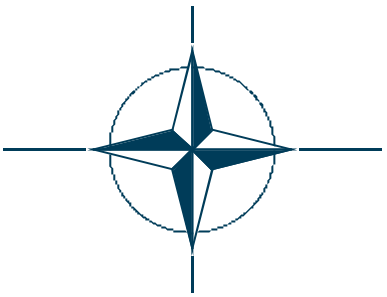
NORTH ATLANTIC TREATY ORGANISATION



(NATO)

ANNEX A

to

ADDITIONAL MILITARY LAYERS

LARGE BOTTOM OBJECTS

PRODUCT SPECIFICATION

Version 2.1, 1 November 2005

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ANNEX A S-57 IMPLEMENTATION OF LARGE BOTTOM OBJECTS PRODUCT SPECIFICATION

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CONTENTS

A.1 AML S-57 FORMAT TABLE AND FILE STRUCTURE

A.1.1 GENERAL INFORMATION

The binary implementation of S-57 must be used for AML Large Bottom Objects using the Chain-Node vector model described in S-57, part 2, Theoretical Data Model.

The application profiles define the structure and content of the catalogue file and data set files in an exchange set.

A.1.1.1 Cells

In order to facilitate the efficient processing of AML data the geographic coverage of a given usage must be split into cells. Each cell of data must be contained in a physically separate, uniquely identified file on the transfer medium, known as a data set file (see Sections A.1.1.6 and A.1.1.7.3 of this Annex).

Cells are no longer constrained to be rectangular (i.e. defined by 2 meridians and 2 parallels). It is recommended that the geographic extent of the cell be chosen by the AML producer to ensure that the resulting data set file contains no more than 5 Megabytes of data. Subject to this consideration, the cell size must not be too small in order to avoid the creation of an excessive number of cells.

The co-ordinates of the vertices of the cell are encoded in decimal degrees in the catalogue file.

The area within the cell which contains data must be indicated by a meta object M_COVR with CATCOV = 1 (see Section A.2.3.1 of this Annex). Any other area not containing data must be indicated by a meta object M_COVR with CATCOV = 2.

Cells of the same scale band (see Section 2.3 of the Product Specification) may overlap. However, data within the cells must not overlap unless the cells are of different security classifications (see Section 1.4.2 or the Product Specification).

Point feature objects which are at the border of two cells with the same intended usage must be part of only one cell. They are put in the south or west cell (i.e. the north and east borders of a cell are part of the cell, whereas the south and west borders are not).

When a feature object exists in several cells its geometry must be split at the cell boundaries and its complete attribute description must be repeated in each cell.

A.1.1.2 Geometry

Edges must be encoded using SG2D fields.

In certain circumstances, the symbolisation of an edge may need to be suppressed. This is done using the value {1} in the “Masking Indicator” [MASK] subfield of the “Feature Record to Spatial Record Pointer” [FSPT] field. If the value in the “Usage Indicator” [USAG] subfield is set to {3} (exterior boundary truncated by the data limit), the MASK subfield must be set to {255} (null).

A.1.1.3 Groups

The group (GRUP) sub-field is not used for AML products and the value must be set to {255}null.

A.1.1.4 Language and Alphabet

A.1.1.4.1 Language

The exchange language must be English. Other languages may be used as a supplementary option.

In general this means that, when a national language is used in textual national attributes (NINFOM and NOBJNM), the English translation must exist in the international attributes (INFORM and OBJNAM). However, national geographic names do not need to be translated in the international attributes, they may be left in their original national language form or may be transliterated or transcribed.

A.1.1.4.2 Use of Lexical Level 2

If the national language cannot be expressed in lexical levels 0 or 1, the following rules apply:

- The exact spelling in the national language is encoded in the "National Attributes" [NATF] field (see Sections A.1.2.7.3.4 and A.1.2.8.3.4 of this Annex) using lexical level 2.
- Translated text, including transliterated or transcribed national geographic names is encoded in the "International Attributes" [ATTF] field (see Sections A.1.2.7.3.3 and A.1.2.8.3.3 of this Annex) using lexical level 0 or 1.

Where possible, international standards should be used for the transliteration of non-Latin alphabets.

A.1.1.5 Exchange Set

The AML Large Bottom Objects implements the international standard ISO/IEC 8211 as a means of encapsulating S-57 structured data. The ISO/IEC 8211 standard provides a file based mechanism for the transfer of data from one computer system to another, independent of make. In addition, it is independent of the medium used to establish such a transfer. It permits the transfer of data and the description of how such data is organised.

For a summary of the S-57 implementation of ISO/IEC 8211, refer to S-57 - Part 3: Annex A.

A.1.1.5.1 Content of the Exchange Set

An exchange set is composed of one and only one catalogue file and at least one data set file. Additional files can also be included in the AML exchange set. These files may be included to provide additional information within an AML product, e.g. beach intelligence information in the case of the Environment, Seabed and Beach (ESB) product.

An exchange set may also contain an optional README file.

Exchange set

|
|--<1>-- README file (see Section A.1.1.7.1 of this Annex)
|
|--<1>-- Catalogue file (see Section A.1.2.6 of this Annex)
|
|--<R>-- Data set file (see Section A.1.1.6 of this Annex)
|
|--<R>-- Text file (see Section A.1.1.7.4 of this Annex)
|
|--<R>-- Picture file (see Section A.1.1.7.4 of this Annex)

In the tables in Sections A.1.1.5.1.1 and A.1.1.5.1.2 below, all files contained in an Exchange Set (shown in the File Type columns) must be in the formats given in column two of the tables (File Format/Extension). The IMPL subfield values, defined in AML Product Specifications, for the Catalogue Directory field (CATD) are given in the third column (Subfield Value).

A.1.1.5.1.1 Mandatory Exchange Set File Types

The table below provides details of the file types and formats that are mandatory in an AML Exchange Set.

File Type	Implementation	Subfield Value
Catalogue	ASCII	ASC
Data Set	Binary	BIN

A.1.1.5.1.2 Additional Exchange Set File Types

The table below provides examples of the file contents and formats that may be included within an AML Exchange Set.

File Type	File Format / Extension	Subfield Value
Text	TXT	TXT
Picture	TIFF	TIF
Document	PDF	PDF
Document	HTML	HTM
Photo	JPEG	JPG
Video	AVI	AVI
Video	MPEG	MPG

A.1.1.5.2 Exchange Set Naming

All AML products will follow the exchange set naming convention specified in this section.

Format

XXLbcDDD

Where

XX = The two-letter NATO country code of the producer (NATO STANAG 1059).

L = The first character of the three-letter AML product identifier (LBO).

M – MFF (Maritime Foundation and Facilities)
E – ESB (Environment, Seabed and Beach)
R – RAL (Routes Areas and Limits)
L – LBO (Large Bottom Objects)
S – SBO (Small Bottom Objects)
C – CLB (Contour Line Bathymetry)
I – IWC (Integrated Water Column)

b = Identifies whether the exchange set is a base or update exchange set.

B – Base. A base exchange set may contain original base cells, new editions and re-issues. All three are base cell files as defined in Section of this Annex.

