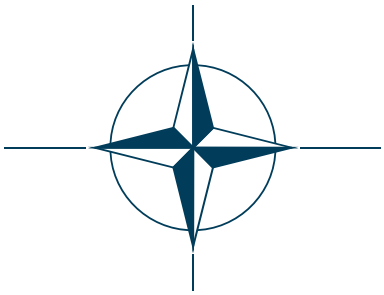
NORTH ATLANTIC TREATY ORGANISATION



(NATO)

ANNEX A

to

ADDITIONAL MILITARY LAYERS

PRODUCT SPECIFICATION

Version 3.0, 1 August 2008

Produced and issued by the United Kingdom Hydrographic

Office under the direction of the Geospatial Maritime Working Group of the NATO Geographic Conference.

ANNEX A S-57 IMPLEMENTATION OF ADDITIONAL MILITARY LAYERS (AML) PRODUCT SPECIFICATION

Document Control

ISSUE

Date	Author	Issue	Summary of Changes
1/11/01	AML	1.0	Part of the v1.0 Product Specification
31/07/04	B Parish	2.0	Includes amendments to AML MFF Product Specification approved by AHHWG 12/05/04
1/11/05	B Parish	2.1	Errors identified by industry fixed
1/08/08	P Burton	3.0	Version combines all 6 previously defined thematic layers into one Product Specification

APPROVALS

Approver and Title	Signature	Date
Chairman GMWG		1/08/08

VERSION CONTROL

Version	Review Date	Reviewed By
Draft 0.2	May 2007	B Parish
Draft 0.3	Jan 2008	
3.0	Aug 2008	
3.0.1	Nov 2009	

FILE DETAILS

Component	Name & Location	Tool
Document text	J:\AML\Specification\Specifications\V3.0\AML PS Annex A 3.0	MS Word

CONTENTS

A.1 AML S-57 Format Table and File Structure 5
A.1.1 GENERAL INFORMATION 5
A.1.1.1 Cells 5
A.1.1.2 Geometry 5
A.1.1.3 Groups 6
A.1.1.4 Language and Alphabet 6
A.1.1.5 Exchange Set 6
A.1.1.6 Data Sets 9
A.1.1.7 File Naming 9
A.1.1.8 Updating 15
A.1.1.9 Error Detection 17
A.1.2 Application Profiles 18
A.1.2.1 General 18
A.1.2.2 Catalogue and Data Set Files 18
A.1.2.3 Records 19
A.1.2.4 Fields 19
A.1.2.5 Subfields 19
A.1.2.6 Catalogue File 19
A.1.2.7 AML (Base Cell) File Structure 21
A.1.2.8 AML (Update) File Structure 28
A.2 AML S-57 Data Dictionary 38
A.2.1 General Guidelines 38
A.2.1.1 Feature Object Identifiers 38
A.2.1.2 Cartographic Objects 38
A.2.1.3 Time Varying Objects 38
A.2.1.4 Prohibited Attributes 38
A.2.1.5 Numeric Attribute Values 38
A.2.1.6 Text Attribute Values 38
A.2.2 Unknown Attribute Values 38
A.2.3 Use of Meta Information 39
A.2.3.1 AML Data Set Metadata 39
A.2.3.2 Hierarchy of Meta Data 40
A.2.4 Schema 41
A.2.4.1 AML Meta Information Table 41
A.2.4.2 AML Features 43
A.2.4.3 AML Attributes 43
A.2.4.4 Mandatory Attributes 43
A.2.4.5 Mandatory Features 43
A.2.4.6 Attribute Definitions 43
A.2.4.7 Relationships Between Features 43
A.2.4.8 Dependency Between Attributes 44
A.3 AML Rules on Feature Coding and Attribution 45
A.3.1 Scope 45
A.3.2 General Rules 45
A.3.2.1 Sounding Datum 45
A.3.2.2 Vertical Datum 45
A.3.2.3 Units 46
A.3.2.3 Depth Areas 46
A.3.3 AML Information 47
Referencing of Nautical Publications 47
Port Locations 47
Aggregation (composite) features 47
Deep Water Route Composite 47
Traffic Separation Scheme Composite 47
Area of Imagery Coverage & Viewpoint 48
Beach 48
Rocks which may cover, Obstructions and Foul Areas, Wellheads 48
Wrecks 48

Wellheads 48
Impact Scour 49
ATS Route Centreline 49
Airspace Restrictions *General* 49
Controlled Airspace *General* 49
Coastguard Track (surveillance) & Coastguard Reporting Point 49
Navigation System (NAVAID) 49
Reporting/Radio Calling-in Point 49
Helicopter Reporting Point 49
ICES Grid - Sub-Divisions - Referencing Grid 49
Maritime Pollution (MARPOL) Reporting Grid- *Lettered Zone- Numbered Zone* 50
ACLANT Grid - Named Areas - Numbered Areas 50
Surface Danger Area & Practice & Exercise Area 50
JMC Areas - JENOA Grid- JENOA Grid -Sub Division 51
Naval Gunfire Support (NGS) Range & Naval Gunfire Support (NGS) Impact Area 51
4W Disposition Grid and Grid Segments 51
N.I. Sealion Patrol Areas 51
Q-Route, Q-Route Leg, Q-Route Waypoint 51
Radar Coverage 51
Maritime Safety Information 51
Radio Stations and broadcast areas 51
Small Bottom Object 52
Contact History 52
Viewpoint 52

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

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

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

Mathematically defined curves may be encoded using ARCC fields; all other edges must be encoded using SG2D fields.

