NORTH ATLANTIC TREATY ORGANISATION

(NATO)

ADDITIONAL MILITARY LAYERS
SMALL BOTTOM OBJECTS
PRODUCT SPECIFICATION

Version 1.0, 1 November 2001

Produced and issued by the United Kingdom Hydrographic Office
under the direction of the Ad Hoc Hydrographic Working Group of
the NATO Geographic Conference.

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1   INTRODUCTION

1.1   SCOPE

The main body of this Product Specification describes the content and defines the data dictionary of the AML Small Bottom Objects (SBO) product, independent of any exchange standard data format. The schema and data format imposed by the chosen exchange standard implementation are defined in separate annexes (where provided).

It has been prepared in accordance with the draft NATO STANAG 4564, Performance Standards for Warship Electronic Chart Display and Information System (WECDIS) Data Products, and is based on the proposed Common Product Specification Framework which is contained as Annex B to the draft STANAG.

The SBO Product Specification is designed to facilitate the encoding of the AML component of the same name. The purpose of this product is to depict all known bottom contacts whose greatest dimension is less than five metres.

> **AML SMALL BOTTOM OBJECTS MUST NOT BE USED FOR NAVIGATIONAL PURPOSES**

1.2   GENERAL INFORMATION ON THE PRODUCT SPECIFICATION

1.2.1   Version Number

1.0

1.2.2   Date of Issue

31st August 2001

1.2.3   Custodian of the Product Specification

The Custodian of this specification is the United Kingdom Hydrographic Office:

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Taunton

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1.2.4   Relevant STANAG Number

To be assigned.

1.3   STATUS OF THE PRODUCT SPECIFICATION

This product specification has been endorsed by the Ad Hoc Hydrographic Working Group of the NATO Geographic Conference and is subject to the change control procedures implemented by that group.

1.4   SECURITY

1.4.1   Security Classification of the Specification

The Product Specification is UNCLASSIFIED.

1.4.2   Security Classification of the Product

AML SBO can be issued at various security classification levels according to content. AML SBO products of differing security levels (specified at the dataset level by the 'Protective Marking' and 'Caveat' details) are physically partitioned.

The table below defines how AML SBO security classification information must be described at a dataset level (see section 5.3.1).

Dataset Security Classification Information	Values
International Defence Organisation (IDO) status (see note)	– North Atlantic Treaty Organisation (NATO) – North Atlantic Co-operation Council (NACC) – Partnership for Peace (PfP) – Western European Union (WEU)
Protective Marking	– COSMIC TOP SECRET – FOCAL TOP SECRET – TOP SECRET – SECRET – CONFIDENTIAL – RESTRICTED – UNCLASSIFIED
Owner Authority	e.g. UK, US
Caveat (see note)	e.g. UK/US Eyes only

NOTE:

International Defence Organisation (IDO) status and caveats are mutually exclusive. If the data has an IDO status, then the caveat is not applicable. Additionally, caveats only apply to data that has a Protective Marking of CONFIDENTIAL or above.

AML SBO security information may also be encoded at the following levels in a dataset:

*   meta information (see section 5.5.1)
*   feature attributes (see section 5.5.3)

1.4.3   Copyright Statement

Producers of AML datasets must ensure that:

- the Intellectual Property Rights of those owning the information that has been used for production of the AML product is not compromised.

- sufficient mechanisms are put in place to ensure that material is not copied either in whole or part, except as specifically required within the host system, without prior agreement of the data producer and any other copyright holders

Copyright statements should be shown at the following locations:
- on the product label
- on the product packaging
- within the product

1.5   CONTENTS OF THE DOCUMENT

The AML SBO Product Specification conforms to the Common Product Specification Framework (CPSF) specified in NATO STANAG No. 4564, Performance Standards for Warship Electronic Chart Display and Information System (WECDIS), Edition 1, Annex B, Data Products.

In accordance with the CPSF, the AML SBO Product Specification defines the real-world entities and metadata required for the production and use of the product.

This Product Specification is divided into the following sections:
- Introduction (section 1)
- General Product Description (section 2)
- General Data Description (section 3)
- Data Structure (section 4)
- Data Dictionary (section 5)
- Data Capture Guidelines (section 6)
- Data Presentation (section 7)
- Provision of Data (section 8)
- Testing Method (section 9)

Also included, as annexes to the product specification, are details of the implementation using the relevant exchange standard(s).

Each annex (if included) is identified as follows:
- AML SBO S-57 Implementation (ANNEX A)

A cross-reference box (an example of which is shown below) will be included for instances when there are relevant details in one or more of the implementation annexes.

ANNEX A	A. EXAMPLE

1.6   REFERENCES

The following standards and specifications affect the content of this Product Specification.

1.6.1   Standards

NATO STANAG 1059 (Edition 6) –	Distinguishing Letters for Geographical Entities for use in NATO.
NATO STANAG 2211	Geodetic Datums, Ellipsoids, Grids & Grid References
NATO STANAG 4564 –	Standard for Warship Electronic Chart Display and Information System (WECDIS), Edition 1, Annex B, Data Products.
NATO STANAG 7074 –	Digital Geographic Information Exchange Standard (DIGEST), Edition 2.1, September 2000.
	Part 1: General Description
	Part 2: Theoretical Model, Exchange Structure and Encapsulation Specifications, Annex C – Vector Relational Format (VRF) Encapsulation Specification.
	Part 3: Codes, Parameters and Tags
	Part 4: Feature and Attribute Coding Catalogue (FACC)
S–57,	IHO Transfer Standard for Digital Hydrographic Data, Edition 3.1, November 2000
	Appendix A:
	Chapter 1, Object Classes
	Annex A – IHO Codes for Producing Agencies
	Chapter 2, Attributes
	Annex B – Attributes/Object Classes Cross Reference
S–52	Specifications for Chart Content and Display Aspects of ECDIS
	5th Edition, dated December 1996 (amended March 1999)
	Appendix 1
	Guidance on Updating the Electronic Navigational Chart
ISO 8859	Information processing – 8-bit single-byte coded graphic character sets
	Part 1: Latin alphabet No.1

ISO 9660   Information Processing – Volume and File Structure of CD–ROM for Information Interchange.

ANSI/IEEE 802.3   IEEE Standards for Local Area Networks, Carrier Sense Multiple Access with Collision Detection (CSMA/CD)Access Method and Physical Layer Specifications

ISO/IEC 8211,   Information processing – Specification for a data descriptive file for information interchange

ISO/IEC 10646   Information technology – Universal Multiple–Octet Coded Character Set (UCS)

                                      Part 1: Architecture and Basic Multilingual Plane

1.6.2 Specifications

MIL-PRF-0089049(NIMA)   General Performance Specification, Vector Product Format (VPF) Products, dated 24 November 1998

MIL-STD-2407   Interface Standard for Vector Product Format, dated 28 June 1996

The Open GIS Abstract   Open GIS Consortium. Topic 9: Quality Version 4
Specification   1999

S–57, Edition 2.0, 11/2000   Appendix B.1: ENC Product Specification

1.6.3 Other References

AML   Object and Attribute Catalogue

1.7 DEFINITIONS

AML   AML is a unified range of digital geospatial data products designed to satisfy the totality of NATO non–navigational maritime defence requirements.

1.8 KEY WORDS

AML

SBO

PRODUCT SPECIFICATION

1.9 MAINTENANCE AND SUPPORT OF THE PRODUCT SPECIFICATION

Specific processes and mechanisms that are established for the maintenance of AML Product Specifications are described in the sections 1.9.1 to 1.9.6 below.

1.9.1 Frequency of Review

The AML SBO Product specification (version 1.0) will be frozen for a period of 2 years following endorsement.

1.9.2 Method of Maintenance

Corrections, clarifications and requests for change will be administered by the custodian. Discussion regarding proposed changes will be carried out by correspondence with

national Points of Contact. Consolidated maintenance documents will be issued periodically containing published corrections and clarifications together with details of agreed extensions to the object catalogue (these will be formally incorporated into the Product Specification and become live at its next revision).

Changes to the Product Specification beyond extensions to the object catalogue will be reviewed by committee[1] during preparatory work for production of the next edition of the specification.

1.9.3   Method of Promulgation

Maintenance documents, new editions of specifications, and related documentation will be sent to nations through their appointed AML point of contact.

1.9.4   Authority Responsible for Maintenance

AML Product Specifications will be maintained by the Custodian specified in section 1.2.3.

1.9.5   Error Reporting/Change Request Procedure

Comments concerning the content of the AML Product Specifications and requests for change should be addressed to the Custodian.

1.9.6   Available Support

Contact the Custodian for guidance and advice relating to this product specification.

[1] Will be a specific group reporting to the AHHWG or its successor.

2   GENERAL PRODUCT DESCRIPTION

PRODUCT TITLE

Additional Military Layers – Small Bottom Objects.

SHORT TITLE

SBO

REFERENCE

NATO STANAG No. 4564 (Performance Standards for Warship Electronic Chart Display and Information System (WECDIS), Edition 1, Annex B, Data Products.

2.1   MAINTENANCE OF THE DATA PRODUCT

The frequency and method of provision of update or replacement data will be defined by each AML producing agency.

ANNEX A	A.1.1.8

2.2   SUPPORT FOR MULTIPLE MODES OF OPERATION

AML SBO data is compiled for the purpose of depicting all known bottom contacts whose greatest dimension is less than five metres and will therefore be made available at the scale band shown in the following table.

SCALE BAND	SCALE RANGE
0	Unscaled data

ANNEX A	A.1.2.7.1.1 and A.1.2.8.1.1

2.3   GEOGRAPHIC ORGANISATION

2.3.1   Regional Scheme

AML products will be partitioned by geographic region. This will vary widely depending upon the scale band of the product.

2.3.2   Tiling Scheme

ANNEX A	A.1.1.1

2.4   LAYER ORGANISATION

The content of the product is not layered. However, specific exchange standards may impose their own internal layering requirements.

2.5   EXCHANGE STANDARD IMPLEMENTATION

This product specification has been written to be independent of the exchange standard used. Details of exchange standard implementations are given in the relevant annex.

2.5.1   Spatial Data Type

AML SBO contains spatial objects as vector data.

2.5.2   Level of Topology

The topological level of the product may be influenced by the exchange standard and so this is defined in the relevant annex.

2.5.3   Relationship with Layering

N/A

2.5.4   Textual Information

Attributes that contain free text must not be used when it is possible to encode the information by means of any other attribute.

2.5.5   Reference to External Files

Text and picture files may also be included in the AML product to provide additional information.

ANNEX A	A.1.1.5.1.2 and A.1.1.7.4

Below are <u>examples</u> of potential formats.

- ASCII
- TIFF
- PDF
- HTML
- JPEG
- AVI
- MPEG

2.6   SIZING REQUIREMENTS

This will be dependent upon the exchange standard implementation being used.

2.7   GENERAL SOURCE DESCRIPTION

2.7.1   Minimum Source Requirements

Sources for any real-world feature detailed in section 5.5.2 meet the following requirements

- the data capture point-density fulfils the data capture requirements specified in section 2.2
- mandatory features specified in section 5.5.2.1 are included
- the mandatory attribution levels for each object, specified in section 5.5.2, are met

2.7.2   Applicable Sources

All sources used must meet the minimum requirements. Wherever available, sources that provide exact definitions of entities e.g. geographical co-ordinates should be used in preference to digitising from graphical representations.

