Flag field related to other/summary qualifiers (1-dim) - bits defined in PFS Doc	n/a	n/a	1	1	1	bitst(8)	1	1	9419
FLAGFIELD_GEN2	Flag field related to other/summary qualifiers (256-dim) - bits defined in PFS Doc	n/a	n/a	256	1	1	bitst(8)	1	256	9420
Appended Interpolated Telemetry										
(Equipment Power Bus Voltages)										
DPU_A_Volt	Power bus voltage DPU A		see RD-2	1	1	1	integer2	2	2	9676
DPU_B_Volt	Power bus voltage DPU B		see RD-2	1	1	1	integer2	2	2	9678
RFU_A_Volt	Power bus voltage RFU A		see RD-2	1	1	1	integer2	2	2	9680
RFU_B_Volt	Power bus voltage RFU B		see RD-2	1	1	1	integer2	2	2	9682
SFE_A_Volt	Power bus voltage SFE A		see RD-2	1	1	1	integer2	2	2	9684
SFE_B_Volt	Power bus voltage SFE B		see RD-2	1	1	1	integer2	2	2	9686
HPA_A_Volt	Power bus voltage HPA A		see RD-2	1	1	1	integer2	2	2	9688
HPA_B_Volt	Power bus voltage HPA B		see RD-2	1	1	1	integer2	2	2	9690
(Equipment Power Bus Powers)										
DPU_A_Pow	Power bus power DPU A		see RD-2	1	1	1	integer2	2	2	9692
DPU_B_Pow	Power bus power DPU B		see RD-2	1	1	1	integer2	2	2	9694
RFU_A_Pow	Power bus power RFU A		see RD-2	1	1	1	integer2	2	2	9696
RFU_B_Pow	Power bus power RFU B		see RD-2	1	1	1	integer2	2	2	9698
SFE_A_Pow	Power bus power SFE A		see RD-2	1	1	1	integer2	2	2	9700
SFE_B_Pow	Power bus power SFE B		see RD-2	1	1	1	integer2	2	2	9702
HPA_A_Pow	Power bus power HPA A		see RD-2	1	1	1	integer2	2	2	9704
HPA_B_Pow	Power bus power HPA B		see RD-2	1	1	1	integer2	2	2	9706
(Equipment Reference Voltages)										
OFFSET_AD	Offset references for equipment temperatures (AD590 channels)		see RD-2	1	1	1	integer2	2	2	9708
GAIN_AD	Gain references for equipment temperatures (AD590 channels)		see RD-2	1	1	1	integer2	2	2	9710
FWD_CAL_ADC_VR1	ref. Voltage 1 of Fwd/Cal PowerADC		see RD-2	1	1	1	integer2	2	2	9712
FWD_CAL_ADC_VR2	ref. Voltage 2 of Fwd/Cal PowerADC		see RD-2	1	1	1	integer2	2	2	9714
REFL_ADC_VR1	ref. Voltage 1 of Reflected PowerADC		see RD-2	1	1	1	integer2	2	2	9716
REFL_ADC_VR2	ref. Voltage 2 of Reflected PowerADC		see RD-2	1	1	1	integer2	2	2	9718
MAIN_ADC_VR1			see RD-2	1	1	1	integer2	2	2	9720