U – Update. An update exchange set will contain update cell files as defined in Section A.1.2.8 of this Annex, but may also contain new editions and new base cells.

c = The security classification code:

N – COSMIC TOP SECRET
W – FOCAL TOP SECRET
T – TOP SECRET
S - SECRET
C - CONFIDENTIAL
R - RESTRICTED
U - UNCLASSIFIED

DDD = The mandatory alphanumeric geographic area identification code. Codes for use in AML are product specific have yet to be defined. Update exchange sets may not require geographical identification in which case this field will be populated with XXX.

A.1.1.5.3 Directory Structure

The following is an example directory structure for an AML Large Bottom Objects exchange set in MS-DOS format.

Directory of D:\UKLBUDDD

<DIR>			09-15-96	12:40p
<DIR>			09-15-96	12:40p
CATALOG[4]	031	1,584	09-15-96	12:46p CATALOG.031
UKL0U123[1]000		45,584	09-15-96	12:50p UKL0U123.000[3]
UKL0U123[1]001		1,095	09-15-96	12:54p UKL0U123.001
UKL0U123[1]002		1,722	09-15-96	12:54p UKL0U123.002
README[2]TXT		504	09-15-96	12:44p README.TXT
		5 file(s)	49,489 bytes	
		2 dir(s)	1,405,952 bytes free	

Notes:

1. UKL0c123 follows the file naming convention specified in Section A.1.1.7 of this Annex.

2. The Exchange set directory may also contain a general README file containing ASCII text.

3. For each file in the exchange set the catalogue file must contain the name of the volume on which it is held and the full path name relative to the exchange set directory in that volume. The full path name relative to the exchange set directory must be encoded in the FILE subfield of the "Catalogue Directory" [CATD] field. The LFIL subfield of the CATD field may be used for other purposes. The full path name of the UKUL0U123 file shown in the example is UKL0U123.000.

4. The catalogue file must be in the root directory of the exchange set.

A.1.1.6 Data Sets

For each individual AML product, four kinds of data sets may be produced:

- New data set: no AML data has previously been produced for this area for the same purpose, or, at the same security classification.
- Update: changing some information in an existing data set.
- Re-issue of a data set: including all the updates applied to the original data set up to the date of the re-issue. A re-issue does not contain any new information additional to that previously issued by updates.
- New edition of a data set: including new information which has not been previously distributed by updates.

Each new data set, re-issue, or new edition is called a base cell file.

A data set containing updates to one base cell file is called an update cell file.

A.1.1.7 File Naming

AML Large Bottom Objects will follow the file naming convention specified below.

Format

XXL0c123.eee

Where

XX = The two-letter NATO country code of the producer (NATO STANAG 1059)

L = The first character of the three-letter AML product identifier. As defined, the overall basic AML service would be made up of seven S-57 products:

M – MFF (Maritime Foundation and Facilities)
E – ESB (Environment, Seabed and Beach)
R – RAL (Routes Areas and Limits)
L – LBO (Large Bottom Objects)
S – SBO (Small Bottom Objects)
C – CLB (Contour Line Bathymetry)
I – IWC (Integrated Water Column)

0 = 'Usage Band'. Values and scale ranges for AML. Potential values are given below .

0 - Non-Scaled Information only
1 - < 1:100,000,000
2 - 1: 25,000,000
3 - 1: 5,000,000
4 - 1:1,000,000
5 - 1:250,000
6 - 1:50,000
7 - 1:10,000
8 - 1:2,500
9 - > 1:1,600

c = The security classification code:

N – COSMIC TOP SECRET
W – FOCAL TOP SECRET
T – TOP SECRET
S - SECRET
C - CONFIDENTIAL
R - RESTRICTED
U - UNCLASSIFIED

123 = Product specific identification. This is dependent upon the geographical partitioning of the product and has yet to be fully defined.

eee = Extension where 000 is base cell and 001, 002 etc are successive updates.

A.1.1.7.1 README File

The README file is an optional ASCII file of general information.

README.TXT is the mandatory name for this file.

A.1.1.7.2 Catalogue File

The catalogue file acts as the table of contents for the exchange set (see Section A.1.1.5.3 of this Annex).

The catalogue file of the exchange set must be named CATALOG.EEE.
Where EEE is the edition number of S-57 used for this exchange set, i.e. 031 for this edition (3.1). No other file may be named CATALOG.

A.1.1.7.3 Data Set File

Each data set file contains data for one cell (see section A.1.1.1 of this Annex). This includes:

- Data set descriptive information that is specific to the data set.
- The description and location of the real-world features.

A.1.1.7.4 Text and Picture Files

Text and picture files do not conform to ISO/IEC 8211 and are not described in the main body of S-57. These files are specific to this Product Specification (see Section 2.5.5 of the Product Specification and Section A.1.1.5.1.2 of this Annex).

A.1.1.8 Updating

In order to ensure that updates are incorporated in the correct sequence without any omission, the file extension and a number of subfields in the "Data Set Identification" [DSID] field are used in the following way:

file extension Every new data set, re-issue or new edition must have a "000" extension. For update cell files the extension is the number of the update, ranging from "001" to "999". These numbers must be used sequentially, without omission. Number "001" is the first update after a new data set or a new edition, but not after a re-issue. The update sequence is not interrupted by a re-issue. After a re-issue, subsequent updates may be incorporated into the display system created from this re-issue or to the display system created from the original data and kept continuously updated.

edition number When a data set is initially created, the edition number 1 is assigned to it. The edition number is increased by 1 at each new edition. Edition number remains the same for a re-issue.

update number Update number 0 is assigned to a new data set. The first update cell file associated with this new data set must have update number 1. The update number must be increased by one for each consecutive update, until a new edition is released. The new edition must have update number 0. A re-issue of a data set must have the update number of the last update applied to the data set. In the case of an update cell file the file extension is the same as the update number.

update application date This date is only used for the base cell files (i.e. new data sets, re-issue, and new edition), not update cell files. All updates dated on or before this date must have been applied by the producer.

issue date Date on which the data was made available by the data producer.

The table in Section A.1.1.8.1 of this Annex gives examples of the way to manage the file extension, the "Edition Number" [EDTN], the "Update Number" [UPDN], the "Update Application Date" [UADT] and the "Issue Date" [ISDT] subfields.

A.1.1.8.1 File Extension and Sub-field Examples

Event	File extension	EDTN	UPDN	UADT	ISDT
New data set	.000	1	0	19950104	19950104
Update 1	.001	1	1	prohibited	19950121
Update 2	.002	1	2	prohibited	19950225
...					
Update 31	.031	1	31	prohibited	19950905
Re-issue of a data set	.000	1	31	19950905	19950910
Update 32	.032	1	32	prohibited	19951023
...					
Update 45	.045	1	45	prohibited	19951112
New edition	.000	2	0	19951201	19951201
Update 1 to edition 2	.001	2	1	prohibited	19960429
...					

This example table relates to the specifications given in S-52 Appendix 1, "Guidance on Updating the Electronic Navigational Chart", in the following way:

- The update information encoded in each individual cell file is called a sequential update.
- The collection of the update information encoded in the update cell files which have been issued since the last new data set, the last re-issue of a data set or since the last update was applied to the display system is called a cumulative update. In the example, the cumulative update for the new data set starts with update number 1. The cumulative update for the re-issue of a data set starts with update number 32. The cumulative update for a data set to which update number n has been applied starts with update number n+1.
- The update information which has been incorporated in a re-issue of a data set is called a compilation update.

Each re-issue or new edition of a data set must have the same name as the base cell file which it replaces.