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

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

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

A.1.1.5.1 *Content of the Exchange Set*

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

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
Document	DOC	DOC
Document	XML	XML
Photo	JPEG	JPG
Video	AVI	AVI
Video	MPEG	MPG

A.1.1.5.2 *Exchange Set Naming*

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

Format

***U_FreeText.aml

Where

******* = the three-letter NATO country code of the producer (NATO STANAG 1059, Ed 8).

U = Security Classification

Security classification codes are given below:

T – TOP SECRET
S - SECRET
C - CONFIDENTIAL
R - RESTRICTED
U – UNCLASSIFIED

_ = Delimiter to separate the the descriptive information in the FreeText from the fixed characters.

FreeText = Free text that describes the content of the data.

e.g. Content = **Territorial_Limits**

The Free Text should only contain alpha-numeric and '_' characters.

.aml = Identifies the exchange set as an AML product.

Exchange Set Name Example:

GBRU_ Territorial_Limits.aml

A.1.1.5.3 *Directory Structure*

The following is an example directory structure for an AML exchange set in MS-WINDOWS format.

Directory of D:\GBRU_ Areas_Limits.aml

CATALOG.031[4]	1 KB File 09/10/2006 13:46
AMLGBR0U_NKAJ _Territorial-Limits.000[1]	45 KB File 09/10/2006 13:06
AMLGBR0U_NKAJ_Exercise-Areas.000[1]	45 KB File 09/10/2006 13:06
AMLGBR0U_ NKAJ3030_Air_Lanes.000[1]	45 KB File 09/10/2006 13:06
README.TXT[2]	1 KB File 09/10/2006 13:44

Notes:

1. File names follow the 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.

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; or, data has been produced to a different version of the AML Product Specification
- 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 will follow the file naming convention specified below.

Format

AML***0U_GeographicPosition_FreeText.eee

Where

AML = standard descriptive shorthand information to distinct AML-Products from other Products as ENC or ICE etc..

******* = the three-letter NATO country code of the producer (NATO STANAG 1059, Ed 8)

0 = Scale Band

‘Scale Band’ values and scale ranges for AML are given below.

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

U = Security Classification

Security classification codes are given below:

T – TOP SECRET
S - SECRET
C - CONFIDENTIAL
R - RESTRICTED
U – UNCLASSIFIED

_ = Delimiter to separate the Geo-Information from the fixed starting characters.

Geographic Position = Text that identifies the geographical position of a file with a maximum length of 8 characters.

AML has adopted the GEOREF (GEOgraphical REFerence System) which is defined by STANAG 3408 for identifying the geographic postition of an AML file. The GEOREF System is designed to use alphabetical characters and numbers for tiles which split the world in rectangular areas ranging from 15°x15° to 1’x1’. The Name always represents the lower left (south-west) corner of the tile.

The GEORREF name consist of two capital alphabetical characters representing a 15°x15° tile. These cells are defined from 180° West to 180° East and 90° South to 90° North. The use of I and O is prohibited since they could be mixed up with the numbers 1 and 0. The naming starts with A at 180° West and increases to Z at 165° East and with A at 90° South to M at 75° North. The naming of these cells is shown in Fig. 1.

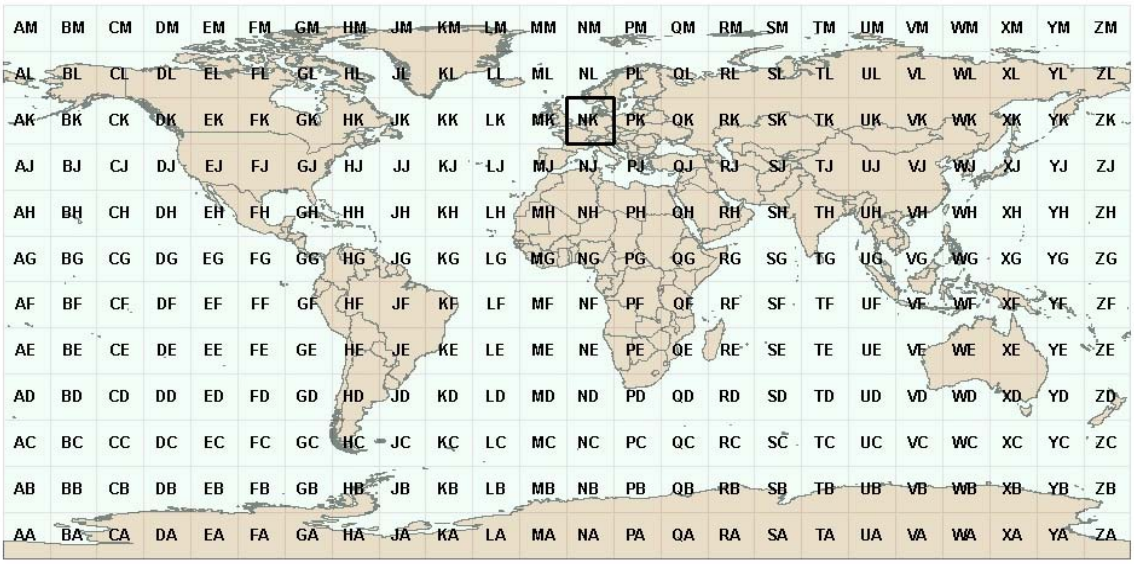


Fig. 1: 15°x15°-Tiles

The next two characters of the name represent a 1°x1° tile inside the 15°x15° tile. There is no difference if a cell lies south or north of the Equator or east or west of the Greenwich meridian. The 1°x1° tile is named with one char representing the west to east direction and one char representing the south to north direction. For the 15 possible tiles the characters from A to Q (without I) are used. The naming of these cells is shown in Fig 2.