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 Worksheet: MDR-1A

FIELD	DESCRIPTION	SF	UNITS	DIM1	DIM2	DIM3	TYPE	TYPE SIZE	FIELD SIZE	OFFSET
MAIN_ADC_VR2			see RD-2	1	1	1	integer2	2	2	9722
(Unit/Equipment Temperatures)										
T_SSPA1_A	SSPA power stage temperature		see RD-2	1	1	1	integer2	2	2	9724
T_SSPA2_A	SSPA output isolator temperature		see RD-2	1	1	1	integer2	2	2	9726
T_EPC_A	EPC temperature		see RD-2	1	1	1	integer2	2	2	9728
T_RFU_A	RFU temperature		see RD-2	1	1	1	integer2	2	2	9730
T_DPU_A	DPU temperature		see RD-2	1	1	1	integer2	2	2	9732
T_SSPA1_B	SSPA power stage temperature		see RD-2	1	1	1	integer2	2	2	9734
T_SSPA2_B	SSPA output isolator temperature		see RD-2	1	1	1	integer2	2	2	9736
T_EPC_B	EPC temperature		see RD-2	1	1	1	integer2	2	2	9738
T_RFU_B	RFU temperature		see RD-2	1	1	1	integer2	2	2	9740
T_DPU_B	DPU temperature		see RD-2	1	1	1	integer2	2	2	9742
T_PDU	PDU temperature		see RD-2	1	1	1	integer2	2	2	9744
T_ICU	ICU internal thermistor		see RD-2	1	1	1	integer2	2	2	9746
TOTAL SIZE										9748

FIELD	DESCRIPTION	SF	UNITS	DIM1	DIM2	DIM3
RECORD_HEADER	Generic Record Header			1	1	1
Quality of MDR has been degraded from nominal due to a processing degradation.						
DEGRADED_INST_MDR	Quality of MDR has been degraded from nominal due to an instrument degradation.	n/a	n/a	1	1	1
DEGRADED_PROC_MDR	Quality of MDR has been degraded from nominal due to a processing degradation.	n/a	n/a	1	1	1
ANTENNA BEAM associated data						
UTC_LOCALISATION	UTC time associated to the echo data (localisation time T_0)	0	UTC	1	1	1
SAT_TRACK_AZI	Azimuth angle bearing (range: 0 to 360) of nadir track velocity	2	deg	1	1	1
AS_DES_PASS	Ascending/descending pass indicator	n/a	n/a	1	1	1
BEAM_NUMBER	Antenna Beam number	n/a	n/a	1	1	1
SIGMA0_FULL	Full-resolution sigma_0 values	6	dB	192	1	1
INC_ANGLE_FULL	Full-resolution incidence angle values	2	deg	192	1	1
AZI_ANGLE_FULL	Azimuth angle of the up-wind direction for a given antenna beam (range: -180 to +180, where minus is west and plus is east with respect to North)	2	deg	192	1	1
LATITUDE_FULL	Latitude (-90 to 90 deg)	6	deg	192	1	1
LONGITUDE_FULL	Longitude (0 to 360 deg)	6	deg	192	1	1
LAND_FRAC	Estimation of the land fraction in the measurement	2	n/a	192	1	1
FLAGFIELD_RF1	Flag field related to the quality of reference functions - bits defined in PFS Doc	n/a	n/a	1	1	1
FLAGFIELD_RF2	Flag field related to the quality of reference functions - bits defined in PFS Doc	n/a	n/a	1	1	1
FLAGFIELD_PL	Flag field related to platform orbit/attitude quality - bits defined in PFS Doc	n/a	n/a	1	1	1
FLAGFIELD_GEN1	Flag field related to other/summary qualifiers (1-dim) - bits defined in PFS Doc	n/a	n/a	1	1	1
FLAGFIELD_GEN2	Flag field related to other/summary qualifiers (256-dim) - bits defined in PFS Doc	n/a	n/a	192	1	1
SIZE OF THE RECORD						

TYPE	TYPE SIZE	FIELD SIZE	OFFSET
REC_HEAD	20	20	0
boolean	1	1	20
boolean	1	1	21
short cds time	6	6	22
u-integer2	2	2	28
boolean	1	1	30
enumerated	1	1	31
integer4	4	768	32
u-integer2	2	384	800
integer2	2	384	1184
integer4	4	768	1568
integer4	4	768	2336
u-integer2	2	384	3104
bitst(8)	1	1	3488
bitst(8)	1	1	3489
bitst(8)	1	1	3490
bitst(8)	1	1	3491
bitst(8)	1	192	3492
			3684

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 ASCAT_Level_1_Product_Format_Specification_-_Annex[1].xls
 Worksheet: MDR-1B-125