The update mechanism is described in S-57 Part 3, clause 8.

In order to delete a data set, an update cell file is created, containing only the Data Set General Information record with the "Data Set Identifier" [DSID] field. The "Edition Number" [EDTN] subfield must be set to 0. This message is only used to cancel a base cell file.

To inform the user that a new edition is available, an update cell file is created, containing only the Data Set General Information record with the "Data Set Identifier" [DSID] field. The "Edition Number" [EDTN] subfield must contain a value one higher than the current edition number.

In order to modify a text, picture or application file, a new file with the same name is created.

When an object pointing to a text, picture or application file is deleted or updated so that it no longer references the file, the display system software should check to see whether any other object reference the same file, before that file is deleted.

An exchange set may contain base cell files and update cell files for the same cells. Under these circumstances the update cell files must follow on in the correct sequential order from the last update applied to the base cell file.

The record version of each feature or vector record is indicated in the "Record Version" [RVER] subfield of the "Feature Record Identifier" [FRID] field or the "Vector Record Identifier" [VRID] field. At each update of a record, this version number is incremented by 1.

A.1.1.9 Error Detection

File integrity checks are based on the CRC-32 algorithm (a 32 bit Cyclic Redundancy Check algorithm) as defined in ANSI/IEEE Standard 802.3 (Section 1.6.1 of the Product Specification refers).

A.1.1.9.1 Implementation

The checksums for each data set are held in the "CRC" [CRCS] subfield of the "Catalogue Directory" [CATD] field. They allow the integrity of each file in the exchange set to be checked on receipt. The CRC value computed on the received file must the same as the CRC value transmitted.

The CRC values are recorded in ASCII as a hexadecimal number most significant byte first.

A.1.1.9.2 Processing

Encoding is defined by the following generating polynomial:

$$G(x) = x^{32} + x^{26} + x^{23} + x^{22} + x^{16} + x^{12} + x^{11} + x^{10} + x^8 + x^7 + x^5 + x^4 + x^2 + x + 1$$

Processing is applied to relevant files as they appear in the exchange set.

The CRC value of the file is defined by the following process:

1. The first 32 bits of the data are complemented.
2. The n bits of the data are then considered to be the coefficients of a polynomial M(x) of degree n-1.
3. M(x) is multiplied by x^{32} and divided by G(x), producing a remainder R(x) of degree <31.
4. The coefficients of R(x) are considered to be a 32-bit sequence.
5. The bit sequence is complemented and the result is the CRC.

The hexadecimal format of CRCs are converted to ASCII characters and stored in the "Catalogue Directory" [CATD] field.

A.1.2 APPLICATION PROFILES

A.1.2.1 General

The binary implementation of S-57 must be used for AML. Therefore, the "Implementation" [IMPL] subfield of the "Catalogue Directory" [CATD] field must be set to "BIN" for the data set files (see Section A.1.2.6.1.1 of this Annex).

A.1.2.2 Catalogue and Data Set Files

These files are composed of the records and fields defined in the following tree structure diagrams (see Sections A.1.2.6.1, A.1.2.7 and A.1.2.8 of this Annex).

The order of data in each base or update cell file is described below:

Data set file

- Data set general information record
- Data set geographic reference record (for Base application profile)
- Vector records
  - Isolated nodes (SG2D)
  - Connected nodes
  - Edges
- Feature records
  - Meta features
  - Geo features (ordered from slave to master)
  - Collection features

This order of records will enable the import software to check that the child record exists each time the parent record references it (i.e. it will already have read the child record so it will know if it exists or not).

A.1.2.3 Records

Records and fields that do not appear in the following tree structure diagrams are prohibited. The order of records in the files must be the same as that described in the tree structure diagrams. The combination of the file name and the "Name" of the record must provide a unique world-wide identifier of the record.

A.1.2.4 Fields

For base cell files, some fields may be repeated (indicated by <R>) and all of their content may be repeated (indicated by *). In order to reduce the volume of data, the encoder should repeat the sequence of subfields, in preference to creating several fields.

A.1.2.5 Subfields

Mandatory subfields must be filled by a non-null value.

Prohibited subfields must be encoded as missing subfields values (see S-57 Part 3, clause 2.1). The exact meaning of missing attribute values is defined in Section A.2.2 of this Annex. In the tables following the tree structure diagrams, mandatory subfields are shown by "M" in the "use" column and prohibited subfields by "P" in the same column. If there is nothing in this column, it means that the use of this subfield is optional. When a subfield value is prescribed, it is indicated in the "value" column. The "comment" column contains general comments and an indication of whether the subfield is ASCII or binary coded.

A.1.2.6 Catalogue File

The catalogue has the same structure for base and update cell application profiles.

A.1.2.6.1 Catalogue File Structure

Catalogue File

```
  |
  |--<R>--Catalogue Directory Record
  |
      |--0001-- ISO/IEC 8211 Record identifier
          |
```

|--<1>-- CATD - Catalogue directory field

A.1.2.6.1.1 Catalogue Directory Field (CATD)

NB: All subfield values are encoded as ASCII.

tag	subfield name	use	value	comment
RCNM	Record name	M	CD	
RCID	Record identification number	M		
FILE	File name	M		full path name
LFIL	File long name			
VOLM	Volume	M		name of volume on which file appears
IMPL	Implementation	M	ASC BIN TXT TIF PDF HTM JPG AVI MPG	Examples for the catalogue file for the data set files for ASCII text files (including the README.TXT file) for picture files for document files for document files for photo files for video/film files for video files
SLAT	Southernmost latitude			mandatory for data set files
WLON	Westernmost longitude			mandatory for data set files
NLAT	Northernmost latitude			mandatory for data set files
ELON	Easternmost longitude			mandatory for data set files
CRCS	CRC	M		except for README and catalogue files
COMT	Comment			

A.1.2.7 AML (Base Cell) File Structure

The two letter identifier for AML Large Bottom Objects base cell application profiles is LN and applies to new data sets, re-issues and new editions of a data set.

Base Cell File

```
|
|--<1>--Data Set General Information Record
|     |
|     |--0001 - ISO/IEC 8211 Record Identifier
|           |
|           |--<1>-- DSID - Data Set Identification field
|                       |
|                       |--<1>--DSSI - Data Set Structure Information field
|
|--<1>--Data Set Geographic Reference Record
|     |
|     |--0001 - ISO/IEC 8211 Record Identifier
|           |
|           |--<1>--DSPM - Data Set Parameter field
|
|--<R>--Vector Record
|     |
|     |--0001 - ISO/IEC 8211 Record Identifier
|           |
|           |--<1>--VRID - Vector Record Identifier field
|                 |
|                 |--<R>--ATTV* - Vector Record Attribute field
|                 |
|                 |--<R>--VRPT* - Vector Record Pointer field
|                 |
|                 |       |--<R>--SG2D* - 2-D Coordinate field
|
|--<R>--Feature Record
|     |
|     |--0001 - ISO/IEC 8211 Record Identifier
|           |
|           |--<1>--FRID - Feature Record Identifier field
|                 |
|                 |--<1>--FOID - Feature Object Identifier field
|                 |
|                 |--<R>--ATTF*- Feature Record Attribute field
|                 |
```

| |--<R>--NATF* - Feature Record National Attribute field
| |
| |--<R>--FFPT* - Feature Record to Feature Object Pointer field
| |
| |--<R>--FSPT* - Feature Record to Spatial Record Pointer field