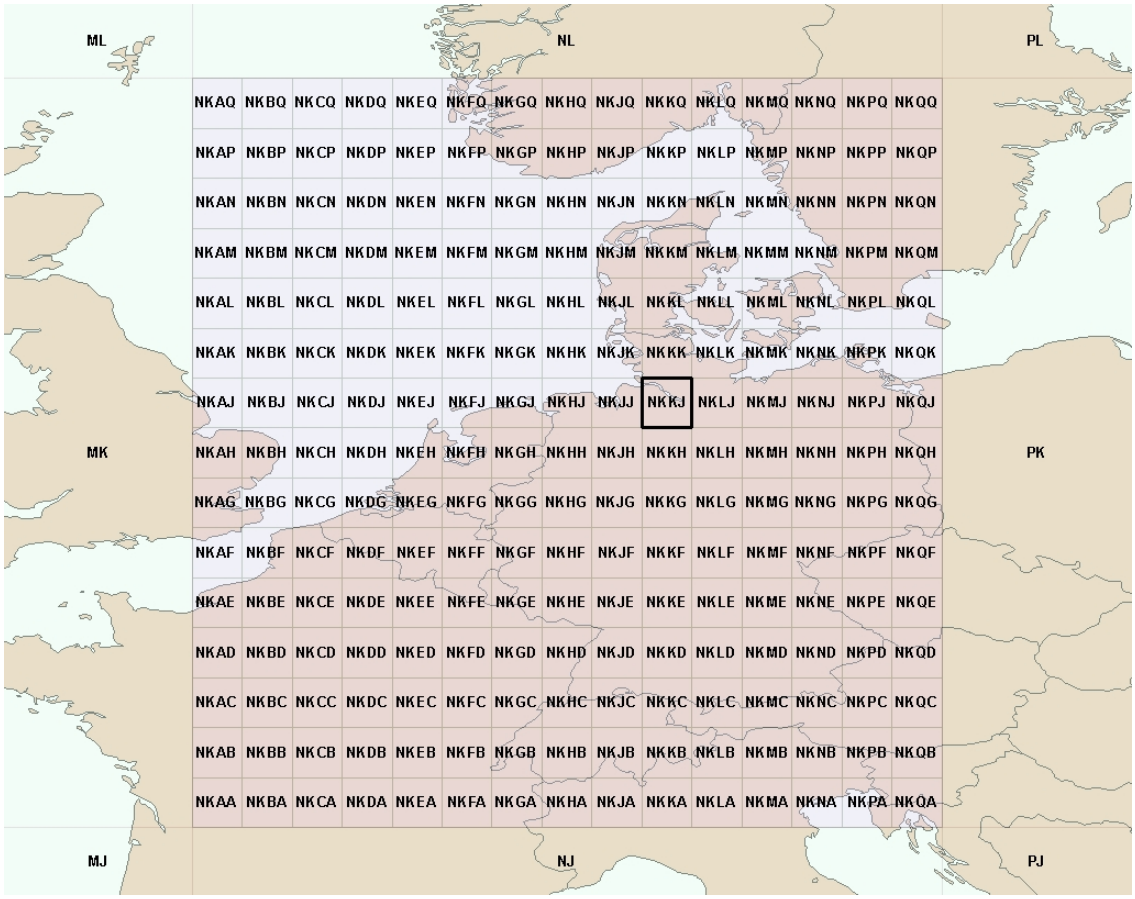


Fig 2: 1°x1°-Tiles

If a tiling below 1 degree is desired the Minute position of the lower left corner is defined in a GeoRef-Cell. Again there is no difference if it is south or north of the Equator or east or west of the Greenwich meridian. The Minutes are always counted from west to east and south to north from the lower left corner. This naming goes from 00 to 59.

Since a tiling down to 1’x1’-tiles is not desirable for AML but a smaller tile-size than 1°x1° should be possible nonetheless the naming with minutes should consist of the lower left corner and the upper right. These minute-tiles needn’t be rectangular any more.
Combining the three naming steps a tile-name result in 8 individual characters. A 30’x30’-tile in the area of the river Elbe is shown in Fig. 3.

Fig. 3: 30'x30'-Tile

The length of the geographic position may be variable with a maximum of 8 characters.

_ = Delimiter to separate the Geo-Information from the descriptive information in the FreeText.

FreeText = Free text that describes the content and may give information concerning the use, validity and system the data is intended for.

e.g. Content = Territorial-Limits
Valid for = Exercise Noble Mariner 09

The Free Text should only contain alpha-numeric and '_' characters.

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

Filename Example:

AMLDEU6U_NKKJ3000_LANDINFO_Excercice_Noble Mariner_09.000

For a 30'x30' cell near Hamburg with land information valid for = Excercice Noble Mariner 09

AMLDEU4U_PK_AIRINFO_Excercice_Noble Mariner_09.000

For a 15°x15° cell covering eastern Europe with aeronautical information.