3   GENERAL DATA DESCRIPTION

3.1   DATUMS

Please refer to NATO STANAG 2211 – Geodetic Datums, Ellipsoids, Grids & Grid References, which establishes the NATO guidelines to the use of horizontal and vertical datums.

3.1.1   Horizontal Datum

The horizontal datum for the AML SBO is the World Geodetic System 1984 (WGS 84).

ANNEX A	A.1.2.7.1.3

3.1.2   Vertical Datums

3.1.2.1   *Height Datum*

The default height datum for the AML SBO is specified in the metadata of the dataset.

ANNEX A	A.1.2.7.1.3

The default height datum can be varied by the use of lower level metadata or feature level attribution.

ANNEX A	A.2.3.2

3.1.2.2   *Sounding Datum*

The default sounding datum for AML SBO is specified in the metadata of the dataset.

ANNEX A	A.1.2.7.1.3

The default sounding datum can be varied by the use of lower level metadata or feature level attribution.

ANNEX A	A.2.3.2

3.2   UNITS

The default units to be used in AML SBO are:
- Position: latitude and longitude in decimal degrees
- Depth: metres
- Height: metres
- Length/width: metres
- Positional accuracy: metres
- Distance: nautical miles or metres

The default units can be varied by the use of lower level metadata or feature level attribution.

3.2.1   Time

AML may contain attributes used to encode time e.g. the beginning and end of an active period for an object. When using these attributes all times should be encoded as

Coordinated Universal Time (UTC). ISO 8601 states that the format for UTC time should be CCYYMMDDThhmmssZ (where 'T' is a separator). However, AML attributes that encode time using the ISO 8601 format DO NOT include the 'Z' and they should all be interpreted as UTC.

3.3   CO-ORDINATE SYSTEM

The co-ordinate system used by AML SBO is Latitude and Longitude. These will be recorded as:

Positive values: Used for latitudes **north** of the equator and longitudes **east** of the Greenwich Meridian.

Negative values: are used for latitudes **south** of the equator and longitudes **west** of the Greenwich Meridian.

3.4   PROJECTION

AML SBO is based upon geographical co-ordinates and is not projected.

3.5   LANGUAGE AND CHARACTER SETS

3.5.1 Language

The exchange language used by AML SBO is English.

ANNEX A	A.1.1.4

3.5.2 Character Sets

ISO 8859-1 supports English and most European languages. For those languages that it does not support ISO/IEC 10646 shall be used.

3.6   DATA QUALITY

AML SBO data quality information should be encoded at an appropriate level, as specified by the exchange standard implementation.

AML data quality information encompasses the following categories:
- Accuracy
- Up-to-dateness/currency
- Source(s) of the data
- Conformance to the Product Specification

Data quality information defined for AML SBO can be encoded in the dataset as:
- dataset metadata (see section 5.3.1)
- meta information features[1] (see section 5.5.1)
- feature attributes (see section 5.5.3)

3.6.1 Accuracy

Where applicable, the maximum two-dimensional error of AML data should be stated. All positional accuracy figures are cumulative and allow for:
- the accuracy of the original data
- additional errors introduced by the AML production process

[1] Only applicable if supported by the exchange standard implementation.

If applicable, the cumulative error should be stated for the following:
- Horizontal Accuracy
- Sounding Accuracy
- Vertical (Height) Accuracy

3.6.2   Up-to-Dateness/Currency

Where applicable, currency information should specify the up-to-dateness of the AML dataset(s). This information should include:
- issue date
- update[2] date

3.6.3   Source(s) of the data

Where available, AML source information should include the following details:
- authority (e.g. data provider)
- source type (e.g. graphic or report)
- source ID
- source date

3.6.4   Conformance to the Product Specification

AML products may be produced to fulfil operational requirements, and therefore, may not conform fully to this Product Specification.

All AML datasets must specify instances when:
- all available data/information has been encoded. Missing data means that the information is not available
- only specified/required data/information is encoded

3.6.5   Geometric Validation

All data produced for AML SBO must be validated for geometric anomalies.

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[2] Only applicable if updating is supported by the exchange standard implementation.

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4   DATA STRUCTURE

Refer to the appropriate implementation annex for details of specific implementation, format, and structure.

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5   DATA DICTIONARY

5.1   GENERAL GUIDELINES

This section provides real-world descriptions for the metadata and features contained within the AML SBO dataset. Details of how this information is to be encoded (e.g. using the chosen Exchange Standard) can be found in the tables contained in the implementation annexes.

5.2   UNKNOWN/MISSING ATTRIBUTE VALUES

The way in which an unknown or missing attribute value is handled is dependent upon the exchange standard implemented.

ANNEX A	A.2.2

5.3   USE OF META INFORMATION

AML datasets contain the following meta-information:

5.3.1   Dataset Metadata

The following table provides the descriptions of dataset meta information required by AML SBO to conform to this Product Specification.

For details of how to represent the dataset metadata described, refer to the appropriate exchange standard implementation annex.

ANNEX A	A.2.3.1

General/Production Information	Description
Production Agency	The agency responsible for the production of the data
Dataset Name	The name of the dataset
Edition Number	The edition number of the dataset
Date of Release	The date of the dataset was made available by the data producer (e.g. edition or revision date)
Product Specification Description	The name of the AML Product Specification to which the dataset conforms (see section 2)
Product Specification Edition Number	The edition number of the AML Product Specification to which the dataset conforms (section 1.2.1)
Product Application	The usage application scale-band of the dataset (see section 2.2)
Compilation Scale	The scale at which the data was compiled (it is recommended that this should be within the defined ranges of the 'Product Application' scale bands)

Security Classification Information	Description
International Defence Organisation (IDO) status (see note)	The International Defence Organisation (IDO) status (if applicable) that must precede, and be applied to, the Protective Marking thus making it an IDO Marking. – North Atlantic Treaty Organisation (NATO) – North Atlantic Co-operation Council (NACC) – Partnership for Peace (PfP) – Western European Union (WEU)
Protective marking	A marking indicating the minimum standards of protection required of the data. – COSMIC TOP SECRET – FOCAL TOP SECRET – TOP SECRET – SECRET – CONFIDENTIAL – RESTRICTED – UNCLASSIFIED
Owner Authority	The NATO country code (NATO STANAG 1059) denoting the 'owner' that is responsible for establishing and setting the protective marking level
Caveat (see note)	A component of a security clearance and/or security class used for computing access rights and controlling information flow by authorising a specific group of subjects to have access to the information

NOTE:

International Defence Organisation (IDO) status and caveats are mutually exclusive. If the data has an IDO status, then the caveat is not applicable. Additionally, caveats only apply to data that has a Protective Marking of CONFIDENTIAL or above.

Update Information	Description
Update Application Date	The date for which all previous updates (dated on or before) must have been applied
Update Number	The update number of the dataset

NOTE:

Update information is only applicable if updating is supported by the exchange standard implementation.

Datums & Units	Description
Horizontal Geodetic Datum	The horizontal geodetic datum of the dataset
Vertical Datum	The vertical datum of the dataset
Sounding Datum	The sounding datum of the dataset
Co-ordinate Units	The co-ordinate units of the dataset

Datums & Units	Description
Height/Length Units	The height and length units of the dataset
Depth Units	The depth units of the dataset
Positional Accuracy Units	The positional accuracy units of the dataset

5.4   MANDATORY META INFORMATION

All dataset meta information stated in section 5.3.1, including Conformance to the Product Specification and Data Coverage (stated in section 5.5.1) are mandatory.

5.5   SCHEMA

The following tables (5.5.1, 5.5.2, and 5.5.3) provide the descriptions of meta information, real−world features, and associated attributes required by AML SBO to conform to this Product Specification.

For details of how to represent the real−world features and associated attributes described, refer to the appropriate exchange standard implementation annex.

ANNEX A	A.2.4.1, A.2.4.2, and A.2.4.3

5.5.1   Meta Information

In the following tables, details of allowable meta information for AML SBO are described.

'Encoding Details' provides additional details of how meta information can be encoded, either as meta information features, or, as attributes. The terms 'specific' and 'generic' are used to indicate an attribute's association to a feature class. Attributes that are 'generic' apply to all feature classes listed in this Product Specification. Attributes listed as 'specific' relate only to those in the Features Class table in section 5.5.2, when included in the 'Associated Attributes' column.

Production Information	Description	Encoding Details
Capture Date	The date when the specific object was captured, edited or deleted.	generic attribute
Production Agency	The agency responsible for the production of the data (IHO Codes for Producing Agencies)	generic attribute
Producing Country	The country responsible for the production of the data (IHO Codes for Producing Agencies)	generic attribute
Data Coverage	The geographical area that describes the coverage and extent of spatial objects	Feature Class

Security Classification Information	Description	Encoding Details
International Defence Organisation (IDO) status	The International Defence Organisation (IDO) status (if applicable) that must precede, and be applied to, the Protective Marking thus making it an IDO Marking	generic attribute
Protective Marking	A marking indicating the minimum standards of protection required of the data	generic attribute
Owner Authority	The NATO country code (NATO STANAG 1059) denoting the 'owner' that is responsible for establishing and setting the protective marking level	generic attribute
Caveat	A component of a security classification used for authorising a specific group to have access rights	generic attribute

Geo–Reference Information	Description	Encoding Details
Sounding Datum	The horizontal plane to which the soundings on a hydrographic survey are reduced. (IHO SP32: 1225)	specific attribute
Vertical Datum Shift Area	An area within which a uniform shift exists between a specific vertical datum and the datum of the data within this area	Feature Class
Depth Units	Unit of measurement for depths	specific attribute
Height/Length Units	Unit of measurement for heights and lengths	specific attribute

NOTE:

Any feature class with attribute(s) used to encode values for; height, depth, length, or width must include an attribute for the unit of measurement.

Source Information	Description	Encoding Details
Source Date	The date of issue of the source information (if applicable)	area feature and generic attribute

Source Information	Description	Encoding Details
Source Country	The country responsible for the production of the source (IHO Codes for Producing Agencies)	area feature and generic attribute
Source Agency	The agency responsible for the production of the source (IHO Codes for Producing Agencies)	area feature and generic attribute
Source ID	ID of the data source (e.g. chart number)	area feature and generic attribute
Source Type	The type of data source (e.g. chart, report, etc.)	area feature and generic attribute
Source Scale	The scale at which the source data has been compiled	area feature and generic attribute

NOTE:

The 'Source Agency' refers to the originators of the data and not the agency responsible for producing AML. If the source agency is not listed in IHO Codes for Producing Agencies, then the agency name should prefix any details provided in the attribute 'Source ID' using a solidus (forward slash) to separate it from the ID.