A.1.2.7.1 Data Set Descriptive (META) Field Content

A.1.2.7.1.1 Data Set Identification Field Structure (DSID

NB: Subfield values are encoded as ASCII or binary as indicated.

tag	subfield name	use	value	comment
RCNM	Record name	M	{10}	= DS, binary
RCID	Record identification number	M		binary
EXPP	Exchange purpose	M	{1}	data set is new, binary
INTU	Intended usage	M	100	= unscaled data
DSNM	Data set name	M		file name with extension excluding path, ASCII
EDTN	Edition number	M		Refer to Section A.1.1.8 of this Annex
UPDN	Update number	M		ASCII
UADT	Update application date	M		ASCII
ISDT	Issue date	M		ASCII
STED	Edition number of S-57	M	03.1	ASCII
PRSP	Product specification	M	53	= Large Bottom Objects
PSDN	Product specification description	M	Additional Military Layers Large Bottom Objects	
PRED	Product specification version number	M	2.1	ASCII
PROF	Application profile identification	M	10	= Large Bottom Objects, new
AGEN	Producing agency	M		binary
COMT	Comment	M		Protective marking Owner authority National caveat

A.1.2.7.1.2 Data Set Structure Information Field Structure (DSSI)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
DSTR	Data structure	M	{2}	= chain node
AALL	ATTF lexical level	M	{0} or {1}	
NALL	NATF lexical level	M	{0}, {1} or {2}	
NOMR	Number of meta records	M		
NOCR	Number of cartographic records	M	{0}	cartographic records are not permitted
NOGR	Number of geo record	M		
NOLR	Number of collection records	M		
NOIN	Number of isolated node records	M		
NOCN	Number of connected node records	M		
NOED	Number of edge records	M		
NOFA	Number of face records	M	{0}	faces are not permitted in chain node structure

A.1.2.7.1.3 Data Set Parameter Field Structure (DSPM)

NB: Subfield values are encoded as ASCII or binary as indicated.

tag	subfield name	use	value	comment
RCNM	Record name	M	{20}	= DP, binary
RCID	Record identification number	M		binary
HDAT	Horizontal geodetic datum	M	{2}	= WGS 84, binary
VDAT	Vertical datum	M		binary
SDAT	Sounding datum	M		binary
CSCL	Compilation scale of data	M		binary
DUNI	Units of depth measurement	M	{1} or {2}	1 =metres, binary 2 = fathoms and feet
HUNI	Units of height measurement	M	{1} or {2}	1 = metres, binary 2 = feet, binary
PUNI	Units of positional accuracy	M	{1}	=metres, binary
COUN	Coordinate units	M	{1}	= lat/long, binary
COMF	Coordinate multiplication factor	M		binary, see S-57 Appendix B.1 clause 4.4
SOMF	3-D (sounding) multiplication factor	M	{10}	binary, see S-57 Appendix B.1 clause 4.4
		M		

tag	subfield name	use	value	comment
COMT	Comment			ASCII

A.1.2.7.2 Spatial Field Content

A.1.2.7.2.1 Vector Record Identifier Field Structure (VRID)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
RCNM	Record name	M	{110} or {120} or {130}	= VI, isolated node = VC, connected node = VE, edge
RCID	Record identification number	M		
RVER	Record version	M		
RUIN	Record update instruction	M	{1}	= insert

A.1.2.7.2.2 Vector Record Attribute Field Structure (ATTV)

NB: Subfield values are encoded as ASCII or binary as indicated.

tag	subfield name	use	value	comment
ATTL	Attribute label/code	M		binary code for an attribute
ATVL	Attribute value	M		ASCII value. Missing attribute value = attribute is relevant but value is unknown.

A.1.2.7.2.3 Vector Record Pointer Field Structure (VRPT)

NB: Subfield values are encoded as ASCII or binary as indicated.

tag	subfield name	use	value	comment
NAME	Name	M		
ORNT	Orientation	M	{255}	= null
USAG	Usage indicator	M	{255}	= null
TOPI	Topology indicator	M	{1} or {2}	= beginning node = end node
MASK	Masking indicator	M	{255}	= null

A.1.2.7.2.4 2-D Co-ordinate Field Structure(SG2D)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
YCOO	Coordinate in Y axis	M		latitude (see S-57 Appendix B.1 clause 4.4)
XCOO	Coordinate in X axis	M		longitude (see S-57 Appendix B.1 clause 4.4)

A.1.2.7.3 Feature Field Content

A.1.2.7.3.1 Feature Record Identifier Field Structure (FRID)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
RCNM	Record name	M	{100}	= FE
RCID	Record identification number	M		
PRIM	Object geometric primitive	M	{1} or {2 } or {3} or {255}	= point = line = area = no geometry
GRUP	Group	M	{255}	= null
OBJL	Object label	M		binary code for an object class
RVER	Record version	M		
RUIN	Record update instruction	M	{1}	= insert

A.1.2.7.3.2 Feature Object Identifier Field Structure (FOID)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
AGEN	Producing agency	M		
FIDN	Feature identification number	M		
FIDS	Feature identification subdivision	M		

A.1.2.7.3.3 Feature Record Attribute Field Structure (ATTF)

NB: Subfield values are encoded as ASCII or binary as indicated.

tag	subfield name	use	value	comment
ATTL	Attribute label/code	M		binary code for an attribute
ATVL	Attribute value			ASCII value. Missing attribute value = attribute is relevant but value is unknown.

A.1.2.7.3.4 Feature Record National Attribute Field Structure (NATF)

NB: Subfield values are encoded as ASCII or binary as indicated.

tag	subfield name	use	value	comment
ATTL	Attribute label/code	M		binary code for an attribute
ATVL	Attribute value			ASCII value. Missing attribute value = attribute is relevant but value is unknown

A.1.2.7.3.5 Feature Record to Feature Object Pointer Field Structure (FFPT)

NB: Subfield values are encoded as ASCII or binary as indicated.

tag	subfield name	use	value	comment
LNAM	Long name	M		binary
RIND	Relationship indicator	M	{2} or {3}	= slave, binary = peer, binary
COMT	Comment			ASCII

A.1.2.7.3.6 Feature Record to Spatial Pointer Field Structure (FSPT)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
NAME	Name	M		
ORNT	Orientation	M	{1} or {2} or {255}	= forward = reverse = null
USAG	Usage indicator	M	{1} or {2} or {3} or {255}	= exterior = interior =exterior boundary, truncated by the data limit = null
MASK	Masking indicator	M	{1} or {2} or {255}	= mask = show = null

A.1.2.8 AML (Update) File Structure

The two letter identifier for AML Large Bottom Objects update cell application profiles is LR and applies to updates to a data set.