The maximum length of the name should be 99 characters which means:

- 3 characters for the standard descriptive shorthand description "AML"
- 3 characters for the 3 letter country code following STANAG 1059 "Codes for National Entities"
- 1 character for the scale band
- 1 character for the security classification
- "_" as a separating character between the starting and the geographic part of the name
- up to 8 characters for a position and size description of the cell following STANAG 3408 GEOREF.
- "_" as a separating character between the geographic an content describing part of the name
- up to 73 characters for an individual descriptive naming

4 characters for the dot and the file extension.

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 (3.1.1). 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
...					
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 (SG3D)
  - Isolated nodes (SG2D)
  - Connected nodes
  - Edges
- Feature records
  - Meta features
  - Geo features (ordered from slave to master)
  - Collection features

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

A.1.2.3 Records

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

A.1.2.4 Fields

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

A.1.2.5 Subfields

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

Prohibited subfields must be encoded as missing subfields values (see S-57 Part 3, clause 2.1). The exact meaning of missing attribute values is defined in section A.2.2.

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		Examples
			ASC	for the catalogue file
			BIN	for the data set files
			TXT	for ASCII text files (including the README.TXT file)
			TIF	for picture files
			PDF	for document files
			HTM	for document files
			DOC	for document files
			XML	for document files
			JPG	for photo files
			AVI	for video/film files
			MPG	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 base cell application profiles is AM 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
|                      |--or--- |
|                      |        |--<R>--SG3D* - 3-D Coordinate (Sounding array) field
|                      |--or--  |
|                               |--<R>--ARCC - Arc/Curve Definitions field
|                                       |
|                                       |--<R>--AR2D - Arc Coordinates field
|
|--<R>--Feature record
     |
     |--0001 - ISO/IEC 8211 Record Identifier
          |
          |--<1>--FRID - Feature Record Identifier field
```

|
|--<1>--FOID - Feature Object Identifier field
|
|--<R>--ATTF* - Feature Record Attribute field
|
|--<R>--NATF* - Feature Record National Attribute field
|
|--<R>--FFPT* - Feature Record to Feature Object Pointer field
|
|--<R>--FSPT* - Feature Record to Spatial Record Pointer field

A.1.2.7.1 Data Set Descriptive (META) Field Content

A.1.2.7.1.1 Data Set Identification Field Structure (DSID)

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

tag	subfield name	use	value	comment
RCNM	Record name	M	{10}	= DS, binary
RCID	Record identification number	M		binary
EXPP	Exchange purpose	M	{1}	data set is new, binary
INTU	Intended usage	M	{100} {101} {102} {103} {104} {105} {106} {107} {108} {109}	Unscaled Data = < 1:100,000,000 = 1:25,000,000 = 1: 5,000,000 = 1: 1,000,000 = 1:250,000 = 1:50,000 = 1:10,000 = 1:2,500 = > 1:1,600 binary
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	3.1	ASCII
PRSP	Product specification	M	{57}	= Additional Military Layers, binary
PSDN	Product specification description	M	AML TSB FAI	Additional Military Layers Territorial Sea Boundaries Flight Aeronautical Information

tag	subfield name	use	value	comment
			CFI MFI PEA MMA QRT SBO LBO CLB AMP ICE MTD SED LND NCD MNI ASCII	Civil Flight Information Military Flight Information Practice and Exercise Areas Marine Management Areas Q-Routes Small Bottom Objects Large Bottom Objects Contour Line Bathymetry Amphibious Warfare Data Ice Data Mine Tactical Data Sediment Land Background Data Nautical Chart Background Data Military Nautical Information
PRED	Product specification version number	M	3.0.n ASCII	where n is the version number of the AML Feature and Attribute Catalogue to which the data set has been produced. (See Para 5.5 in Product Specification),
PROF	Application profile identification	M	{20} Binary	= Additional Military Layers, new
AGEN	Producing agency	M		Binary
COMT	Comment	M		IDO status Protective marking Owner authority Caveat

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

NB: All subfield values are encoded as binary.

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

A.1.2.7.1.3 Data Set Parameter Field Structure (DSPM)

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

tag	subfield name	use	value	comment
RCNM	Record name	M	{20}	= DP, binary
RCID	Record identification number	M		binary
HDAT	Horizontal geodetic datum	M	{2}	= WGS 84, binary
VDAT	Vertical datum	M		binary
SDAT	Sounding datum	M		binary
CSCL	Compilation scale of data	M		binary
DUNI	Units of depth measurement	M	{1} {2}	=metres, binary =fathoms & feet, binary
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.1.2.7.2.5 *3-D Coordinate (Sounding Array) Field Structure (SG3D)*

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)
VE3D	3-D (sounding) value	M		value of sounding (see S-57 Appendix B.1 clause 4.4)

A.1.2.7.2.6 *Arc/Curve Definition Field Structure (ARCC)*

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
ATYP	Arc/Curve type	M	{1}	= C, Arc 3 point centre (see S-57, section 5.1.4.4)
SURF	Construction surface	P		
ORDR	Curve order	P		
RESO	Interpolated point resolution	P		
FPMF	Floating point multiplication factor	P		Floating point to integer multiplication factor for interpolated point resolution value (see S-57, section 5.1.4.4)

A.1.2.7.2.7 *Arc Coordinates Field Structure (AR2D)*

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
STPT	Start point	M		ISO/IEC 8211 Cartesian label
CTPT	Centre point	M		ISO/IEC 8211 Cartesian label
ENPT	End point	M		ISO/IEC 8211 Cartesian label
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	{3}	= 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 update cell application profiles is AM and applies to updates to a data set.

Update cell file

|

|--<1>--**Data Set General Information record**

| |