FIELD	DESCRIPTION	SF	UNITS	DIM1	DIM2	DIM3	TYPE	TYPE SIZE	FIELD SIZE	OFFSET
RECORD_HEADER	Generic Record Header			1	1	1	REC_HEAD	20	20	0
Quality of MDR has been degraded from nominal due to a processing degradation.										
DEGRADED_INST_MDR	Quality of MDR has been degraded from nominal due to an instrument degradation.	n/a	n/a	1	1	1	boolean	1	1	20
DEGRADED_PROC_MDR	Quality of MDR has been degraded from nominal due to a processing degradation.	n/a	n/a	1	1	1	boolean	1	1	21
SWATH GRID LINE and associated data										
UTC_LINE_NODES	UTC time of line of nodes	n/a	UTC	1	1	1	short cds time	6	6	22
ABS_LINE_NUMBER	Absolute (unique) counter for the line of nodes (from format version 12.0 onwards only)	n/a	count	1	1	1	integer4	4	4	28
SAT_TRACK_AZI	Azimuth angle bearing (range: 0 to 360) of nadir track velocity	2	deg	1	1	1	u-integer2	2	2	32
AS_DES_PASS	Ascending/descending pass indicator	n/a	n/a	1	1	1	boolean	1	1	34
NODE and associated data										
NODE_NUM	Node number as used in the PGF (ref AD-2]), i.e., (20 to -20) for the left swath in the left-to-right order, (-20 to 20) for the right swath in the left-to-right order, 0 corresponding to the mid swath position in both swaths.	0	count	82	1	1	integer2	2	164	Deleted
SWATH_INDICATOR	Swath (0=LEFT, 1=RIGHT)	n/a	n/a	82	1	1	boolean	1	82	35
LATITUDE	Latitude (-90 to 90 deg)	6	deg	82	1	1	integer4	4	328	117
LONGITUDE	Longitude (0 to 360 deg)	6	deg	82	1	1	integer4	4	328	445
ATMOSPHERIC_HEIGHT	Height of atmosphere used	3	km	82	1	1	u-integer2	2	164	Deleted
ATMOSPHERIC_LOSS	Atmospheric loss per unit length of atmosphere	10	dB/km	82	1	1	u-integer4	4	328	Deleted
TRIPLET and associated data										
SIGMA0_TRIP	Sigma0 triplet, re-sampled to swath grid, for 3 beams (fore, mid, aft)	6	dB	3	82	1	integer4	4	984	773
KP	Kp for re-sampled sigma0 triplet. Values between 0 and 1	4	n/a	3	82	1	u-integer2	2	492	1757
INC_ANGLE_TRIP	Incidence angle for re-sampled sigma0 triplet.	2	deg	3	82	1	u-integer2	2	492	2249

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 ASCAT_Level_1_Product_Format_Specification_-_Annex[1].xls
 Worksheet: MDR-1B-125

FIELD	DESCRIPTION	SF	UNITS	DIM1	DIM2	DIM3	TYPE	TYPE SIZE	FIELD SIZE	OFFSET
AZI_ANGLE_TRIP	Azimuth angle of the up-wind direction for a given measurement triplet (range: -180 to +180, where minus is west and plus is east with respect to North)	2	deg	3	82	1	integer2	2	492	2741
NUM_VAL_TRIP	Number of full resolution sigma0 values contributing to the re-sampled sigma0 triplet.	0	count	3	82	1	u-integer4	4	984	3233
F_KP	Flag related to the quality of the Kp estimate (0=NOMINAL, 1=NON-NOMINAL)	n/a	n/a	3	82	1	boolean	1	246	4217
F_USABLE	Flag related to the usability of the sigma0 triplet (0=GOOD, 1=USABLE, 2=NOT USABLE)	n/a	n/a	3	82	1	enumerated	1	246	4463
F_F	Flag related to non-nominal amount of input raw data to calculate echo corrections (value between 0 and 1 shows the fraction of original samples affected)	3	n/a	3	82	1	u-integer2	2	492	4709
F_V	Flag related to non enough amount of input raw data to calculate echo corrections (value between 0 and 1 shows the fraction of original samples affected)	3	n/a	3	82	1	u-integer2	2	492	5201
F_OA	Flag related to lack of accuracy of orbit/attitude knowledge (value between 0 and 1 shows the fraction of original samples affected)	3	n/a	3	82	1	u-integer2	2	492	5693
F_SA	Flag related to solar array reflection contamination (value between 0 and 1 shows the fraction of original samples affected)	3	n/a	3	82	1	u-integer2	2	492	6185
F_TEL	Flag related to non-nominal telemetry check results (value between 0 and 1 shows the fraction of original samples affected)	3	n/a	3	82	1	u-integer2	2	492	6677