Update Cell File

```
|
|--<1>--Data Set General Information Record
|      |
|      |--0001 - ISO/IEC 8211 Record Identifier
|               |
|               |--<1>--DSID - Data Set Identification field
|                              |
|                              |--<1>--DSSI - Data Set Structure Information field
|
|--<R>--Vector Record
|      |
```

```
|      |--0001 - ISO/IEC 8211 Record identifier
|              |
|              |--<1>--VRID - Vector Record Identifier field
|                      |
|                      |--<R>--ATTV* - Vector Record Attribute field
|                      |
|                      |--<1>--VRPC - Vector Record Pointer Control field
|                      |
|                      |--<R>--VRPT*         - Vector Record Pointer field
|                      |
|                      |--<1>--SGCC - Coordinate Control field
|                      |
|                      |         |--<R>--SG2D* - 2-D Coordinate field
|                      |         |
|
|--<R>--Feature Record
|      |
|      |--0001 - ISO/IEC 8211 Record identifier
|              |
|              |--<1>--FRID - Feature Record Identifier field
|                      |
|                      |--<1>--FOID - Feature Object Identifier field
|                      |
|                      |--<R>--ATTF*         - Feature Record Attribute field
|                      |
|                      |--<R>--NATF* - Feature Record National Attribute field
|                      |
|                      |--<1>--FFPC - Feature Record to Feature Object
                                    Pointer Control field
|                      |
|                      |--<R>--FFPT* - Feature Record to Feature Object
                                    Pointer field
|                      |
|                      |--<1>--FSPC - Feature Record to Spatial Record
                                    Pointer Control field
|                      |
|                      |--<R>--FSPT* - Feature Record to Spatial Record Pointer field
|
```

A.1.2.8.1 Data Set Descriptive (META) Field Content

A.1.2.8.1.1 Data Set Identification Field Structure (DSID)

NB: Subfield values are encoded as ASCII or binary as indicated.

tag	subfield name	use	value	comment
RCNM	Record name	M	{10}	= DS, binary
RCID	Record identification number	M		binary
EXPP	Exchange purpose	M	{2}	data set is a revision, binary
INTU	Intended usage	M	100	= unscaled data
DSNM	Data set name	M		file name with extension excluding path, ASCII
EDTN	Edition number	M		Refer to section A.1.1.8 of this Annex
UPDN	Update number	M		ASCII
UADT	Update application date	P		empty, ASCII
ISDT	Issue date	M		ASCII
STED	Edition number of S-57	M	03.1	ASCII
PRSP	Product specification	M	53	= Large Bottom Objects
PSDN	Product specification description	M	Additional Military Layers Large Bottom Objects	
PRED	Product specification version number	M	2.1	ASCII
PROF	Application profile identification	M	11	= Large Bottom Objects, revision
AGEN	Producing agency	M		binary
COMT	Comment	M		Protective marking Owner authority National caveat

A.1.2.8.1.2 Data Set Structure Information Field Structure (DSSI)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
DSTR	Data structure	M	{2}	= chain node
AALL	ATTF lexical level	M	{0} or {1}	
NALL	NATF lexical level	M	{0} or {1} or {2}	
NOMR	Number of meta records	M		
NOCR	Number of cartographic records	M	{0}	cartographic records are not permitted
NOGR	Number of geo records	M		
NOLR	Number of collection records	M		
NOIN	Number of isolated node records	M		
NOCN	Number of connected node records	M		
NOED	Number of edge records	M		
NOFA	Number of face records	M	{0}	faces are not permitted in chain node structure

A.1.2.8.2 Spatial Field Content

A.1.2.8.2.1 Vector Record Identifier Field Structure (VRID)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
RCNM	Record name	M	{110} or {120} or {130}	= VI, isolated node = VC, connected node = VE, edge
RCID	Record identification number	M		
RVER	Record version	M		
RUIN	Record update instruction	M	{1} or {2} or {3}	= insert = delete = modify

A.1.2.8.2.2 Vector Record Attribute Field Structure (ATTV)

NB : Subfield values are encoded as ASCII or binary as indicated.

tag	subfield name	use	value	comment
ATTL	Attribute label/code	M		binary code for an attribute
ATVL	Attribute value			ASCII value, missing attribute value = attribute value is deleted or unknown (see S-57 Appendix B.1 clause 3.5.1)

A.1.2.8.2.3 Vector Record Pointer Control Field Structure (VRPC)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
VPUI	Vector record pointer update instruction	M	{1} or {2} or {3}	= insert = delete = modify
VPIX	Vector record pointer index	M		
NVPT	Number of vector record pointers	M		

A.1.2.8.2.4 Vector Record Pointer Field Structure (VRPT)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
NAME	Name	M		
ORNT	Orientation	M	{255}	= null
USAG	Usage indicator	M	{255}	= null
TOPI	Topology indicator	M	{1} or {2}	= beginning node = end node
MASK	Masking indicator	M	{255}	= null

A.1.2.8.2.5 Co-ordinate Control Field Structure (SGCC)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
CCUI	Coordinate update instruction	M	{1} or {2} or {3}	= insert = delete = modify
CCIX	Coordinate index	M		
CCNC	Number of coordinates	M		

A.1.2.8.2.6 2-D Co-ordinate Field Structure(SG2D)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
YCOO	Coordinate in Y axis	M		latitude (see S-57 Appendix B.1 clause 4.4)
XCOO	Coordinate in X axis	M		longitude (see S-57 Appendix B.1 clause 4.4)

A.1.2.8.3 Feature Field Content

A.1.2.8.3.1 Feature Record Identifier Field Structure (FRID)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
RCNM	Record name	M	{100}	= FE
RCID	Record identification number	M		
PRIM	Object geometric primitive	M	{1} or {2} or {3} or {255}	= point = line = area = no geometry
GRUP	Group	M	{255}	= null
OBJL	Object label	M		binary code for an object class
RVER	Record version	M		
RUIN	Record update instruction	M	{1} or {2} or {3}	= insert = delete = modify

A.1.2.8.3.2 Feature Object Identifier Field Structure (FOID)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
AGEN	Producing agency	M		
FIDN	Feature identification number	M		
FIDS	Feature identification subdivision	M		

A.1.2.8.3.3 Feature Record Attribute Field Structure (ATTF)

NB: Subfield values are encoded as ASCII or binary as indicated.

tag	subfield name	use	value	comment
ATTL	Attribute label/code	M		binary code for an attribute
				ASCII value. Missing attribute value = attribute value is

tag	subfield name	use	value	comment
ATVL	Attribute value			deleted or unknown (see S-57 Appendix B.1 clause 3.5.1)

A.1.2.8.3.4 Feature Record National Attribute Field Structure (NATF)

NB: Subfield values are encoded as ASCII or binary as indicated.

tag	subfield name	use	value	comment
ATTL	Attribute label/code	M		binary code for an attribute
ATVL	Attribute value			ASCII value. Missing attribute value = attribute value is deleted.

A.1.2.8.3.5 Feature Record to Feature Object Pointer Control Field Structure (FFPC)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
FFUI	Feature object pointer update instruction	M	{1} or {2} or {3}	= insert = delete = modify
FFIX	Feature object pointer index	M		
NFPT	Number of feature object pointers	M		

A.1.2.8.3.6 Feature Record to Feature Object Pointer Field Structure (FFPT)

NB: Subfield values are encoded as ASCII or binary as indicated.

tag	subfield name	use	value	comment
LNAM	Long name	M		binary
RIND	Relationship indicator	M	{2} or {3}	= slave, binary = peer, binary
COMT	Comment			ASCII

A.1.2.8.3.7 Feature Record to Spatial Record Pointer Control Field Structure (FSPC0

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
FSUI	Feature to spatial record pointer update instruction	M	{1} or {2} or {3}	= insert = delete = modify
FSIX	Feature to spatial record pointer index	M		
NSPT	Number of feature to spatial record pointers	M		

A.1.2.8.3.8 Feature Record to Spatial Pointer Field Structure (FSPT)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
NAME	name	M		
ORNT	orientation	M	{1} or {2} or {255}	= forward = reverse = null
USAG	usage indicator	M	{1} or {2} or {3} or {255}	= exterior = interior = exterior boundary, truncated by the data limit = null
MASK	Masking indicator	M	{1} or {2} or {255}	= mask = show = null

A.2 AML S-57 DATA DICTIONARY

A.2.1 GENERAL GUIDELINES

A.2.1.1 Feature Object Identifiers

Each feature object must have a unique world-wide identifier. This identifier, called the feature object identifier, is formed by the binary concatenation of the contents of the subfields of the ”Feature Object Identifier” [FOID] field.