Data Quality Information	Description	Encoding Details
Absolute Horizontal Accuracy	The positional error estimate for a single point, relative to the specified spatial reference system	generic attribute
Error Ellipse	Also known as the Figure of Merit. 95% 2sigma value – semi–major and semi–minor axes of error ellipsoid plus orientation.	generic attribute
Absolute Vertical Accuracy	The vertical error estimate for a single point, relative to the specified spatial reference system	generic attribute
Relative Horizontal Accuracy	The horizontal error estimate for the distance between two points, or the accuracy of one point with respect to another	generic attribute
Relative Vertical Accuracy	The vertical error estimate for the distance between two points, or the accuracy of one point with respect to another	generic attribute

Data Quality Information	Description	Encoding Details
Quality of Position	An indication of the reliability of a quoted position	generic attribute
Quality of Sounding Measurement	An indication of the reliability of a sounding	specific attribute
Technique of sounding measurement	Indicates the method or equipment used to obtain the object's depth	specific attribute
Conformance to the Product Specification	An indication of how well the data conforms to the product specification	Feature Class

External Reference Information	Description	Encoding Details
Image File Link	A reference to an image file containing a pictorial representation of the object	generic attribute
Text File Reference (in national language characters)	The file name relating to an external text file	generic attribute
Reference to a publication	Reference to a specific location of any relevant information within an external publication	generic attribute

Other Supporting Information	Description	Encoding Details
Supporting textual information	Supporting (free text) information relevant to the object that cannot be explicitly encoded by any other attribute	generic attribute
Supporting textual information (in national language characters)	Supporting (free text) information relevant to the object that cannot be explicitly encoded by any other attribute	generic attribute

5.5.2 Feature Classes

The following table contains the information described below:

- Feature Class – gives the name of the feature class
- Description – describes the feature class
- Associated Attributes – indicates allowable attributes relevant to each feature class. (see section 5.5.3 for attribute descriptions and values.)
- M – denotes that export of the attribute field is mandatory
- Form – indicates the geometric form that the feature class can take (i.e. **P**oint, **L**ine, or **A**rea)

In addition to the 'associated attributes' listed for individual real‑world feature classes 'generic attributes' are used at the feature level. These encode meta and supporting information that may exist on any feature. Generic attributes used in AML SBO are described in section 5.5.1.

For details of how to encode the feature classes listed in this section, refer to the appropriate exchange standard implementation annex.

ANNEX A	A.2.4.2

Feature Class	Description	Associated Attributes		Form		
		Description	**M**	**P**	**L**	**A**
Conformance to the Product Specification	An area in which data is of a specified conformance to the product specification	– Category of conformance	✓			✓
Contact	Feature appearing mine‑like on a sonar image *(AML)*	– Blind Zone – Burial Percentage – Burial Mechanism – Colour – Command System – Contact Shape – Contact Reference Number – Current Scour Dimensions – Depth of water over feature – Depth Units – First Detection Year – First Sensor – General Depth of Water		✓		

Feature Class	Description	Associated Attributes		Form			
		Description	**M**	**P**	**L**	**A**	
Contact *(continued)*	Feature appearing mine–like on a sonar image *(AML)*	– Height/Length Units				A	
		– Horizontal Length					
		– Horizontal Width					
		– Inclination					
		– Last Detection Year					
		– Last Sensor					
		– Magnetic Anomaly Detector (MAD) Signature					
		– Magnetic Intensity					
		– Mission Classification					
		– Minesweeping System					
		– Mission Comments					
		– Mission Date					
		– Mission Name					
		– **Minehunting System**					
		– Multiple Contacts					
		– MWDC Reference Number					
		– Nature of Construction					
		– Navigation System					
		– Not Found					
		– Number of Previous Observations					
		– On Sonar					
		– Orientation of Best Observation					
		– Origin of Data					
		– Originator					
		– Orientation					
		– Qualification of Sounding Measurement					

Feature Class	Description	Associated Attributes		Form			
		Description	M	P	L	A	
Contact	Feature appearing mine‑like on a sonar image *(AML)*	- Sonar Reflectivity - Sounding Datum - Status of Contact - Strength of Magnetic Anomaly - Survey Date and Time - Survey Date ‑ End - Target Strength - Technique used to acquire sounding measurement - Underwater Reference Mark - Vertical Length	✓				
Contact History	Details of a previous occasion when a contact was found. *(AML)*	- Originator - Survey Date ‑ End - Survey Date and Time	✓ ✓	✓			
Data Coverage	A geographical area that describes the coverage and extent of spatial objects	- Category of coverage	✓			✓	
Data Source Area *(This feature uses the generic source information attributes to encode source information which is applicable to an area. Features within the area need not be individually attributed)*	A geographical area that describes the spatial extent of a data source. *(AML)*	- *Source Agency* - *Source Country* - *Source Date* - *Source ID* - *Source Scale* - *Source Type*				✓	
Mine	An explosive device used in naval warfare located on or below the sea. *(Digital Geographic Information Working Group – DGIWG, Oct.87)*	- Blind Zone - Burial Mechanism - Burial Percentage - Colour - Command System - Current Scour Dimensions - Depth of water over feature		✓			

Feature Class	Description	Associated Attributes		Form			
		Description	M	P	L	A	
Mine *(continued)*	An explosive device used in naval warfare located on or below the sea. *(Digital Geographic Information Working Group – DGIWG, Oct.87)*	– Depth Units					
		– First Detection Year					
		– First Sensor					
		– General Depth of Water					
		– Height/Length Units					
		– Inclination					
		– Lay Platform					
		– Lay Reference Number					
		– Lay Time					
		– Last Detection Year					
		– Last Sensor					
		– Magnetic Anomaly Detector (MAD) Signature					
		– Magnetic Intensity					
		– Mine Reference Number					
		– Mission Classification					
		– Mine Index Mine Case					
		– Mine Index Mine Type					
		– Mission Comments					
		– Mission Date					
		– Mission Name					
		– Minehunting System					

Feature Class	Description	Associated Attributes		Form			
		Description	M	P	L	A
Mine *(continued)*	An explosive device used in naval warfare located on or below the sea. *(Digital Geographic Information Working Group – DGIWG, Oct.87)*	- Minesweeping System				
		- MWDC Reference Number				
		- Navigation System				
		- Not Found				
		- Number of Previous Observations				
		- On Sonar				
		- Orientation of Best Observation				
		- Origin of Data				
		- Originator				
		- Orientation				
		- Quality of Sounding Measurement				
		- Sonar Reflectivity				
		- Sounding Datum				
		- Status of Contact	✓			
		- Strength of Magnetic Anomaly				
		- Survey Date and Time				
		- Survey Date – End				
		- Target Strength				
		- Technique used to acquire sounding				
		- Underwater Reference Mark				
		- Vertical Length				
Survey Area	An area within which a uniform assessment of the reliability of source survey information exists	- Survey authority	✓			✓
		- Survey type				
		- Survey date start	✓			
		- Survey date end	✓			
		- Minimum distance between survey lines				
		- Maximum distance between survey lines				

Feature Class	Description	Associated Attributes		Form			
		Description	M	P	L	A	
Survey Area *(continued)*	An area within which a uniform assessment of the reliability of source survey information exists	- Quality of sounding measurement - Technique of sounding measurement - The largest scale of survey information - The smallest scale of survey information					
Vertical Datum Shift Area	An area within which a uniform shift exists between a specific vertical datum and the datum of the data within this area	- Vertical datum shift parameter	✓	✓		✓	
Viewpoint	Position from which an image has been obtained *(AML)*	- Bearing - Depth Units - Distance from Contact - Ship's Speed - Sonar Frequency - Sonar Range Scale - Towed Body Depth		✓			

5.5.2.1   Mandatory Features

There are no mandatory features in SBO AML.

5.5.3   Attributes

The table below displays the following information:

- Attribute – gives the name of attribute.

- Definition – gives a more detailed description of the attribute if required.

- Values – specifies the possible values the attribute may take if appropriate.

For details of how to encode the attributes listed in this section, refer to the appropriate exchange standard implementation annex.

ANNEX A	A.2.4.3

Attribute	Definition	Values
Absolute Horizontal Accuracy	The positional error estimate for a single point, relative to the specified spatial reference system *(AML)*	Value: min 0 Units: metres or feet (units must be defined) Resolution: 0.1 (metres or feet)

Attribute	Definition	Values
Absolute Vertical Accuracy	The vertical error estimate for a single point, relative to the specified spatial reference system *(AML)*	Value: min 0 Units: metres or feet (units must be defined) Resolution: 0.1 (metres or feet)
Bearing	The horizontal direction of one terrestrial point from another, expressed as the angular distance from a reference direction. *(IHO Dictionary, S-32, 5th Edition, 435.)*	Value: 0.00° – 359.9° Unit: degree (°) Resolution: 0.1
Blind Zone	Pair(s) of bearings that define the blind zone *(AML)*	Value: 0.00° – 359.9° Unit: degree (°) Resolution: 0.1 **Note:** Multiple blind zones will be represented by repeated pairs of these values
Burial Mechanism Burial Mechanism	The method by which the mine has or could become buried. *(AML)*	- **Impact:** The contact has become buried by the force of the contact hitting the sediment. *(AML)* - **Scour:** The contact has become buried by the action of current or flow of water around the object. *(AML)* - **Sandwave Migration:** The contact has become buried by the movement of sandwaves. *(AML)* - **Sediment Migration:** The contact has become buried by the movement of sediment. *(AML)* - **Unknown:** The mechanism of burial is unknown. *(AML)* - **Liquefaction:** The contact has become buried by the process whereby under certain conditions, a solid seafloor sediment behaves as a liquid. *(AML)*
Burial Percentage	The percentage of the mine that has become buried. *(AML)*	Value: 0 – 100 Unit: Percentage (%) Resolution: 1
Capture Date	Gives the date when the object was captured, edited or deleted. *(AML)*	Indication: 4 digits for the calendar year (CCYY), 2 digits for the month (MM) (e.g. April = 04) and 2 digits for the day (DD).
Category of conformance	Indicates the inclusion criteria and completeness regarding the feature class content of the dataset *(AML)*	- **complete:** the area specified has been populated for all feature classes. Absence of features from any class indicates that there are no such entities

Attribute	Definition	Values
		- **partial:** certain feature classes have not been included (or only partially included) within the specified area. Details **must** be provided in supporting textual information
Category of coverage	The availability of coverage *(AML)*	- **coverage available:** continuous coverage of spatial objects is available within this area - **no coverage available:** an area containing no spatial objects
Caveat	A component of a security classification used for authorising a specific group to have access rights *(AML)*	Text String
Colour	Colour of the object. *(AML)*	- **White** - **Black** - **Red** - **Green** - **Blue** - **Yellow** - **Grey** - **Brown** - **Amber** - **Violet** - **Orange** - **Magenta** - **Pink**
Command System	The command system in use by the vessel that found the contact. *(AML)*	Text string
Contact Reference Number	Reference number given to the contact. *(AML)*	Text string
Contact Shape	Geometric form, appearance or configuration of the feature. *(Digital Geographic Information Working Group – DGIWG, Oct.87)*	Text string
Current Scour Dimensions	The length, width, depth and orientation of a scour that is associated with the object and that is caused by the action of currents. *(AML)*	**Encodes in quadruplets:** The length, width, depth and orientation of the current scour.*(AML)* **Note:** Where no value is available for one or more elements, a null value should be used to preserve integrity of the quadruplet **Note:** Multiple current scours will be represented by repeated groups of these values