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 Worksheet: MDR-1B-125

FIELD	DESCRIPTION	SF	UNITS	DIM1	DIM2	DIM3	TYPE	TYPE SIZE	FIELD SIZE	OFFSET
F_EXT_FIL	Flag related to the presence of extrapolated reference functions in the generation of averaged value (ref. Ad-2) (value between 0 and 1)	3	n/a	3	82	1	u-integer2	2	492	Deleted
F_REF	Flag related to non-nominal raw echo correction reference functions (value between 0 and 1 shows the fraction of original samples affected)	3	n/a	3	82	1	u-integer2	2	492	7169
F_LAND	Flag related to presence of land in the re-sampled sigma0 triplet (value between 0 and 1 shows the fraction of original samples affected)	3	n/a	3	82	1	u-integer2	2	492	7661
SIZE OF THE RECORD										8153

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 ASCAT_Level_1_Product_Format_Specification_-_Annex[1].xls
 Worksheet: MDR-1B-250

FIELD	DESCRIPTION	SF	UNITS	DIM1	DIM2	DIM3	TYPE	TYPE SIZE	FIELD SIZE	OFFSET
RECORD_HEADER	Generic Record Header			1	1	1	REC_HEAD	20	20	0
Quality of MDR has been degraded from nominal due to a processing degradation.										
DEGRADED_INST_MDR	Quality of MDR has been degraded from nominal due to an instrument degradation.	n/a	n/a	1	1	1	boolean	1	1	20
DEGRADED_PROC_MDR	Quality of MDR has been degraded from nominal due to a processing degradation.	n/a	n/a	1	1	1	boolean	1	1	21
SWATH GRID LINE and associated data										
UTC_LINE_NODES	UTC time of line of nodes	n/a	UTC	1	1	1	short cds time	6	6	22
ABS_LINE_NUMBER	Absolute (unique) counter for the line of nodes (from format version 12.0 onwards only)	n/a	count	1	1	1	integer4	4	4	28
SAT_TRACK_AZI	Azimuth angle bearing (range: 0 to 360) of nadir track velocity	2	deg	1	1	1	u-integer2	2	2	32
AS_DES_PASS	Ascending/descending pass indicator	n/a	n/a	1	1	1	boolean	1	1	34
NODE and associated data										
NODE_NUM	Node number as used in the PGF (ref AD-2]), i.e., (10 to -10) for the left swath in the left-to-right order, (-10 to 10) for the right swath in the left-to-right order, 0 corresponding to the mid swath position in both swaths.	0	count	42	1	1	integer2	2	84	Deleted
SWATH_INDICATOR	Swath (0=LEFT, 1=RIGHT)	n/a	n/a	42	1	1	boolean	1	42	35
LATITUDE	Latitude (-90 to 90 deg)	6	deg	42	1	1	integer4	4	168	77
LONGITUDE	Longitude (0 to 360 deg)	6	deg	42	1	1	integer4	4	168	245
ATMOSPHERIC_HEIGHT	Height of atmosphere used	3	km	42	1	1	u-integer2	2	84	Deleted
ATMOSPHERIC_LOSS	Atmospheric loss per unit length of atmosphere	10	dB/km	42	1	1	u-integer4	4	168	Deleted
TRIPLET and associated data										
SIGMA0_TRIP	Sigma0 triplet, re-sampled to swath grid, for 3 beams (fore, mid, aft)	6	dB	3	42	1	integer4	4	504	413
KP	Kp for re-sampled sigma0 triplet. Values between 0 and 1	4	n/a	3	42	1	u-integer2	2	252	917
INC_ANGLE_TRIP	Incidence angle for re-sampled sigma0 triplet.	2	deg	3	42	1	u-integer2	2	252	1169