The feature object identifier may be used to identify multiple instances of the same object. For example, the same object may appear in different scale bands, or an object may be split by the cell structure. In these circumstances, each instance of this object may have the same identifier.

Feature object identifiers must not be reused, even when a feature has been deleted

A.2.1.2 Cartographic Objects

The use of cartographic objects is prohibited.

A.2.1.3 Time Varying Objects

Specific AML products may contain information about magnetic variation, tides, tidal streams and currents. However, depth information should only be displayed as it has been provided in the AML product and not adjusted by tidal height.

A.2.1.4 Prohibited Attributes

Attributes not included in this Product Specification are prohibited.

A.2.1.5 Numeric Attribute Values

Floating point or integer attribute values must not be padded by non-significant zeros (e.g. 2.5 and not 02.500) unless they are required to specify units of resolution where trailing zeros will become significant in order to distinguish between values (e.g. 3.2 may need to be differentiated from 3.200).

A.2.1.6 Text Attribute Values

The lexical level used for the “Feature Record Attribute” [ATTF] field must be 1 (ISO 8859-1) (see Sections A.1.2.7.3.3 and A.1.2.8.3.3 of this Annex). Lexical level 1 or 2 may be used for the “Feature Record National Attribute” [NATF] field (see Sections A.1.2.7.3.4 and A.1.2.8.3.4 of this Annex). Format effecting (C0) characters, as defined in S-57 Part 3, Annex B, are prohibited. The delete character is only used in the update mechanism (see S-57 part 3, clause 8.4.2.2.a and 8.4.3.2.a).

A.2.2 UNKNOWN ATTRIBUTE VALUES

In a base data set (LN application profile), when an attribute code is present but the attribute value is missing, it means that the producer wishes to indicate that this attribute value is unknown.

In a revision data set (LR application profile), when an attribute code is present but the attribute value is missing it means:

- That the value of this attribute is to be replaced by an unknown value if it was present in the original data set
- That an unknown value is to be inserted if the attribute was not present in the original data set

In both cases the missing attribute value is encoded by the means described in S-57 Part 3, clause 2.1.

A.2.3 USE OF META INFORMATION

A.2.3.1 AML Data Set Metadata

For all AML Products, the Data Set Descriptive records (defined in the application profile structures - Sections A.1.2.7.1 and A.1.2.8.1 of this Annex) are used to contain the metadata of the dataset. The mandatory meta information specified in Section 5.3 of the Product Specification is encoded in S-57 as indicated in the table below.

General/Production Information	Field	Sub-field
Production Agency	DSID	AGEN
Dataset Name	DSID	DSNM
Edition Number	DSID	EDTN
Date of Release	DSID	ISDT
Product Specification Description	DSID DSID	PRSP PSDN
Product Specification Version Number	DSID	PRED
Product Scale Band	DSID	INTU
Compilation Scale	DSPM	CSCL

Security Classification Information	Field	Sub-field
International Defence Organisation (IDO) Status	DSID	COMT (stored as comma-separated values in free- text subfield)
Protective Marking	DSID	
Owner Authority	DSID	
Caveat	DSID	
Update Information	**Field**	**Sub-field**
Update Application Date	DSID	UADT
Update Number	DSID	UPDN

Datums & Units	Field	Sub-field
Horizontal Geodetic Datum	DSPM	HDAT
Vertical Datum	DSPM	VDAT
Sounding Datum	DSPM	SDAT
Co-ordinate Units	DSPM	COUN
Height / Length Units	DSPM	HUNI

Datums & Units	Field	Sub-field
Depth Units	DSPM	DUNI
Positional Accuracy Units	DSPM	PUNI

A.2.3.2 Hierarchy of Meta Data

Any meta data stored as attributes of Meta Objects, or, Geo or Spatial features will override meta information stored in the Data Set Descriptive records. The table below indicates which AML meta objects and associated attributes supersede information stored in the data set subfields (see Sections A.2.3.1, A.1.2.7.1 and A.1.2.8.1 of this Annex).

Notes:

In the following tables, acronyms shown in upper-case type, are those approved by the IHO for use in the S-57 data schema. However, additional acronyms have been created for use in the AML data schema. These are shown in lower-case type.

Additionally, the terms 'specific' and 'generic' are used in the tables to indicate an attribute's association to a feature. Attributes that are 'generic' apply to all features listed in this Product Specification. Attributes listed as 'specific' relate only to those in the Real-World Features table in Section 5.5.1 of the Product Specification, when included in the 'Associated Attributes' column.

Field	Sub-field	S-57 Meta Object	S-57 Attribute	S-57 Geo Object	S-57 Attribute
DSID	AGEN	M_PROD	AGENCY	generic	AGENCY
DSPM	CSCL	M_CSCL	CSCALE	generic	CSCALE
DSID	COMT (stored as comma-separated values in free-text subfield)	m_clas	secido	generic	secido
			secpmk	generic	secpmk
			secown	generic	secown
			seccvt	generic	seccvt

Field	Sub-field	S-57 Meta Object	S-57 Attribute	S-57 Geo Object	S-57 Attribute
DSPM	VDAT	M_VDAT	VERDAT	specific	VERDAT
DSPM	SDAT	M_SDAT	soudat	specific	soudat
DSPM	DUNI	M_UNIT	DUNITS	specific	DUNITS

A.2.4 SCHEMA

A.2.4.1 AML Large Bottom Objects Meta Information Table

The meta information specified in Section 5.3 of the Product Specification is encoded in S-57 as indicated in the table below.