Attribute	Definition	Values
Depth of water over feature	Depth of water over the feature *(AML)*	Value: min 0 Units: metres or feet (units must be defined) Resolution: 0.1 (metres or feet)
Depth Units	Unit of measurement for depths *(AML)*	- **Metres** - **Fathoms and Feet** - **Feet** - **Fathoms and Fractions**
Distance from Contact	Distance from the contact of the position from which the image was obtained. *(AML)*	Value: min 0 Units: metres Resolution: 0.1
Error Ellipse	Also known as the Figure of Merit. 95% 2sigma value – semi-major and semi-minor axes of error ellipsoid plus orientation. *(AML)*	**Encodes in triplets:** The semi-major, semi-minor and orientation of the error ellipse.
First Detection Year	The year in which the contact was originally reported. *(Adapted from STANAG 3715)*	Indication: 4 digits for the calendar year (CCYY).
First Sensor First Sensor	Indicates by the use of which sensor the contact was originally reported. *(Adapted from STANAG 3715)*	- **Acoustic Sensor:** The contact was reported as a result of a sound signal being returned from the object. *(AML)* - **Magnetic Sensor:** The contact was reported as a result of detecting a fluctuation in the local magnetic field. *(AML)* - **Video Sensor:** The contact was reported as a result of a sighting through electronic visual equipment. *(AML)* - **Diver Sighting:** The contact was reported as a result of a visual sighting made by a diver. *(AML)* - **Other:** The contact was reported as a result of another method. *(AML)* - **Physical Snag:** The contact was reported as a result of the object fouling lines, anchors or fishing nets. *(AML)* - **None Reported:** The method by which the contact was found was not reported. *(AML)* - **Reported Sinking:** The contact was reported as a result of a report made by a third party or from published information. *(AML)* - **Observed Sinking:** The contact was reported as a result of a first hand observation of the object sinking. *(AML)*

Attribute	Definition	Values

General Water Depth	The general depth of the water in the vicinity of the object. *(AML)*	Value: min 0
		Units: metres or feet
		    (units must be defined
		    in dataset metadata)
		Resolution: 1 (metres or feet)

Height/Length Units	Unit of measurement for heights and lengths.	- **Metres** - **Feet**
Horizontal Length	A measurement of the longer of the two linear axis. *(Digital Geographic Information Working Group – DGIWG, Oct 87.)*	Value: min 0 Units: metres or feet (units must be defined) Resolution: 1 (metres or feet)
Horizontal Width	A measurement of the shorter of the two axis. *(Digital Geographic Information Working Group – DGIWG, Oct 87.)*	Value: min 0 Units: metres or feet (units must be defined) Resolution 1 (metres or feet)
Image File Link	Indicates an external file containing a pictorial representation of the object (S–57 Annex A, Appendix A, IHO Object Catalogue)	Text String
Inclination	The angle, measured from the horizontal, at which the object rests on the sea floor *(AML)*	Value: 0.00– 90.00 Unit: degree (°) Resolution: 0.01
International Defence Organisation (IDO) status	The International Defence Organisation (IDO) status (if applicable) that must precede, and be applied to, the Protective Marking thus making it an IDO Marking	- **North Atlantic Treaty** - **Organisation (NATO)** - **North Atlantic Co-operation** - **Council (NACC)** - **Partnership for Peace (PfP)** - **Western European Union** - **(WEU)**
Last Detection Year	The year in which the contact was subsequently confirmed. *(Adapted from STANAG 3715)*	Indication: 4 digits for the calendar year (CCYY).
Last Sensor	Indicates by the use of which sensor the contact was subsequently confirmed. *(Adapted from STANAG 3715)*	- **Acoustic Sensor:** The contact was reported as a result of a sound signal being returned from the object. *(AML)* - **Magnetic Sensor:** The contact was reported as a result of detecting a fluctuation in the local magnetic field. *(AML)* - **Video Sensor:** The contact was reported as a result of a sighting through electronic visual equipment. *(AML)*

Attribute	Definition	Values
		- **Diver Sighting:** The contact was reported as a result of a visual sighting made by a diver. *(AML)*
		- **Physical Snag:** The contact was reported as a result of the object fouling lines, anchors or fishing nets. *(AML)*
		- **Reported Sinking:** The contact was reported as a result of a report made by a third party or from published information. *(AML)*
		- **Observed Sinking:** The contact was reported as a result of a first hand observation of the object sinking. *(AML)*
		- **None Reported:** The method by which the contact was found was not reported. *(AML)*
		- **Other:** The contact was reported as a result of another method. *(AML)*
Lay Platform	The type of unit that laid the mine. *(AML)*	- **Vessel:** A craft or structure for transport by water. *(Adapted from Chambers Concise Dictionary)* - **Aircraft:** Any structure or machine for travelling in the air. *(Chambers Concise Dictionary)*
Lay Reference Number	A number allocated to an individual mine by the minefield planning authority. *(AML)*	Text string
Lay Time	Date and time a mine has been laid. *(AML)*	Indication: The 'lay time' will consist of a date and a time separated by a capital "T". The date should be encoded using 4 digits for the calendar year (CCYY), 2 digits for the month (MM) and 2 digits for the day (DD). The time should be encoded using 2 digits for the hour (hh) and 2 digits for the minutes (mm).
Magnetic Anomaly Detector (MAD) Signature	Indication of the strength of the Magnetic Anomaly Detector reading caused by the contact. *(AML)*	- **Nil:** The object has no magnetic anomaly detector reading. *(AML)* - **Slight:** The object has a slight magnetic anomaly detector reading. *(AML)* - **Moderate:** The object has a moderate magnetic anomaly detector reading. *(AML)* - **Strong:** The object has a strong magnetic anomaly detector reading. *(AML)*
Magnetic Intensity	Magnetic intensity generated by the contact. *(AML)*	Value: 0 – 999 Unit: nanotessels/metre Resolution: 1

Attribute	Definition	Values
Maximum distance between survey lines	The maximum spacing of the principal sounding lines of a survey	Units: metres or feet (units must be defined) Resolution: 1
Mine Index Mine Case	Information on the mine body. *(AML)*	- **0:** No information on the mine body. - **1:** Moored mine - **2:** Shallow moored mine - **3:** Deep moored mine - **4:** Ground Mine - **5:** Ground Mine – explosive charge of less than 500 kg - **6:** Ground Mine – explosive charge of 500 kg or greater - **7:** Contact classified as 'mine-like' - **8:** Obstructors - **9:** Moving mines
Mine Index Mine Type	Information on the type of mine. *(AML)*	- **A:** Contact - **B:** Antenna - **C:** Influence - **D:** Acoustic - **E:** Acoustic Audio Frequency - **F:** Acoustic Low Frequency - **G:** Acoustic High Frequency - **H:** Passive - **I:** Pressure - **J:** Magnetic - **K:** Magnetic H (Horizontal component) - **L:** Magnetic V (Vertical component) - **M:** Magnetic T (Total component) - **N:** Sensitive for normal target - **O:** - **P:** Very sensitive (anti sweeper) - **Q:** Coarse (anti sweep) - **R:** Multi-look mines - **S:** Sequence - **T:** Combination (overlap) - **U:** Fitted with ship counter - **V:** Fitted with delayed arming or rising mechanism - **W:** Active - **X:** No information on firing system - **Y:** - **Z:** Minehunting sonar decoy

Attribute	Definition	Values
Mine Reference Number	Reference number of object classified as a mine, consisting of the last two or three letters of the ship's international call sign followed by a two figure number allocated by the ship. *(AML)*	Indication: The mine reference number consists of the last two or three letter's of the ship's international call sign (c3) followed by a two figure number (i2) allocated by the ship
Minehunting System	The method of minehunting employed by the vessel that found the object. *(AML)*	Text string
Minesweeping System	The method of minesweeping employed by the vessel that found the contact. *(AML)*	Text string
Minimum distance between survey lines	The minimum spacing of the principal sounding lines of a survey	Units: metres or feet (units must be defined) Resolution: 1
Mission Classification	Classification of the mission that found the object. *(AML)*	- **Nato Secret:** - **Nato Confidential:** - **Nato Restricted:** - **Unclassified:**
Mission Comments	Textual information relating to the mission that found the object. *(AML)*	Text string
Mission Date	Dates of mission that found the object. *(AML)*	Indication: 4 digits for the calendar year (CCYY), 2 digits for the month (MM) (e.g. April = 04) and 2 digits for the day (DD).
Mission Name	Name of exercise or operation taking place when the contact was found. *(AML)*	Text string
Multiple Contacts	Where a contact consists of multiple contacts on a small area. *(AML)*	Value: 0 – 99 Unit: none Resolution: 1
MWDC Reference Number	Reference number used by the Minewarfare Data Centre. *(AML)*	Text string
Nature of Construction	The material(s) used to make the object. *(S-57 Annex A, Appendix A, IHO Object Catalogue)*	- **Masonry:** Constructed from brick or stone. *(S-57 Annex A, Appendix A, IHO Object Catalogue)* - **Metal:** Constructed from metal. *(S-57 Annex A, Appendix A, IHO Object Catalogue)*

Attribute	Definition	Values
Nature of Construction *(continued)*	The material(s) used to make the object. *(S-57 Annex A, Appendix A, IHO Object Catalogue)*	- **Concreted:** Constructed of concrete, a material made of sand and gravel that is united by cement into a hardened mass used for foundations etc. *(Adapted from the Illustrated Contemporary Dictionary, Encyclopaedic Edition, 1978)*
Navigation System	Navigation system used by the vessel that found the contact. *(AML)*	Text String
Not found	Occasions when area has been surveyed and the contact not found *(AML)*	Encoded as repeating value pairs of name of vessel and date of survey. The survey date should be encoded using 4 digits for the calendar year (CCYY), 2 digits for the month (MM) (e.g. April = 04) and 2 digits for the day (DD).
Number of Previous Observations	Number of times the contact has been reported. *(AML)*	Integer value
On Sonar	Indicates whether the contact is visible on sonar *(AML)*	- **Yes:** The contact is visible on sonar *(AML)* - **No:** The contact is not visible on sonar *(AML)*
Orientation	The angular distance measured from true north to the major axis of the object. *(Digital Geographic Information Working Group – DGIWG, Oct.87)*	Value: 0.00- 359.99 Unit: degree (°) Resolution: 0.01
Orientation of Best Observation	The bearing from which the object can be best observed. *(AML)*	Value: 0- 359 Unit: degree (°) Resolution: 1
Origin of Data	The method by which the data was determined. *(AML)*	- **Derived:** - **Measured:** - **Statistical:** - **Raw:** - **Foundation:**
Originator	Name of vessel or unit from which the information originated *(AML)*	Text string
Owner Authority	The NATO country code (NATO STANAG 1059) denoting the 'owner' that is responsible for establishing and setting the protective marking level	
Producing Country	The country responsible for the production of the data	IHO Codes for Producing Agencies
Production Agency	The agency responsible for the production of the data	IHO Codes for Producing Agencies
Protective Marking	A marking indicating the minimum standards of protection required of the data	- **COSMIC TOP SECRET** - **FOCAL TOP SECRET** - **TOP SECRET**