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 ASCAT_Level_1_Product_Format_Specification_-_Annex[1].xls
 Worksheet: MDR-1B-250

FIELD	DESCRIPTION	SF	UNITS	DIM1	DIM2	DIM3	TYPE	TYPE SIZE	FIELD SIZE	OFFSET
AZI_ANGLE_TRIP	Azimuth angle of the up-wind direction for a given measurement triplet (range: -180 to +180, where minus is west and plus is east with respect to North)	2	deg	3	42	1	integer2	2	252	1421
NUM_VAL_TRIP	Number of full resolution sigma0 values contributing to the re-sampled sigma0 triplet.	0	count	3	42	1	u-integer4	4	504	1673
F_KP	Flag related to the quality of the Kp estimate (0=NOMINAL, 1=NON-NOMINAL)	n/a	n/a	3	42	1	boolean	1	126	2177
F_USABLE	Flag related to the usability of the sigma0 triplet (0=GOOD, 1=USABLE, 2=NOT USABLE)	n/a	n/a	3	42	1	enumerated	1	126	2303
F_F	Flag related to non-nominal amount of input raw data to calculate echo corrections (value between 0 and 1 shows the fraction of original samples affected)	3	n/a	3	42	1	u-integer2	2	252	2429
F_V	Flag related to non enough amount of input raw data to calculate echo corrections (value between 0 and 1 shows the fraction of original samples affected)	3	n/a	3	42	1	u-integer2	2	252	2681
F_OA	Flag related to lack of accuracy of orbit/attitude knowledge (value between 0 and 1 shows the fraction of original samples affected)	3	n/a	3	42	1	u-integer2	2	252	2933
F_SA	Flag related to solar array reflection contamination (value between 0 and 1 shows the fraction of original samples affected)	3	n/a	3	42	1	u-integer2	2	252	3185
F_TEL	Flag related to non-nominal telemetry check results (value between 0 and 1 shows the fraction of original samples affected)	3	n/a	3	42	1	u-integer2	2	252	3437

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 ASCAT_Level_1_Product_Format_Specification_-_Annex[1].xls
 Worksheet: MDR-1B-250

FIELD	DESCRIPTION	SF	UNITS	DIM1	DIM2	DIM3	TYPE	TYPE SIZE	FIELD SIZE	OFFSET
F_EXT_FIL	Flag related to the presence of extrapolated reference functions in the generation of averaged value (ref. Ad-2) (value between 0 and 1)	3	n/a	3	42	1	u-integer2	2	252	Deleted
F_REF	Flag related to non-nominal raw echo correction reference functions (value between 0 and 1 shows the fraction of original samples affected)	3	n/a	3	42	1	u-integer2	2	252	3689
F_LAND	Flag related to presence of land in the re-sampled sigma0 triplet (value between 0 and 1 shows the fraction of original samples affected)	3	n/a	3	42	1	u-integer2	2	252	3941
SIZE OF THE RECORD										4193

Field Type	Size in Bytes
bitst(16)	2
bitst(24)	3
bitst(32)	4
bitst(48)	6
bitst(64)	8
bitst(8)	1
boolean	1
byte	1
char(1)	1
char(100)	100
char(2)	2
char(3)	3
char(4)	4
char(40)	40
char(88)	88
e-char(1)	1
e-char(2)	2
e-char(3)	3
enumerated	1
general time	15
integer2	2
integer4	4
integer8	8
long cds time	8
REC_HEAD	20
short cds time	6
u-byte	1
u-integer2	2
u-integer4	4
u-integer8	8