```
|      |--0001 - ISO/IEC 8211 Record Identifier
|              |
|              |--<1>--DSID - Data Set Identification field
|                          |
|                          |--<1>--DSSI - Data Set Structure Information field
|
|--<R>--Vector record
|      |
|      |--0001 - ISO/IEC 8211 Record identifier
|              |
|              |--<1>--VRID - Vector Record Identifier field
|                      |
|                      |--<R>--ATTV* - Vector Record Attribute field
|                      |
|                      |--<1>--VRPC - Vector Record Pointer Control field
|                      |
|                      |--<R>--VRPT* - Vector Record Pointer field
|                      |
|                      |--<1>--SGCC - Coordinate Control field
|                      |
|                      |        |--<R>--SG2D* - 2-D Coordinate field
|                      |--or--- |
|                      |        |--<R>--SG3D* - 3-D Coordinate (Sounding array) field
|                      |--or--  |
|                               |--<R>--ARCC - Arc/Curve Definitions field
|                                       |
|                                       |--<R>--AR2D - Arc Coordinates 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	100 101 102 103 104 105 106 107 108 109	Unscaled Data = < 1:100,000,000 = 1:25,000,000 = 1: 5,000,000 = 1: 1,000,000 = 1:250,000 = 1:50,000 = 1:10,000 = 1:2,500 = > 1:1,600
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	3.1	ASCII
PRSP	Product specification	M	57	= Additional Military Layers
PSDN	Product specification description	M	AML TSB FAI CFI MFI PEA MMA QRT SBO LBO	Additional Military Layers Territorial Sea Boundaries Flight Aeronautical Information Civil Flight Information Military Flight Information Practice and Exercise Areas Marine Management Areas Q-Routes Small Bottom Objects Large Bottom Objects

tag	subfield name	use	value	comment
			CLB AMP ICE MTD SED LND NCD MNI	Contour Line Bathymetry Amphibious Warfare Data Ice Data Mine Tactical Data Sediment Land Background Data Nautical Chart Background Data Military Nautical Information
PRED	Product specification version number	M	3.0.n	where n is the version number of the AML Feature and Attribute Catalogue to which the data set has been produced. (See Para 5.5 in Product Specification), ASCII
PROF	Application profile identification	M	21	= Additional Military Layers, revision
AGEN	Producing agency	M		binary
COMT	Comment	M		IDO status Protective marking Owner authority Caveat

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

NB: All subfield values are encoded as binary.

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

A.1.2.8.2 ***Spatial Field Content***

A.1.2.8.2.1 *Vector Record Identifier Field Structure (VRID)*

NB: All subfield values are encoded as binary.

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

A.1.2.8.2.2 *Vector Record Attribute Field Structure (ATTV)*

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

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

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

NB: All subfield values are encoded as binary.

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

A.1.2.8.2.4 *Vector Record Pointer Field Structure (VRPT)*

NB: All subfield values are encoded as binary.

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

A.1.2.8.2.5 *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} 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.1.2.8.2.7 *3-D Coordinate (Sounding Array) Field Structure (SG3D)*

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)
VE3D	3-D (sounding) value	M		value of sounding (see S-57 Appendix B.1 clause 4.4)

A.1.2.8.2.8 Arc/Curve Definition Field Structure (ARCC)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
ATYP	Arc/Curve type	M	{1}	= C, Arc 3 point centre (see S-57, section 5.1.4.4)
SURF	Construction surface	P		
ORDR	Curve order	P		
RESO	Interpolated point resolution	P		
FPMF	Floating point multiplication factor	p		Floating point to integer multiplication factor for interpolated point resolution value (see S-57, section 5.1.4.4)

A.1.2.8.2.9 Arc Coordinates Field Structure (AR2D)

NB: All subfield values are encoded as binary.

tag	subfield name	use	value	comment
STPT	Start point	M		ISO/IEC 8211 Cartesian label
CTPT	Centre point	M		ISO/IEC 8211 Cartesian label
ENPT	End point	M		ISO/IEC 8211 Cartesian label
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		
NFPT	Number of feature object pointers	M		

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

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

tag	subfield name	use	value	comment
LNAM	Long name	M		binary
RIND	Relationship indicator	M	{3}	= 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
USAG	usage indicator	M	{1} or {2} or {3} or {255}	= exterior = interior = exterior boundary, truncated by the data limit = null
MASK	Masking indicator	M	{1} or {2} or {255}	= mask = show = null

A.2 AML S-57 Data Dictionary

A.2.1 General Guidelines

A.2.1.1 Feature Object Identifiers

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

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

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

A.2.1.2 Cartographic Objects

The use of cartographic objects is prohibited.

A.2.1.3 Time Varying Objects

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

A.2.1.4 Prohibited Attributes

Attributes not included in this Product Specification are prohibited.