Attribute	Definition	Values
		- **SECRET**
		- **CONFIDENTIAL**
		- **RESTRICTED**
		- **UNCLASSIFIED**
Quality of Position	An indication of the reliability of a quoted position *(S-57 Annex A, Appendix A, IHO Object Catalogue)* *Note: the value 'Approximate' when applied to the attribute 'Quality of Position' is prohibited for use in AML. In circumstances where the term 'Position Approximate' would normally be applied to an object in a standard navigational charting sense, the value 'Estimated' should be used.*	- **Surveyed:** The position(s) was (were) determined by the operation of making measurements for determining the relative position of points on, above or beneath the earth's surface. Survey implies a regular, controlled survey of any date. *(Adapted from IHO Dictionary, S-32, 5195, & IHO Chart Specifications, M-4, 175.2)* - **Unsurveyed:** Survey data is does not exist or is very poor. *(Adapted from IHO Dictionary, S-32, 5732)* - **Inadequately Surveyed:** Position data is of a very poor quality. *(Adapted from IHO Dictionary, S-32, 5732)* - **Position Doubtful:** An object whose position has been reported but which is considered to be doubtful. *(S-57 Annex A, Appendix A, IHO Object Catalogue)* - **Unreliable:** An object's position obtained from questionable or unreliable data. *(S-57 Annex A, Appendix A, IHO Object Catalogue)* - **Reported (Not Surveyed):** An object whose position has been reported and its position confirmed by some means other than a formal survey such as an independent report of the same object. *(S-57 Annex A, Appendix A, IHO Object Catalogue)*
Quality of Position		- **Reported (Not Confirmed):** An object whose position has been reported and its position has not been confirmed. *(S-57 Annex A, Appendix A, IHO Object Catalogue)* - **Estimated:** The most probable position of an object determined from incomplete data or data of questionable accuracy. *(Adapted from IHO Dictionary, S-32, 3960)* - **Precisely Known:** A position that is of a known value, such as the position of an anchor berth or other defined object. *(S-57 Annex A, Appendix A, IHO Object Catalogue)* - **Calculated:** A position that is

Attribute	Definition	Values
		computed from data. *(S-57 Annex A, Appendix A, IHO Object Catalogue)*
Quality of Sounding Measurement	Indicates the reliability of the value of the sounding. *(S-57 Annex A, Appendix A, IHO Object Catalogue)*	- **Depth Known:** The depth from chart datum to the bottom is a known value. *(S-57 Annex A, Appendix A, IHO Object Catalogue)*
		- **Depth Unknown:** The depth from chart datum to the bottom is unknown. *(S-57 Annex A, Appendix A, IHO Object Catalogue)*
		- **Doubtful Sounding:** A depth that may be less than indicated. *(Adapted from IHO Dictionary, S-32, 5th Edition, 4840)*
		- **Unreliable Sounding:** A depth that is considered to be an unreliable value. *(S-57 Annex A, Appendix A, IHO Object Catalogue)*
		- **No Bottom Found at Value Shown:** Upon investigation the bottom was not found at this depth. *(Adapted from IHO Dictionary, S-32, 5th Edition, 4848)*
		- **Least Depth Known:** The shoalest depth over an object is of known value. *(Adapted from IHO Dictionary, S-32, 5th Edition, 2705)*
		- **Least Depth Unknown, Safe Clearance at Depth Shown:** The least depth over an object is unknown, but there is considered to be safe clearance at this depth. *(S-57 Annex A, Appendix A, IHO Object Catalogue)*
Quality of Sounding Measurement		- **Value Reported (Not Surveyed):** Depth value obtained from a report, but not fully surveyed. *(S-57 Annex A, Appendix A, IHO Object Catalogue)*
		- **Value Reported (Not Confirmed):** Depth Value obtained from a report, which it has not been possible to confirm. *(S-57 Annex A, Appendix A, IHO Object Catalogue)*
Reference to a publication	Reference to a specific location of any relevant information within an external publication	Text String
Relative Horizontal Accuracy	The horizontal error estimate for the distance between two points, or the accuracy of one point with respect to another	
Relative Vertical Accuracy	The vertical error estimate for the distance between two points, or the accuracy of one point with respect to another	

Attribute	Definition	Values
Ship's Speed	Speed of ship when image was obtained *(AML)*	Unit: knots Resolution: 0.1
Sonar Frequency	Frequency of the sonar that obtained the image. *(AML)*	- **VLF:** Very low frequency - **LF:** Low frequency - **HF:** High frequency - **VHF:** Very high frequency
Sonar Range Scale	The specified range of the sonar *(AML)*	Value: min 0 Unit: metres Resolution: 1
Sonar Reflectivity	Measure of sonar reflectivity returned by the contact. *(AML)*	- **H:** A high level of reflectivity is returned by the contact. *(AML)* - **M:** A medium level of reflectivity is returned by the contact. *(AML)* - **L:** A low level of reflectivity is returned by the contact. *(AML)*
Sounding Datum	Indicates the datum to which soundings are referred. *(Adapted from S-57 Annex A, Appendix A, IHO Object Catalogue)*	- **Approximate Lowest Astronomical Tide:** An arbitrary level, usually within ± 0.3m from that of Lowest Astronomical Tide (LAT). *(Hydrographic Service, Royal Australian Navy)* - **Approximate Mean Low Water Springs:** An arbitrary level, usually within ± 0.3m from that of Mean Low Water Springs (MLWS). *(Hydrographic Service, Royal Australian Navy)* - **Approximate Mean Low Water:** An arbitrary level, usually within ± 0.3m from that of Mean Low Water (MLW). *(Hydrographic Service, Royal Australian Navy)* - **Approximate Mean Lower Low Water:** An arbitrary level, usually within ± 0.3m from that of Mean Lower Low Water (MLLW). *(Hydrographic Service, Royal Australian Navy)* - **Approximate Mean Sea Level:** An arbitrary level, usually within ± 0.3m from that of Mean Sea Level (MSL). *(Hydrographic Service, Royal Australian Navy)* - **Equinoctial Spring Low Water:** The level of low water springs near the time of an equinox. *(S-57 Annex A, Appendix A, IHO Object Catalogue)*

Attribute	Definition	Values
Sounding Datum *(continued)*	Indicates the datum to which soundings are referred. *(Adapted from S-57 Annex A, Appendix A, IHO Object Catalogue)*	- **High Water Springs:** An arbitrary level, approximating that of Mean High Water Springs (MHWS). *(Hydrographic Service, Royal Australian Navy)* - **High Water:** The highest level reached at a place by the water surface in one tidal cycle. Also called high tide. *(IHO Dictionary, S-32, 5th Edition, 2251)* - **Higher High Water Large Tide (HHWLT):** The average of the highest high waters, one from each of 19 years of observations. *(S-57 Annex A, Appendix A, IHO Object Catalogue)* - **Highest Astronomical Tide (HAT):** The highest level which can be predicted to occur under average meteorological conditions and under any combination of astronomical conditions. *(Adapted from Admiralty Tide Tables)* - **Indian Spring Low Water (ISLW):** An arbitrary tidal datum approximating the level of the mean of the lower low water at spring tides. Also called Indian Tidal Plane. *(IHO Dictionary, S-32, 5th Edition, 2427)* - **International Great Lakes Datum 1985 (IGLD 1985):** A vertical reference system with its zero based on the mean water level at Rimouski/Pointe-au-Père, Quebec, over the period 1970 to 1988. *(S-57 Annex A, Appendix A, IHO Object Catalogue)* - **Local Datum:** An arbitrary datum defined by a local harbour authority, from which levels and tidal heights are measured by this authority. *(S-57 Annex A, Appendix A, IHO Object Catalogue)* - **Low Water Springs:** An arbitrary level, approximating that of Mean Low Water Springs (MLWS). *(Hydrographic Service, Royal Australian Navy)*

Attribute	Definition	Values
Sounding Datum *(continued)*	Indicates the datum to which soundings are referred. *(Adapted from S-57 Annex A, Appendix A, IHO Object Catalogue)*	- **Low Water:** An approximation of mean low water adopted as the reference level for a limited area, irrespective of better determinations at a later date. Used mostly in harbour and river engineering. *(S-57 Annex A, Appendix A, IHO Object Catalogue)*
		- **Lower Low Water Large Tide (LLWLT):** The average of the lowest low waters, one from each of 19 years of observations. *(S-57 Annex A, Appendix A, IHO Object Catalogue)*
		- **Lowest Astronomical Tide (LAT):** The lowest tide level which can be predicted to occur under average meteorological conditions and under any combination of astronomical conditions. *(IHO Dictionary, S-32, 5th Edition, 2936)*
		- **Lowest Low Water:** An arbitrary level conforming to the lowest tide observed at a place, or somewhat lower. *(S-57 Annex A, Appendix A, IHO Object Catalogue)*
		- **Lowest Low Water Springs:** An arbitrary level conforming to the lowest water level observed at a place at spring tides during a period of time shorter than 19 years. *(Hydrographic Service, Royal Australian Navy)*
		- **Mean High Water (MHW):** The average height of all high waters at a place over a 19-year period. *(IHO Dictionary, S-32, 5th Edition, 3141)*
		- **Mean High Water Springs (MHWS):** The average height of the high waters of spring tides. Also called spring high water. *(IHO Dictionary, S-32, 5th Edition, 3144)*
		- **Mean Higher High Water (MHHW):** The average height of higher high waters at a place over a 19-year period. *(IHO Dictionary, S-32, 5th Edition, 3140)*
		- **Mean Low Water (MLW):** The average height of all low waters at a place over a 19-year period. *(IHO Dictionary, S-32, 5th Edition, 3147)*

Attribute	Definition	Values
Sounding Datum *(continued)*	Indicates the datum to which soundings are referred. *(Adapted from S-57 Annex A, Appendix A, IHO Object Catalogue)*	- **Mean Low Water Springs (MLWS):** The average height of the low waters of spring tides. Also called spring low water. *(IHO Dictionary, S-32, 5th Edition, 3150)* - **Mean Lower Low Water (MLLW):** The average height of the lower low waters at a place over a 19-year period. *(IHO Dictionary, S-32, 5th Edition, 3145)* - **Mean Lower Low Water Springs (MLLWS):** The average height of lower low water springs at a place. *(IHO Dictionary, S-32, 5th Edition, 3146)* - **Mean Sea Level (MSL):** The average height of the surface of the sea at a tide station for all stages of the tide over a 19-year period, usually determined from hourly height readings measured from a fixed predetermined reference level. *(IHO Dictionary, S-32, 5th Edition, 3156)* - **Mean Tide Level (MTL):** The level mid-way between one or more successive high and low waters. It may be computed by averaging the four tidal levels (MHWS, MHWN, MLWN and MLWS or MHHW, MLHW, MHLW and MLLW) for the place concerned. *(UKHO Tidal Branch)* - **Mean Water Level:** The average of all hourly water levels over the available period of record. *(S-57 Annex A, Appendix A, IHO Object Catalogue)* - **Nearly Highest High Water:** An arbitrary level approximating the highest water level observed at a place, usually equivalent to the high water springs. *(S-57 Annex A, Appendix A, IHO Object Catalogue)* - **Nearly Lowest Low Water:** An arbitrary level approximating the lowest water level observed at a place, usually equivalent to the Indian Spring Low Water (ISLW). *(Hydrographic Service, Royal Australian Navy)*
Source Agency	The agency responsible for the production of the source. *(AML)*	IHO Codes for Producing Agencies