Production Information	S-57 Meta Object	S-57 Attribute	S-57 Geo Object	S-57 Attribute
Capture Date	M_PROD	RECDAT	generic	RECDAT

Production Information	S-57 Meta Object	S-57 Attribute	S-57 Geo Object	S-57 Attribute
Copyright Statement	M_PROD	cpyrit	generic	cpyrit
Production Agency	M_PROD	AGENCY	generic	AGENCY
Producing Country	M_PROD	PRCTRY	generic	PRCTRY
Data Coverage	M_COVR	CATCOV	N/A	N/A

Security Classification Information	S-57 Meta Object	S-57 Attribute	S-57 Geo Object	S-57 Attribute
International Defence Organisation (IDO) Status	m_clas	secido	generic	secido
Protective Marking	m_clas	secpmk	generic	secpmk
Owner Authority	m_clas	secown	generic	secown
Caveat	m_clas	seccav	generic	seccvt

Geo-Reference Information	S-57 Meta Object	S-57 Attribute	S-57 Geo Object	S-57 Attribute
Vertical Datum	M_VDAT	VERDAT	specific	VERDAT
Sounding Datum	M_SDAT	soudat	specific	soudat
Height / Length Units	M_UNIT	HUNITS	specific	HUNITS
Depth Units	M_UNIT	DUNITS	specific	DUNITS
Source Information	**S-57 Meta Object**	**S-57 Attribute**	**S-57 Geo Object**	**S-57 Attribute**
Source Date	M_CSCL	SORDAT	generic	SORDAT
Source Country	M_CSCL	SORIND	generic	SORIND
Source Agency	M_CSCL	SORIND	generic	SORIND
Source ID	M_CSCL	SORIND	generic	SORIND
Source Type	M_CSCL	SORIND	generic	SORIND
Source Scale	M_CSCL	CSCALE	generic	CSCALE

Data Quality Information	S-57 Meta Object	S-57 Attribute	S-57 Geo Object	S-57 Attribute
Absolute Horizontal Accuracy	M_ACCY (non-bathymetric data) M_QUAL (bathymetric data)	POSACC POSACC	generic generic	POSACC (spatial object) POSACC (spatial object)
Error Ellipse	M_ACCY (non-bathymetric data)	errell	generic	errell (spatial object)

Data Quality Information	S-57 Meta Object	S-57 Attribute	S-57 Geo Object	S-57 Attribute
Absolute Vertical Accuracy	M_ACCY	elvacc	generic	elvacc
Relative Horizontal Accuracy	M_ACCY	HORACC	generic	HORACC
Relative Vertical Accuracy	M_ACCY	VERACC	generic	VERACC
Sounding Accuracy	M_QUAL	SOUACC	specific	SOUACC
Quality of Position	M_SREL	QUAPOS	generic	QUAPOS (spatial object)
Quality of Sounding Measurement	M_SREL	QUASOU	specific	QUASOU
Technique of Sounding Measurement	M_SREL	TECSOU	specific	TECSOU
Completeness for the Product Specification	m_conf	catcnf	N/A	N/A
External Reference Information	**S-57 Meta Object**	**S-57 Attribute**	**S-57 Geo Object**	**S-57 Attribute**
Image File Link	M_NPUB	PICREP	generic	PICREP
Text File Reference	generic	TXTDSC	generic	TXTDSC
Text File Reference (in national language)	generic	NTXTDS	generic	NTXTDS
Reference to a Publication	M_NPUB	PUBREF	generic	PUBREF

Other Supporting Information	S-57 Meta Object	S-57 Attribute	S-57 Geo Object	S-57 Attribute
Supporting Textual Information	generic	INFORM	generic	INFORM
Supporting Textual Information (in national language)	generic	NINFOM	generic	NINFOM

Notes:

1. When there is no meta object attribute, an individual attribute can supersede a data set subfield.
2. It is prohibited to use an attribute on an individual object, if this attribute has the same value as the general value defined by the meta object or the equivalent data set subfield.
3. It is prohibited to use a meta object, if the information given by this meta object is the same as the value given by the equivalent data set subfield.

A.2.4.2 AML Large Bottom Objects Object Table

The tables below define the S-57 / AML six-letter acronym for each of the features / objects described in Section 5.5.1 of the Product Specification.

The tables provide the following details:

- Geo Object - gives the feature name.
- Acronym - gives the six-character code for the feature.

Allowable attributes for all the features / objects listed in the following tables are given in Section A.2.4.3 below.

Feature (Geo Object)	Acronym
Impact Scour	iscour
Obstruction	OBSTRN
Sensor Anomaly	senanm
Underwater / Awash Rock	UWTROC
Wreck	WRECKS
User defined	u_defd

Collection & Meta Object	Acronym
Completeness for the Product Specification	m_conf
Data Coverage	M_COVR
Data source area	M_CSCL

A.2.4.3 AML Large Bottom Objects Attribute Table

The table below defines the S-57 / AML six-letter acronym for each of the attributes described in Section 5.5.2 in the Product Specification.

The table provides the following details:

- Attribute - gives the attribute name.
- Acronym - gives the six-character alpha-numeric code.

Allowable attribute values for all the attributes listed are given in Section 5.5 - Schema, of the Product Specification.

Attribute	Acronym
Abandonment Date	databa
Absolute Horizontal Accuracy	POSACC
Absolute Vertical Accuracy	elvacc
Beam of Vessel	vesbem
Capture Date	RECDAT
Cardinal Point Orientation	orcard
Category of Completeness	catcnf
Category of Coverage	CATCOV
Category of Obstruction	CATOBS
Category of Wreck	CATWRK
Caveat	seccvt
Condition	CONDTN
Conspicuous, Radar	CONRAD
Conspicuous, Visually	CONVIS
Controlling Authority	authty
Copyright Statement	cpyrit
Current Scour Dimensions	scrdim
Date Sunk	datsnk
Debris Field	debfld
Depth Units	DUNITS
Depth of Water Over Feature	VALSOU
Draught of Vessel	vesdgh
Error Ellipse	errell
Existence of Restricted Area	exzres
Field Name	fldnam
First Detection Year	datfir
First Sensor	senfir
First Source	sorfir
General Water Depth	gendep
Height	HEIGHT
Height / Length Units	HUNITS
Horizontal Length	HORLEN
Horizontal Width	HORWID
Image File Link	PICREP
Inclination	incltn
International Defence Organisation (IDO) Status	secido
Last Detection Year	datlst
Last Sensor	senlst
Last Source	sorlst

Attribute	Acronym
Length of Vessel	veslen
Magnetic Anomaly Detector (MAD) Signature	madsig
Magnetic Intensity	magint
Name	OBJNAM
Name (in national language characters)	NOBJNM
Nationality	NATION
Nature of Construction	NATCON
Operator	oprtor
Orientation	ORIENT
Owner Authority	secown
Producing Country	PRCTRY
Product	PRODCT
Production Agency	AGENCY
Protective Marking	secpmk
Quality of Position	QUAPOS
Quality of Sounding Measurement	QUASOU
Re-entered Date	datren
Re-suspended Date	datres
Reference to a Publication	PUBREF
Relative Horizontal Accuracy	HORACC
Relative Vertical Accuracy	VERACC
Sonar Signal Strength	sonsig
Sounding Datum	soudat
Sounding Accuracy	SOUACC
Source Agency	SORIND (comma separated value)
Source Country	SORIND (comma separated value)
Source Date	SORDAT
Source ID	SORIND (comma separated value)
Source Scale	CSCALE
Source Type	SORIND (comma separated value)
Spudded Date	datspd
Status	STATUS
Strength of Magnetic Anomaly	magany
Supporting Textual Information	INFORM
Supporting Textual Information (in national language characters)	NINFOM
Surface Composition	NATSUR

Attribute	Acronym
Surface Composition - Qualifying Terms	NATQUA
Suspension Date	datsus
Technique of Sounding Measurement	TECSOU
Text File Reference	TXTDSC
Text File Reference (in national language characters)	NTXTDS
Textual description	txtdes
Tonnage	tonage
Type of Tonnage	typton
Type of Wreck	typewk
Underwater Reference Mark	unwrfm
Vertical Datum	VERDAT
Vertical Length	VERLEN
Water Level Effect	WATLEV

A.2.4.4 Mandatory Attributes

The table below specifies attributes that are mandatory to specific features / objects in Large Bottom Objects. Feature / objects not included in this table have no mandatory attributes.