A.2.1.5 Numeric Attribute Values

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

A.2.1.6 Text Attribute Values

The lexical level used for the “Feature Record Attribute” [ATTF] field must be 1 (ISO 8859-1) (see sections A.1.2.7.3.3 and A.1.2.8.3.3). 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 (AM 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 (AM 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 is encoded in S-57 as indicated in the table below.

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

Security Classification Information	Field	Sub-field
IDO status	DSID	COMT (stored as comma-separated values in free- text subfield)
Protective Marking	DSID	
Owner Authority	DSID	
Caveat	DSID	

Update Information	Field	Sub-field
Update Application Date	DSID	UADT
Update Number	DSID	UPDN

Datums & Units	Field	Sub-field
Horizontal Geodetic Datum	DSPM	HDAT
Vertical Datum	DSPM	VDAT
Sounding Datum	DSPM	SDAT
Co-ordinate Units	DSPM	COUN
Depth Units	DSPM	DUNI
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).

Meta data should be primarily stored at the dataset level. Where required to override the dataset meta data values, at the meta-object level and finally, only if needed to override either of the above, at the feature level.

NOTES:

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

Additionally, the terms ‘specific’ and ‘generic’ are used in the tables to indicate an attribute’s association to a feature. Attributes that are ‘generic’ apply to all features listed in this Product Specification. Attributes listed as ‘specific’ relate only to those features they are listed against in the Specific S-57 Attribute column in the Feature and Attribute spreadsheet as explained in section 5.5.1.

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	S-57	S-57 Geo	S-57

		Object	Attribute	Object	Attribute
DSPM	VDAT	M_VDAT	VERDAT	specific	VERDAT
DSPM	SDAT	M_SDAT	soudat	specific	soudat
DSPM	DUNI	M_UNIT	DUNITS	specific	DUNITS

A.2.4 Schema

A.2.4.1 AML Meta Information Table

The meta information specified in section 5.3 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
Copyright Statement	M_PROD	cpyrit	generic	cpyrit
Production Agency	M_PROD	AGENCY	generic	AGENCY
Producing Country	M_PROD	PRCTRY	generic	PRCTRY
Data Coverage	M_COVR	CATCOV	N/A	N/A

Security Classification Information	S-57 Meta Object	S-57 Attribute	S-57 Geo Object	S-57 Attribute
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
Vertical Datum	M_VDAT	VERDAT	specific	VERDAT
Sounding Datum	M_SDAT	soudat	specific	soudat
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) M_QUAL (bathymetric data)	POSACC POSACC	generic generic	POSACC (spatial object) POSACC (spatial object)
Error Ellipse	M_ACCY (non-bathymetric data)	errell	generic	errell (spatial object)
Absolute Vertical Accuracy	M_ACCY	elvacc	generic	elvacc
Relative Horizontal Accuracy	M_ACCY	HORACC	generic	HORACC
Relative Vertical Accuracy	M_ACCY	VERACC	generic	VERACC
Sounding Accuracy	M_QUAL	SOUACC	specific	SOUACC
Quality of Position	M_SREL	QUAPOS	generic	QUAPOS (spatial object)
Quality of Sounding Measurement	M_SREL	QUASOU	specific	QUASOU
Technique of Sounding Measurement	M_SREL	TECSOU	specific	TECSOU
Completeness for the Product Specification	m_conf	catcnf	N/A	N/A
Vertical Datum Shift Area	m_vers	vershf	N/A	N/A

External Reference Information	S-57 Meta Object	S-57 Attribute	S-57 Geo Object	S-57 Attribute
Image File Link	M_NPUB	PICREP	generic	PICREP
Text File Reference	generic	TXTDSC	generic	TXTDSC
Text File Reference (in national language)	generic	NTXTDS	generic	NTXTDS
Reference to a publication	M_NPUB	PUBREF	generic	PUBREF

Other Supporting Information	S-57 Meta Object	S-57 Attribute	S-57 Geo Object	S-57 Attribute
Supporting Textual Information	generic	INFORM	generic	INFORM
Supporting Textual	generic	NINFOM	generic	NINFOM

Information (in national language)				
Scale Minimum	N/A	N/A	generic	SCAMIN
Scale Maximum	N/A	N/A	generic	SCAMAX

Notes:

1. The attributes QUAPOS, POSACC and errell may be applied to any spatial object, in order to qualify the location of an object.
2. When there is no meta object attribute, an individual attribute can supersede a data set subfield.
3. 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.
4. 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 Features

All valid AML features and their S-57/AML six-letter acronym are listed in the spreadsheet described in section 5.5, Schema.

A.2.4.3 AML Attributes

All valid AML attributes and their S-57/AML six-letter acronym are listed in the spreadsheet described in section 5.5, Schema.

A.2.4.4 Mandatory Attributes

Mandatory attributes are defined in the spreadsheet referenced in Section 5.5, Schema.

Where a mandatory attribute is unknown the Attribute Value (ATVL) subfield should be left empty as described in A.2.2.

A.2.4.5 Mandatory Features

There are no mandatory features in AML.

A.2.4.6 Attribute Definitions

AML attribute definitions, permissible values, formats, together with details of S-57 encoding, are given in the spreadsheet referenced in section 5.5, Schema.

A.2.4.7 Relationships Between Features

Relationships are defined between features in AML by using the methods specified in sections A.2.4.7.1 and A.2.4.7.2. The application of these relationships is described in section A.3, ‘AML Rules on Feature Coding and Attribution’.