Attribute	Definition	Values
Source Country	The country responsible for the production of the source. *(AML)*	IHO Codes for Producing Agencies
Source Date	The date of issue of the source information, if applicable. *(AML)*	Indication: 4 digits for the calendar year (CCYY), 2 digits for the month (MM) (e.g. April = 04) and 2 digits for the day (DD).
Source ID	Any ID of the source (e.g. chart number). *(AML)*	Text string
Source Scale	The scale at which the source data has been compiled. *(AML)*	Unit: None Resolution: 1
Source Type	The type of the source (e.g. chart or report). *(AML)*	Text string
Status of Contact	Current minehunting status of the object. *(AML)*	- **Detected (MILEC):** Minelike echoes have been selected from within the sonar clutter. *(AML)*
		- **Classified (MILCO):** The contact has been classified as a minelike contact. *(AML)*
		- **Classified (NON-MILCO):** The contact has been classified as a non-minelike contact. *(AML)*
		- **Identified (NOMBO):** The contact has been positively identified as a non mine minelike bottom object. *(AML)*
		- **Identified (Mine):** The object has been positively identified as a mine. *(AML)*
		- **Identified (UXO):** The object has been positively identified as an Unexploded Ordnance. *(AML)*
Status of Contact		- **Countermined:** The mine has been exploded by an explosive charge placed close to the mine. *(AML)*
		- **Neutralised:** The mine has been rendered incapable of firing though may still remain dangerous to handle. *(AML*
		- **Removed:** The mine has been taken out of an area where its detonation would be unacceptable. *(AML)*
		- **Swept:** The object has been removed or destroyed by minesweepers using explosive or mechanical gear. *(AML)*

Attribute	Definition	Values
Strength of Magnetic Anomaly	Indication of the strength of the magnetic anomaly caused by the contact. *(AML)*	- **Nil:** The object generates no magnetic anomaly. *(AML)* - **Slight:** The object generates a slight magnetic anomaly. *(AML)* - **Moderate:** The object generates a moderate magnetic anomaly. *(AML)* - **Strong:** The object generates a strong magnetic anomaly. *(AML)*
Supporting textual information	Supporting (free text) information relevant to the object that cannot be explicitly encoded by any other attribute	Text String
Supporting textual information (in national language characters)	Supporting (free text) information in national language characters relevant to the object that cannot be explicitly encoded by any other attribute	Text String
Survey authority	The authority which was responsible for the survey	Text String
Survey Date and Time	Date of minehunting survey and time that the contact was found. *(AML)*	Indication: The date should be encoded using 4 digits for the calendar year (CCYY), 2 digits for the month (MM) (e.g. April = 04) and 2 digits for the day (DD). The time should be encoded using four digits for the time in hours and minutes (hhmm)
Survey date end	The end date of the survey	Indication: 4 digits for the calendar year (CCYY), 2 digits for the month (MM) (e.g. April = 04) and 2 digits for the day (DD)
Survey date start	The start date of the survey	Indication: 4 digits for the calendar year (CCYY), 2 digits for the month (MM) (e.g. April = 04) and 2 digits for the day (DD)
Survey type Survey type	The method used in acquiring survey data	- **reconnaissance/sketch survey:** a survey made to a lower degree of accuracy and detail than the chosen scale would normally indicate. (IHO Dictionary, S‑32, 5th Edition, 5219) - **controlled survey:** a thorough survey usually conducted with reference to guidelines - **examination survey:** a survey principally aimed at the investigation of underwater obstructions and dangers - **remotely sensed:** a survey where features have been positioned and delimited using remote sensing techniques - **passage survey:** a survey where soundings are acquired by vessels on passage

Attribute	Definition	Values
Target Strength	The strength of the returning signal from the target. *(AML)*	Units: dB
Technique of sounding measurement	Indicates the method or equipment used to obtain the object's depth. *(S-57 Annex A, Appendix A, IHO Object Catalogue)*	- **Found by Echo-Sounder:** The depth was determined by using an instrument that determines depth of water by measuring the time interval between emission of a sonic or ultra-sonic signal and return of its echo from the bottom. (Adapted from IHO Dictionary, S-32, 1547) - **Found by Side-Scan Sonar:** The depth was computed from a record produced by active sonar in which fixed acoustic beams are directed into the water perpendicularly to the direction of travel to scan the bottom and generate a record of the bottom configuration. (Adapted from IHO Dictionary, S-32, 4710) - **Found by Multi-Beam:** The depth was determined by using a wide swath echo sounder that uses multiple beams to measure depths directly below and transverse to the ship's track. (Adapted from IHO Dictionary, S-32, 3339) - **Found by Diver:** The depth was determined by a person skilled in the practice of diving. (Adapted from IHO Dictionary, S-32, 1422) - **Found by Lead Line:** The depth was determined by using a line, graduated with attached marks and fastened to a sounding lead. (Adapted from IHO Dictionary, S-32, 2698)
Technique of sounding measurement		- **Found by Laser:** The depth was determined by using an instrument that measures distance by emitting timed pulses of laser light and measuring the time between emission and reception of the reflected pulses. (Adapted from IHO Dictionary, S-32, 2763) - **Swept by Vertical Acoustic System:** The given area has been swept using a system comprised of multiple echo sounder transducers attached to booms deployed from the survey vessel. (S-57 Annex A, Appendix A, IHO Object Catalogue) - **Found by Electromagnetic Sensor:** The depth was determined by using an instrument that compares electromagnetic signals. (Adapted from IHO Dictionary, S-32, 1571)

Attribute	Definition	Values
		- **Swept by Wire Drag:** the given area was determined to be free from navigational dangers to a certain depth by towing a buoyed wire at the desired depth by two launches, or a least depth was identified using the same technique. (Adapted from IHO Dictionary, S-32, 5248, 6013) - **Photogrammetry:** The depth was determined by applying mathematical techniques to photographs. (Adapted from IHO Dictionary, S-32, 3791) - **Satellite Imagery:** The depth was determined by using instruments placed aboard an artificial satellite. (Adapted from IHO Dictionary, S-32, 4509) - **Found by Levelling:** The depth was determined by using levelling techniques to find the elevation of the point relative to a datum. (Adapted from IHO Dictionary, S-32, 2741) - **Computer Generated:** The sounding was determined from a bottom model constructed using a computer. (AML)
Text File Reference	The file name relating to an external text file	Text string
Text File Reference (in national language characters)	The file name (in national language characters) relating to an external text file	Text string
The largest scale of survey information	The largest scale for the range of survey scale as used in source diagram information	Units: none Resolution: 1
The smallest scale of survey information	The smallest scale for the range of survey scale as used in source diagram information	Units: none Resolution: 1
Towed Body Depth	Depth of towed body that obtained the image. *(AML)*	Unit: Metres Resolution: 0.1
Underwater Reference Mark	Indication that the contact can be used as a reference mark to confirm the vessel's position. *(AML*	- **Yes:** The contact is suitable as an underwater reference mark. *(AML)* - **No:** The contact is not suitable as an underwater reference mark. *(AML)*
Vertical Datum Shift Parameter	Shift parameter required to encode the difference between vertical datums. (AML)	Units: metres

Attribute	Definition	Values
Vertical Length	The effective vertical length of an object, measured from the highest (lowest) point of the object to either the seabed or ground (if fixed), or the water level (if floating) *(S-57 Annex A, Appendix A, IHO Object Catalogue)*	Units: metres or feet (units must be defined) Resolution: 0.1 (metres or feet)

5.5.4   Relationships Between Features

5.5.4.1   *Feature Dependency*

The following table lists the parent–child relationships that exist in AML SBO

Parent Feature Class	Child Feature Class
Contact	Contact History
Mine	Contact History

ANNEX A	A.3.3.1 & A.3.4.1 A.3.3.2 & A.3.4.1

5.5.4.2   *Feature Association*

The following table lists the feature classes in AML Small Bottom Objects that have an association (i.e. not dependent but linked to provide additional information) with other feature classes.

Feature Class 1	Feature Class 2
Contact	Viewpoint
Mine	Viewpoint

ANNEX A	A.3.3.1 & A.3.4.2 A.3.3.2 & A.3.4.2

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6   DATA CAPTURE GUIDELINES

The 'AML SBO Guidance on Feature Coding and Attribution' provides guidance on the conventions that are to be used to encode features, their geometry, and associated attribution, using a relevant implementation standard.

The content of the AML SBO is at the discretion of the producing authority, provided that the conventions described in the 'AML SBO Guidance on Feature Coding and Attribution' are followed.

6.1   CONTINUITY

Features crossing the boundaries of digital source files or other media should be continuous whenever possible. Datasets consisting of multiple digital source files should also aim to be contiguous for consistency of display.

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7   DATA PRESENTATION

7.1   SCOPE

The way in which AML SBO is displayed is dependent upon an individual customer's requirement. How their systems are developed to display AML SBO data will largely be governed by the:

- environment in which the data is to be viewed
- types of products that are to be displayed with the AML product

This Product Specification is designed to support the production and supply of SBO. It does not address data presentation.

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8   PROVISION OF DATA

8.1   GENERAL

8.1.1   File Format (Encapsulation)

The file format or encapsulation is exchange standard specific.

ANNEX A	A.1.1.5

8.1.2   Auxiliary Information

All media containing AML products will contain cataloguing information regarding the coverage of the products contained within it. A complete AML catalogue is planned for future development.

8.2   DISTRIBUTION MEDIA

AML is available in the following format(s):

- **CD-ROM**

Other approved means of distribution will be promulgated in due course. While data must be available to users on standard media, other media/transmission means may be agreed directly between producers and recipients.

8.3   VOLUME NAMING

AML volumes (defined as packages) may contain several datasets, each from a different product specification. The volume naming convention for AML 'Packages' is not defined by AML Product Specifications.

8.4   FILE NAMING

CD-ROM   AML file naming conforms to ISO 9660, International Standards Organisation, Information Processing – Volume and File Structure of CD-ROM for Information Interchange.

8.5   DIRECTORY STRUCTURE

CD-ROM   The directory structure conforms to ISO 9660, International Standards Organisation, Information Processing – Volume and File Structure of CD-ROM for Information Interchange.

8.6   ERROR DETECTION

Datasets will undergo file integrity checks that are dependent upon the exchange standard implemented.

ANNEX A	A.1.1.9

8.7   COMPRESSION

AML products do not use compression techniques.

8.8   ENCRYPTION

All AML products are unencrypted, irrespective of security classification.

8.9   HARDWARE AND SOFTWARE REQUIREMENTS

N/A.

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9   TESTING METHOD

This product specification has been designed to achieve interoperability of AML data products and other digital data products. This is achieved by the separation of the data dictionary from the standard used to encode the data and by the use of internationally recognised standards for the transfer of the data.

It is the responsibility of the data producer to ensure that AML data products fully conform to this Product Specification and to the chosen transfer standard.

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ANNEX A S-57 IMPLEMENTATION OF SBO PRODUCT SPECIFICATION

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 SBO 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 section A.1.1.6 and A.1.1.7.3 of this Product Specification).

Cells must 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 coordinates of the borders 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 Product Specification). 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 2.2) may overlap. However, data within the cells must not overlap unless the cells are of different security classifications (see section 1.4.2).

Point or line 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. north and east borders of the cell are part of the cell, 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

The presentation of symbolised lines may be affected by line length. Therefore, the encoder must be aware that splitting a line into numerous small edges may result in poor symbolisation.

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) 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) 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 SBO 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.

An exchange set may also contain an optional README file.

Exchange set

   |

   |--<1>--   README file (see A.1.1.7.1)

   |

   |--<1>--   Catalogue file (see A.1.2.6)

   |

   |--<R>--   Data set file (see A.1.1.6)

   |

   |--<R>--   Text file (see A.1.1.7.4)

   |

   |--<R>--   Picture file (see A.1.1.7.4)

In tables A.1.1.5.1.1 and A.1.1.5.1.2, 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.