Feature	Attributes					
iscour	VALSOU					
OBSTRN	CATOBS	VALSOU	WATLEV			
senanm	VALSOU	WATLEV				
UWTROC	at least one of:		VALSOU	WATLEV		
WRECKS	CATWRK	VALSOU	WATLEV			
M_ACCY	POSACC					
m_clas	secpmk	secown	either but not both of:		secido	seccvt
m_conf	catcnf					
M_COVR	CATCOV					
M_CSCL	CSCALE					
M_PROD	cpyrit	at least one of:		AGENCY	PRCTRY	
M_QUAL	at least one of:		SOUACC	VERDAT		
M_NPUB	at least one of:		PICREF	PUBREF		
M_SDAT	soudat					
M_VDAT	VERDAT					

A.2.4.5 Mandatory Features / Objects

There are no mandatory features in AML Large Bottom Objects.

A.2.4.6 Attribute Definitions

AML attribute definitions, permissible values and formats, together with details of S-57 encoding, are given in the AML Object & Attribute Catalogue.

A.2.4.7 Relationships Between Features

AML Large Bottom Objects does not contain any relationships between features.

A.2.4.8 Dependency Between Attributes

AML Large Bottom Objects does not contain any dependencies between features.

A.3 AML LARGE BOTTOM OBJECTS GUIDANCE ON FEATURE CODING AND ATTRIBUTION

A.3.1 SCOPE

The following clauses specify the conventions that are to be used to encode the geometry and semantic description of objects in AML Large Bottom Objects.

This document describes how to encode information that the cartographer considers relevant to a specific purpose. The content of AML Large Bottom Objects is at the discretion of the producing authority provided that the conventions described below are followed.

A.3.2 GENERAL RULES

Generally, the conventions extant in S-57 APPENDIX B.1, Annex A, Use of the Object Catalogue for ENC will also apply to the AML Large Bottom Objects product. However, there may be some cases where the range of allowable attribute values may differ, or where additional attributes apply. The following guide-lines seek to clarify such amendments or additions for use in AML Large Bottom Objects.

This document must be used in conjunction with the AML Large Bottom Objects product specification.

Note:
Only the object primitive point is allowable for any feature in AML Large Bottom Objects. Therefore any S-57 conventions applying to area or line primitives of an object/feature can be disregarded.

A.3.2.1 SOUNDING DATUM

The default value for the entire data set is given in the 'Sounding Datum' [SDAT] subfield of the 'Data Set Parameter' [DSPM] field. If the sounding datum is different to the value given in the SDAT subfield for some part of the data set, it may be encoded as meta object M_SDAT.

The areas covered by meta objects M_SDAT must be mutually exclusive.

Meta object : Sounding datum (M_SDAT)
Attributes : soudat INFORM NINFOM
The sounding datum attribute 'soudat' can also apply on an individual object (see note).

NOTE:
When using the attributes **VALSOU** and **gendep** on an individual object the following criteria apply:

1. The 'soudat' attribute must be populated if the sounding datum:

- differs from the sounding datum specified in the SDAT subfield of the Data Set Parameter (DSPM) field structure

or,

- differs from the sounding datum attribute 'soudat' specified by a M_SDAT meta-object

A.3.2.2 VERTICAL DATUM

The default value for the entire data set is given in the 'Vertical Datum' [VDAT] subfield of the 'Data Set Parameter' [DSPM] field. If the vertical datum is different to the value given in the VDAT subfield for some part of the data set, it may be encoded as meta object M_VDAT.

The areas covered by meta objects M_VDAT must be mutually exclusive.

Meta object : Vertical datum (M_VDAT)
Attributes : VERDAT INFORM NINFOM

The vertical datum attribute VERDAT can also apply on an individual object (see note).

NOTE:
When using the attribute height on an individual object the following criteria apply:

1. The VERDAT attribute must be populated if the vertical datum:

- differs from the vertical datum specified in the VDAT subfield of the Data Set Parameter (DSPM) field structure

or,

- differs from the vertical datum attribute VERDAT specified by a M_VDAT meta-object

A.3.2.3 UNITS

Units are specified in the 'Units of Depth Measurement' [DUNI] subfield and 'Units of Height Measurement' [HUNI] subfield of the 'Data Set Parameter' [DSPM] field. If the units for objects in some part of the data set are different to either of the values given in the DUNI or HUNI subfields, it may be encoded as meta object M_UNIT.

The areas covered by meta objects M_UNIT must be mutually exclusive.

Meta object : Units of measurement of data (M_UNIT)
Attributes : HUNITS INFORM NINFOM
or
DUNITS INFORM NINFOM

The unit attributes 'HUNITS' and 'DUNITS' can also apply on an individual object (see note).

NOTE:
When using the attributes **debfld; VALSOU; gendep; HEIGHT; HORLEN; HORWID; scrdim; VERLEN; vesbem; vesdgh; veslen** on an individual object the following criteria apply:

1. The measurement units must be set to the appropriate units using the HUNITS or DUNITS attribute if they:

- differ from the units specified in the HUNI subfield of the Data Set Parameter (DSPM) field structure

or,

- differ from the attributes 'HUNITS' or 'DUNITS' specified by a M_UNIT meta-object

A.3.3 LARGE BOTTOM OBJECT INFORMATION

Rocks which may cover, Obstructions and Foul Areas, Wellheads

- The attribute **scrdim** (current scour dimensions) should only be used to define the dimensions of a scour caused by the effect of current flow around the captured geographic object/feature.
- Scours caused by impact of an object should be encoded as a separate object/feature of class iscour (Impact Scour). Where known, this object should be associated with the object which caused the impact.
- Where additional or more detailed information is available, it should be encoded using an appropriate attribute taken from the list in Section A.2.4.2 of this Annex.

Wrecks

- The use of HEIGHT and VERLEN should not be confused. HEIGHT should only be used to indicated the measurement of an object above a specified datum, whereas VERLEN should be used to indicate the overall vertical measurement of an object regardless of its relationship to a datum.
- Information on the cargo of a wreck or the product of an obstruction should be encoded using the values in the attribute PRODCT. In many cases the definition of a value will in fact encompass a grouping of similar elements, materials or items under a single heading. If a producer feels that there is value in describing the exact nature of the product, then the attribute INFORM / NINFOM may be used to encode relevant data.
- INFORM / NINFOM may be used to encode relevant details from circumstances of loss or surveying reports.
- The flag under which the vessel was operating should be encoded under NATION.

Obstructions and Foul Areas

- Snags, stumps, foul areas and ice booms will <u>not</u> be captured for LBO.
- For the purposes of LBO, a number of structures related to the oil and gas industry have been added as obstructions, refer to CATOBS.

Wellheads

- For the purposes of LBO, a number of structures related to the oil and gas industry have been added as obstructions, refer to CATOBS.
- INFORM / NINFOM may be used to encode relevant details from the installations history or other remarks.
- The country for which the installation operates / produces should be encoded under NATION.

Impact Scour

- The object/feature Impact Scours (iscour) should only be used to capture a geographic object/feature when the scour cannot be directly associated with an object/feature of the class Obstruction, Sensor Anomaly, Underwater / Awash Rock or Wreck.
- The AML Large Bottom Objects product will only include Impact Scours where there is a possibility of confusion with a potential target.