A.2.4.7.1 Collection Objects

All association or aggregation relationships using collection objects classes ‘aggregation’ (C_AGGR), or ‘association’ (C_ASSO) are assumed to be peer to peer. The ‘Relationship Indicator’ [RIND] subfield of these collection feature records must be {3} = peer.

A.2.4.7.2 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 Rules 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.

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

These rules must be used in conjunction with the AML product specification.

A.3.2.1 Sounding Datum

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

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

Meta object : Sounding datum (M_SDAT)
Attributes : soudat INFORM NINFOM

The sounding datum attribute 'soudat' can also apply on an individual object (see note).

NOTE:
When using the attributes **VALSOU; WATLEV; DRVAL1; DRVAL2; gendep; mindep** or **VALDCO** on an individual object the following criteria apply:
1. The 'soudat' attribute must be populated if the sounding datum:

- differs from the sounding datum specified in the SDAT subfield of the Data Set Parameter (DSPM) field structure
- or,
- differs from the sounding datum attribute 'soudat' specified by a M_SDAT meta-object

A.3.2.2 Vertical Datum

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

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

Meta object : Vertical datum (M_VDAT)

Attributes : VERDAT INFORM NINFOM

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

NOTE:
When using the attributes **ELEVAT; elvacc; HEIGHT; dgrhgt; maxalt; minalt; maxftl; minftl; VERACC; VERLEN; VERCLR, VERCCL, VERCOP or VERCSA** on an individual object the following criteria apply:
1. The VERDAT attribute must be populated if the vertical datum:
- differs from the vertical datum specified in the VDAT subfield of the Data Set Parameter (DSPM) field structure
- or,
- differs from the vertical datum attribute VERDAT specified by a M_VDAT meta-object

A.3.2.3 Units

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

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

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

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

NOTE:
When using the attributes **BURDEP;VALSOU; DRVAL1; DRVAL2; ELEVAT; elvacc; HEIGHT; limanc; T_HWLW; T_THDF; T_TSVL; VALNMR; VERLEN; vershf**; **HORLEN; HORWID; deplyr; debfld; gendep; scrdim; vesbem; vesdgh; veslen; dgrhgt; cswidt; maxalt; maxftl; minalt; mindep; minftl; VERCSA; HORCLR; VERCLR; VERCCL; VERCOP or ICEFAC** on an individual object the following criteria apply:
1. The measurement units must be set to the appropriate units using the HUNITS or DUNITS attribute if they:
- differ from the units specified in the HUNI subfield of the Data Set Parameter (DSPM) field structure
- or,
- differ from the attributes 'HUNITS' or 'DUNITS' specified by a M_UNIT meta-object

A.3.2.3 Depth Areas

Section 5.4 of S57: Appendix B1: Annex A Use of the Object Catalogue for ENC gives guidance on the encoding of depth areas that is applicable to AML.

A.3.3 AML Information

Referencing of Nautical Publications

When additional information is required from nautical publications it will be accessed by either:

- a link from specific real world objects using the TXTDSC attribute or
- using the meta object M_NPUB and the TXTDSC or PUBREF attribute to link to soft or hardcopy files respectively. One or more meta objects may cover the entire cell to provide general information such as fishery activity levels in the cell.

Port Locations

Ports are encoded using the **ADMARE** object. These may be area or point primitives depending upon the scale of compilation of the cell.
Urban areas close to the sea are encoded with the **BUAARE** object.

Aggregation (composite) features

Aggregation features can be used to combine objects that are related in some way, ie a part or component of, to form a single higher level object.

Deep Water Route Composite

If both component parts of a Deep Water Route, being the centre line and route part, are used to define a route, they may be aggregated using the “Deep Water Route Composite” feature to form a single deep water route feature. It can then be attributed as shown below:

Collection object:

	C_AGGR	Deep Water Route Composite
Attribute:	INFORM	Supporting textual information Note: if using a national language equivalent, use the NINFOM attribute.
Attribute:	OBJNAM	Route Name Note: if using a national language equivalent, use the NOBJNM attribute.
Attribute:	TXTDSC	Text file reference Note: if using a national language equivalent, use the NTXTDS attribute.

Traffic Separation Scheme Composite

Two or more of the component parts of a traffic separation scheme, being boundary, crossing, lane part, roundabout or zone, may be aggregated using the “Traffic Separation Scheme Composite” feature to form a single traffic separation scheme feature. It can then be attributed as shown below:

Collection object:

	C_AGGR	Traffic Separation Scheme Composite
Attribute:	INFORM	Supporting textual information Note: if using a national language equivalent, use the NINFOM attribute.
Attribute:	OBJNAM	Scheme Name Note: if using a national language equivalent, use the

		NOBJNM attribute.
Attribute:	TXTDSC	Text file reference Note: if using a national language equivalent, use the NTXTDS attribute.

Area of Imagery Coverage & Viewpoint

Where the area the image covers is known, the collection object C_ASSO should be used to associate the 'Area of Imagery Coverage' that is associated with a 'Viewpoint'.

Beach

The collection object C_AGGR should be used to aggregate all beach information objects for a particular beach into a single beach object.