<u>Format</u>

       XXSbcDDD

<u>Where</u>

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

S   = the first character of the three-letter AML product identifier (SBO).

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 A.1.2.7.

       U – Update. An update exchange set will contain update cell files as defined in section A.1.2.8 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 =is 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 SBO exchange set in MS-DOS format.

Directory of D:\UKS0CDDD

<DIR>			09-15-96	12:40p
<DIR>			09-15-96	12:40p
CATALOG[4]	031	1,584	09-15-96	12:46p CATALOG.031
UKS0C123[1]000		45,584	09-15-96	12:50p UKS0C123.000[3]
UKS0C123[1]001		1,095	09-15-96	12:54p UKS0C123.001
UKS0C123[1]002		1,722	09-15-96	12:54p UKS0C123.002
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. UKS0C123 follows the file naming convention specified in section A.1.1.7 of this Product Specification.

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 UKS0C123 file shown in the example is UKS0C123.000.

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 SBO will follow the file naming convention specified below.

<u>Format</u>

      XXS0c123.eee

<u>Where</u>

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

S   = 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 - < 1:40,000,000

      2 - 1: 10,000,000 - 1:62,500,000

      3 - 1: 2,000,000 - 1:12,500,000

      4 - 1:400,000 - 1: 2,500,000

> 5 – 1:100,000 – 1:625,000
> 6 – 1:20,000 – 1:125,000
> 7 – 1:4,000 – 1:25,000
> 8 – 1:1,000 – 1:6,250
> 9 – > 1:1,500

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 alphanumeric 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).

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 Files

Each data set file contains data for one cell (see section A.1.1.1). 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 sections 2.5.5 and A.1.1.5.1.2).

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.

Table A.1.1.8.1 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

Event	File extension	EDTN	UPDN	UADT	ISDT
...					
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 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).

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).

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)

            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).

Note:

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.

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	<u>Examples</u> 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 SBO base cell application profiles is SN 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
```
(continued on following page)

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```
                    |
                    |--<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
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	56	= Small Bottom Objects
PSDN	Product specification description	M	Additional Military Layers Small Bottom Objects	
PRED	Product specification edition number	M	1.0	ASCII
PROF	Application profile identification	M	18	= Small Bottom Objects
AGEN	Producing agency	M		binary
COMT	Comment	M		IDO status Protective marking Owner authority Caveat (Refer to section 5.3.1)

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	{1}	binary
DUNI	Units of depth measurement	M	{1} {2}	=metres, binary =fathoms & 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
COMT	Comment	M		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 Coordinate 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 SBO update cell application profiles is SR 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
|                   |
|     (continued on following page)
```

```
|     (continued from previous page)
|                    |--<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
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	56	= Small Bottom Objects

tag	subfield name	use	value	comment
PSDN	Product specification description	M	Additional Military Layers Small Bottom Objects	
PRED	Product specification edition number	M	1.0	ASCII
PROF	Application profile identification	M	19	= Small Bottom Objects
AGEN	Producing agency	M		binary
COMT	Comment	M		IDO status Protective marking Owner authority Caveat (Refer to section 5.3.1)

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		

tag	subfield name	use	value	comment
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 Coordinate Control Field Structure (SGCC)

NB: All subfield values are encoded as binary.

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

A.1.2.8.2.6 2-D Coordinate 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
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.1.2.8.3.4 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		
NOPT	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 (FSPC)

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

tag	subfield name	use	value	comment
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

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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). 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). 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 (SN 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 (SR 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) are used to contain the metadata of the dataset. The mandatory meta information specified in section 5.3.1 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	DSID	PRSP
Description	DSID	PSDN
Product Specification Edition Number	DSID	PRED
Product Application	DSID	INTU
Compilation Scale	DSPM	CSCL

Security Classification Information	Field	Sub-field
IDO status	DSID	COMT
Protective Marking	DSID	(stored as comma–separated values in free- text subfield)
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
Depth Units	DSPM	DUNI

Datums & Units	Field	Sub-field
Height/Length Units	DSPM	HUNI
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).

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 an object class. Attributes that are 'generic' apply to all object classes listed in this Product Specification. Attributes listed as 'specific' relate only to those in the Real-World Features table in section 5.5.2, 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	SDAT	M_SDAT	soudat	specific	soudat
DSPM	HUNI	M_UNIT	HUNITS	specific	HUNITS
DSPM	DUNI	M_UNIT	DUNITS	specific	DUNITS

A.2.4   SCHEMA

A.2.4.1   AML SBO Meta Information Table

The meta information specified in section 5.5.1 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 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
IDO status	m_clas	secido	generic	secido
Protective Marking	m_clas	secpmk	generic	secpmk
Owner Authority	m_clas	secown	generic	secown
Caveat	m_clas	seccvt	generic	seccvt

Geo-Reference Information	S-57 Meta Object	S-57 Attribute	S-57 Geo Object	S-57 Attribute
Sounding Datum	M_SDAT	soudat	specific	soudat
Vertical Datum Shift Area	m_vers	vershf	N/A	N/A
Height Units	M_UNIT	HUNITS	specific	HUNITS
Depth Units	M_UNIT	DUNITS	specific	DUNITS
Length/Width Units	M_UNIT	HUNITS	specific	HUNITS

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)	POSACC	generic	POSACC (may be encoded on the spatial object)
Error Ellipse	M_ACCY (non-bathymetric data)	errell	generic	errell (may be encoded on the 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

Data Quality Information	S-57 Meta Object	S-57 Attribute	S-57 Geo Object	S-57 Attribute
Relative Vertical Accuracy	M_ACCY	VERACC	generic	VERACC
Quality of Position	M_SREL	QUAPOS	generic	QUAPOS (may be encoded on the spatial object)
Quality of Sounding Measurement	M_SREL	QUASOU	specific	QUASOU
Technique of sounding measurement	M_SREL	TECSOU	specific	TECSOU
Conformance to 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 NTXTDS	generic	TXTDSC 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 NINFOM	generic	INFORM 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 SBO Object Table

The table below defines the S-57/AML six-letter acronym for each of the features described in section 5.5.2.

The tables provide the following details:
- feature class name
- the six-character alpha-numeric code for the object class

Geo Objects	Acronym
Contact	contct
Contact History	histob
Mine	mindev
Viewpoint	viewpt

Collection & Meta Objects	Acronym
Conformance to the Product Specification	m_conf
Data Coverage	M_COVR
Data Source Area	M_CSCL
Survey Area	M_SREL
Vertical Datum Shift Area	m_vers

A.2.4.3   AML SBO Attribute Table

The table below defines the S-57/AML six-letter acronym for each of the attributes described in section 5.5.3.

The tables provide the following details:
- the attribute name
- the six-character alpha-numeric code

Allowable attribute values for all the attributes listed are given in section 5.5, Schema.

Attribute	Acronym
Absolute Horizontal Accuracy	POSACC
Absolute Vertical Accuracy	elvacc
Bearing	bearng
Blind Zone	blndzn
Burial Mechanism	brmchm
Burial Percentage	brpctg
Capture Date	RECDAT
Category of conformance	catcnf
Category of coverage	CATCOV
Caveat	seccvt
Colour	COLOUR

Attribute	Acronym
Command System	comsys
Contact Reference Number	contrn
Contact Shape	conshp
Current Scour Dimensions	scrdim
Depth of water over feature	depwat
Depth Units	DUNITS
Distance from Contact	discon
Error Ellipse	errell
First Detection Year	datfir
First Sensor	senfir
General Water Depth	gendep
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
Lay Platform	layptm
Lay Reference Number	layrfn
Lay Time	laytim
Magnetic Anomaly Detector (MAD) Signature	madsig
Magnetic Intensity	magint
Maximum distance between survey lines	SDISMX
Mine Index Mine Case	mnimnc
Mine Index Mine Type	mnimnt
Mine Reference Number	minern
Minehunting System	mnhsys
Minesweeping System	mnssys
Minimum distance between survey lines	SDISMN
Mission Classification	miscls
Mission Comments	miscom
Mission Date	misdat
Mission Name	misnme
Multiple Contacts	mulcon
MWDC Reference Number	mwdcrn

Attribute	Acronym
Nature of Construction	NATCON
Navigation System	navsys
Not Found	notfnd
Number of Previous Observations	nmprob
On Sonar	onsonr
Orientation	ORIENT
Orientation of Best Observation	orbobn
Origin of Data	orgdat
Originator	orgntr
Owner Authority	secown
Producing Country	PRCTRY
Production Agency	AGENCY
Protective Marking	secpmk
Quality of position	QUAPOS
Quality of sounding measurement	QUASOU
Reference to a publication	PUBREF
Relative Horizontal Accuracy	HORACC
Relative Vertical Accuracy	VERACC
Ship's Speed	shpspd
Sonar Frequency	snrfrq
Sonar Range Scale	snrrsc
Sonar Reflectivity	snrflc
Sounding Datum	soudat
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)
Status of Contact	stacon
Strength of Magnetic Anomaly	magany
Supporting textual information	INFORM

Attribute	Acronym
Supporting textual information (in national language)	NINFOM
Survey authority	SURATH
Survey Date and Time	surdat
Survey date end	SUREND
Survey date start	SURSTA
Survey type	SURTYP
Target Strength	tarstg
Technique of Sounding Measurement	TECSOU
Text File Reference	TXTDSC
Text File Reference (in national language)	NTXTDS
The largest scale of survey information	SCVAL1
The smallest scale of survey information	SCVAL2
Towed Body Depth	twdbdp
Underwater Reference Mark	unwrfm
Vertical datum shift parameter	vershf
Vertical Length	VERLEN

A.2.4.4   Mandatory Attributes

The table below specifies attributes that are mandatory to specific feature classes in AML SBO. Feature classes not included in this table have no mandatory attributes.

Object Class	Attributes					
contct	stacon					
histob	orgntr	surdat				
mindev	stacon					
M_ACCY	POSACC					
m_clas	secpmk	secown	at least one of:		secido	seccvt
m_conf	catcnf					
M_COVR	CATCOV					
M_CSCL	CSCALE					
M_PROD	at least one of:		AGENCY	PRCTRY		
M_NPUB	at least one of:		PICREP	PUBREF		
M_SDAT	soudat					
M_SREL	SURATH	SUREND	SURSTA			
M_UNIT	at least one of:		HUNITS	DUNITS		
m_vepa	vershf					

A.2.4.5   Mandatory Features

There are no mandatory features in AML SBO.

A.2.4.6   Attribute Definitions

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

A.2.4.7   Relationships Between Features

Relationships are defined between features in AML SBO by using the methods specified in section A.2.4.7.1. The application of these relationships is described in section A.3, 'AML SBO Guidance on Feature Coding and Attribution'.

A.2.4.7.1   Nominated Master feature Record

All hierarchical relationships (master to slave) must be encoded by using a nominated 'master' feature record carrying the pointers to the 'slave' objects in the 'Relationship Indicator' [RIND] subfield in the 'Feature Record to Feature Object Pointer' [FFPT] field with the value {2} = slave.

A.2.4.8   Dependency Between Attributes

Refer to sections A.2.4.3 and A.3, for details of relationships between attributes.

A.3   AML SBO 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 SBO.

This document describes how to encode information that the cartographer considers relevant to a specific purpose. The content of AML SBO 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 SBO 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 SBO.

This document must be used in conjunction with the AML SBO product specification. Note: only the object primitive point is allowable for any object/feature in SBO. 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 must 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 depwat, gendep and twdbdp 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   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 an individual object are different to either of the values given in the DUNI or HUNI subfields for some part of the data set, it must 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 depwat, gendep, twdbdp, HORLEN, HORWID, VERLEN, scrdim, discon and snrrsc on an individual object the following criteria apply:

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

• differs from the units specified in the DUNI or HUNI subfield of the Data Set Parameter (DSPM) field structure

or,

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

A.3.3   SMALL BOTTOM OBJECTS

A.3.3.1   Contact

Geo Object: contct   Contact
Attributes:

	blndzn	Use to encode the pair of bearings that define the blind zone. Multiple blind zones will be represented by repeated pairs of these values
	brmchm	Use to encode mechanism by which burial of an object could or has taken place, refer to section 5.5.3 Attribute Table for a list of values
	brpctg	Use to encode the percentage of the contact that has become buried
	COLOUR	Refer to section 5.5.3 Attribute Table for list of values.
	comsys	Free text field used to encode the command system in use by the vessel that found the contact.
	conshp	Free text field used to encode the shape of the contact
	contrn	Use to encode the reference number given to the contact.

datfir	Use to encode the first year that the contact was found.
datlst	Use to encode the year the contact was last reported.
depwat	Use to encode the depth of water over the contact
DUNITS	Use to encode the unit of measurement for depths
gendep	Use to encode the general depth of water in the vicinity of the contact.
HORLEN	Use to encode the horizontal length of the contact
HORWID	Use to encode the horizontal width of the contact.
HUNITS	Use to encode the height and or length units
incltn	Use to encode the inclination of the contact
madsig	Use to encode the magnetic signature of the contact, refer to section 5.5.3 Attribute Table for list of values.
magany	Use to encode the strength of the magnetic anomaly, refer to section 5.5.3 Attribute Table for list of values.
magint	Use to encode the magnetic intensity of the contact.
miscls	Use to encode the classification of the mission that found the contact, refer to section 5.5.3 Attribute Table for list of values.
miscom	Free text field used to encode mission comments such as weather, sea state etc.
misdat	Use to encode the dates of the mission that found the contact
misnme	Use to encode the name of the mission taking place when the contact was found
mnhsys	Use to encode the minehunting system employed by the vessel that found the contact.
mnssys	Use to encode the minesweeping system of the vessel that found the contact
mulcon	Use to encose the number of contacts where a contact is made up of numerous contacts over a small area.
mwdcrn	Use to encode the reference number used by the Minewarfare Data Centre for the contact
NATCON	Use to encode the nature of the contact, use values 1 – Masonry 2 – Concreted 3 – Metal • Rock • Boulder
navsys	Use to encode the navigation system used by the vessel that found the contact.
notfnd	Use to encode occasions when the area has been surveyed and the contact not found. Encoded as

	repeating value pairs of name of vessel and date of survey.
nmprob	Use to encode the number of times previously the contact has been observed.
onsonr	Use to encode whether or not the contact is on sonar.
orbobn	Use to encode the orientation of the best observation.
orgdat	Use to encode the origin of the data, refer to section 5.5.3 Attribute Table for list of values.
orgntr	Use to encode the name of the vessel or unit that found the contact
ORIENT	Use to encode the orientation of the contact.
QUASOU	Refer to section 5.5.3 Attribute Table for list of values.
scrdim	Use to encode the scour dimensions, Encodes in quadruplets: The length, width, depth and orientation of the current scour. Multiple current scours will be represented by repeated groups of these values.
senfir	Use to encode the use of which sensor the contact was originally reported. Refer to section 5.5.3 Attribute Table for list of values.
senlst	Use to encode the use of which sensor the contact was last reported. Refer to section 5.5.3 Attribute Table for list of values.
snrflc	Use to encode the sonar reflectivity, refer to section 5.5.3 Attribute Table for list of values.
soudat	(see remarks), refer to section 5.5.3 Attribute Table for list of values.
stacon	Use to encode the status of the contact, refer to section 5.5.3 Attribute Table for list of values.
surdat	Where the contact has been found during the course of a minehunting survey, use to encode the date and time the contact was found. The time zone, which the time is referred to, is to be encoded by use of the INFORM attribute.
SUREND	Where the contact was found during the course of a bathymetric survey, use to encode the date the survey was completed.
tarstg	Use to encode the strength of the returning sonar signal from the contact
TECSOU	Refer to section 5.5.3 Attribute Table for list of values.
unwrfm	Use to encode whether the contact is suitable as an underwater reference mark, refer to section 5.5.3 Attribute Table for list of values.

| | VERLEN | Use to encode the height of the object above the seabed. |

Remarks:

When using the gendep and depwat attributes the following criteria apply:

The soudat attribute must be populated if the vertical datum:

* Differs from the vertical datum specified in the SDAT subfield of the Data Set Parameter (DSPM) field structure.
* Can be hierarchically altered by the vertical datum attribute soudat specified by a M_SDAT meta-object

Note:

The collection object C_ASSO should be used to associate a 'Contact' that is associated with a 'Viewpoint' (see section A.3.4.2).

A.3.3.2   Mine

Geo object:	mindev	Mine
Attributes:		
	blndzn	Use to encode the pair of bearings that define the blind zone. Multiple blind zones will be represented by repeated pairs of these values.
	brmchm	Use to encode mechanism by which burial of an object could or has taken place, refer to section 5.5.3 Attribute Table for a list of values
	brpctg	Use to encode the percentage of the mine that has become buried
	COLOUR	Refer to section 5.5.3 Attribute Table for list of values.
	comsys	Free text field used to encode the command system in use by the vessel that found the mine.
	datfir	Use to encode the first year that the mine was found.
	datlst	Use to encode the year the mine was last reported.
	depwat	Use to encode the depth of water over the minecase
	DUNITS	Use to encode the unit of measurement for depths
	gendep	Use to encode the general depth of water in the vicinity of the mine.
	HUNITS	Use to encode the height and or length units
	incltn	Use to encode the inclination of the mine
	layptm	Use to encode the platform used to lay the mine, refer to section 5.5.3 Attribute Table for list of values.
	layrfn	A number allocated to an individual mine by the minefield planning authority.
	laytim	Use to encode a time at which a mine has been laid. The time zone, which the time is referred to, is to be encoded by use of the INFORM attribute.

madsig	Use to encode the magnetic signature of the mine, refer to section 5.5.3 Attribute Table for list of values.
magany	Use to encode the strength of the magnetic anomaly, refer to section 5.5.3 Attribute Table for list of values.
magint	Use to encode the magnetic intensity of the mine.
minern	Use to encode a reference number for a mine that has been found
miscls	Use to encode the classification of the mission that found or laid the mine, refer to section 5.5.3 Attribute Table for list of values.
miscom	Free text field used to encode mission comments such as weather, sea state etc.
misdat	Use to encode the dates of the mission that found the mine
misnme	Use to encode the name of the mission taking place when the mine was found
mnhsys	Use to encode the minehunting system employed by the vessel that found the mine.
mnimnc	Use to encode information about the mine case, refer to section 5.5.3 Attribute Table for list of values.
mnimnt	Use to encode information about the type of mine, refer to section 5.5.3 Attribute Table for list of values.
mnssys	Use to encode the minesweeping system of the vessel that found the mine.
mwdcrn	Use to encode the reference number used by the Mine-warfare Data Centre for the mine
navsys	Use to encode the navigation system used by the vessel that found the mine.
notfnd	Use to encode occasions when the area has been surveyed and the mine not found. Encoded as repeating value pairs of name of vessel and date of survey.
nmprob	Use to encode the number of times previously the mine has been observed.
onsonr	Use to encode whether or not the mine is on sonar.
orbobn	Use to encode the orientation of the best observation.
orgdat	Use to encode the origin of the data, refer to section 5.5.3 Attribute Table for list of values.
orgntr	Use to encode the name of the vessel or unit that found the mine
ORIENT	Use to encode the orientation of the mine.

	QUASOU	Refer to section 5.5.3 Attribute Table for list of values.
	scrdim	Use to encode the scour dimensions, Encodes in quadruplets: The length, width, depth and orientation of the current scour. Multiple current scours will be represented by repeated groups of these values.
	senfir	Use to encode the use of which sensor the mine was originally reported. Refer to section 5.5.3 Attribute Table for list of values.
	senlst	Use to encode the use of which sensor the mine was last reported. Refer to section 5.5.3 Attribute Table for list of values.
	soudat	(see remarks), refer to section 5.5.3 Attribute Table for list of values.
	snrflc	Use to encode the sonar reflectivity, refer to section 5.5.3 Attribute Table for list of values.
	stacon	Use to encode the status of the mine, refer to section 5.5.3 Attribute Table for list of values.
	surdat	Where the mine has been found during the course of a minehunting survey, use to encode the date and time the mine was found. The time zone, which the time is referred to, is to be encoded by use of the INFORM attribute.
	SUREND	Where the mine was found during the course of a bathymetric survey, use to encode the date the survey was completed.
	tarstg	Use to encode the strength of the returning sonar signal from the contact
	TECSOU	Refer to section 5.5.3 Attribute Table for list of values.
	unwrfm	Use to encode whether the mine is suitable as an underwater reference mark, refer to section 5.5.3 Attribute Table for list of values.
	VERLEN	Use to encode the height of the object above the seabed.

Remarks:

When using the gendep and depwat attributes the following criteria apply:

The soudat attribute must be populated if the vertical datum:

- Differs from the vertical datum specified in the SDAT subfield of the Data Set Parameter (DSPM) field structure.
- Can be hierarchically altered by the vertical datum attribute soudat specified by a M_SDAT meta-object

Note:

The collection object C_ASSO should be used to associate a 'Mine' that is associated with a 'Viewpoint' (see section A.3.4.2).

A.3.4 SURVEY INFORMATION

A.3.4.1   Contact History

Geo object: histob   Contact History

Attributes:

	orgntr	Use to encode the name of the vessel or unit that found the contact
	surdat	Where the contact has been found during the course of a minehunting survey, use to encode the date and time the contact was found. The time zone, which the time is referred to, is to be encoded by use of the INFORM attribute.
	SUREND	Where the contact was found during the course of a bathymetric survey, use to encode the date the survey was completed.

Remarks

To be encoded as a slave to the master objects contact and mine, the last ten observations are to be held.

A.3.4.2   Viewpoint

Geo object   viewpt   Viewpoint

Attributes:

	bearng	Use to encode the bearing from which the image was taken.
	discon	Use to encode the distance from the contact the image was taken from
	DUNITS	Use to encode the unit of measurement for depths
	HUNITS	Use to encode the height and or length units
	shpspd	Use to encode the speed of the ship that produced the image
	snrfrq	Use to encode the frequency of the sonar used.
	snrrsc	Use to encode the sonar range scale
	twdbdp	Use to encode the depth of the towed body

Remarks

The object viewpoint is to be slaved to the relevant mine/contact master object.

For images with no alignment information the attribute PICREP is to be used on the master object.

Note:

The collection object C_ASSO should be used to associate a 'Viewpoint' that is associated with a 'Contact' (see section A.3.3.1).

Note:

The collection object C_ASSO should be used to associate a 'Viewpoint' that is associated with a 'Mine' (see section A.3.3.2).