Rocks which may cover, Obstructions and Foul Areas, Wellheads

- The attribute **scrdim** (current scour dimensions) should only be used to define the dimensions of a scour caused by the effect of current flow around the captured geographic object/feature.
- Scours caused by impact of an object should be encoded as a separate object/feature of class iscour (Impact Scour). Where known, this object should be associated with the object which caused the impact.
- Where additional or more detailed information is available, it should be encoded using an appropriate attribute taken from the spreadsheet referenced in Section 5.5, Schema.

Wrecks

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

.

Wellheads

- INFORM / NINFOM may be used to encode relevant details from the installations history or other remarks.
- The country for which the installation operates / produces should be encoded under NATION.

Impact Scour

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

ATS Route Centreline

The collection object C_ASSO should be used to associate all 'Airways' that are components of an ATS Route.

Airspace Restrictions *General*

Airspace restriction (airres) may be coincident to Surface Danger Areas and/or Practice & Exercise Areas (MIPARE). When features co-exist in the same co-ordinate space, then each separate feature should be encoded (e.g. airres and MIPARE) and associated together using the C_ASSO collection object.

Controlled Airspace *General*

Multiple Airways, associated with a single ATS Route Centreline feature, should be aggregated using the 'Controlled Airspace Composite' feature and associated attribution.

Coastguard Track (surveillance) & Coastguard Reporting Point

Use the collection object C_ASSO to associate the Coastguard tracks [surveillance] to their respective Coastguard reporting points.

Navigation System (NAVAID)

The C_ASSO collection object should be used to link all navigation systems (NAVAID) to their respective ATS Airway. Airways are encoded as 'Controlled airspace' (ctlasp) with 'Category of Controlled Airspace' (catcas) attribute value = Airway (see Controlled Airspace).

Reporting/Radio Calling-in Point

The C_ASSO collection object should be used to link all radio calling-in point to their respective ATS Airways. 'Airways' are encoded as 'Controlled airspace' (ctlasp) with 'Category of Controlled Airspace' (catcas) attribute value = Airway (see Controlled Airspace).

Helicopter Reporting Point

Use the collection object C_ASSO to associate the helicopter reporting point to their respective operational area/zone.

ICES Grid - Sub-Divisions - Referencing Grid

The offshore management zones as defined by the International Council for the Exploration of the Sea (ICES) used for the purpose of fishery statistics and regulations in the north-east Atlantic. The grid is divided into sub-divisions based on geographical co-ordinates listed in the Official Journal of the European Communities (85/C 347/05). These sub-divisions are further

divided into areas of 1° longitude x ½° latitude that provide a lattice or referencing grid for all of the ICES fishing areas (e.g. areas identified 01, 02, 03 etc.)

A network of ICES Grid - Sub-Divisions forming an ICES Grid should be aggregated by using the 'Marine Management Area Composite' feature and associated attribution.

A network of ICES Grid - Referencing Grids forming an ICES Grid - Sub-Division should be aggregated by using the 'Marine Management Area Composite' feature and associated attribution.

Maritime Pollution (MARPOL) Reporting Grid- *Lettered Zone- Numbered Zone*

The Maritime Pollution (MARPOL) Reporting Grid comprises a matrix used for reporting maritime pollution. It is divided into 25 Lettered Zones, each covering 2° 30' latitude and 5° longitude identified by a single letter (A – Z, omitting I). Each Lettered Zone is further divided into 900 Numbered Zone rectangles, each covering 5' latitude and 10' longitude that are individually identified by a 3-figure number (000-899).

A network of MARPOL Reporting Grid - Lettered Zones forming a MARPOL Reporting Grid should be aggregated by using the 'Marine Management Area Composite' feature and associated attribution.

A network of MARPOL Reporting Grid - Numbered Zones forming a MARPOL Reporting Grid - Lettered Zone should be aggregated by using the 'Marine Management Area Composite' feature and associated attribution.

ACLANT Grid - Named Areas - Numbered Areas

The ACLANT (Allied Command Atlantic) submarine grid provides NATO submarine operating authorities with a common grid for the water space management of NATO submarines (modified ATP-1(C) 3-42). It is sub-divided into named grid segments, each of which is further sub-divided into and numbered grid segments.

A network of ACLANT Grid - Named Areas forming an ACLANT Grid should be aggregated by using the 'Military Practice Area Composite' feature and associated attribution.

A network of ACLANT Grid - Numbered Areas forming an ACLANT Grid - Named Area should be aggregated by using the 'Military Practice Area Composite' feature and associated attribution.

Surface Danger Area & Practice & Exercise Area

A Surface Danger Area or a Practice and Exercise Area may be defined horizontally with the same co-ordinates as those defining an Airspace Restriction zone that may contain additional information relating to the aeronautical aspects of a Surface Danger or Practice and Exercise Area. Under such circumstances, the Surface Danger or Practice and Exercise Area should be associated to Airspace Restriction using the C_ASSO collection object.

JMC Areas - JENOA Grid- JENOA Grid -Sub Division

The Joint Maritime Course - Joint Exercise Notification & Operating Area (JENOA) grid employs the 4W Disposition Grid framework for monitoring forces in widely dispersed groups. The grid is usually sub-divided into 10NM x 10NM grid segments based upon a specified origin.

A network of JMC Areas - JENOA Grid sub-divisions forming a single JMC Area - JENOA Grid should be aggregated by using the 'Military Practice Area Composite' feature and associated attribution

Naval Gunfire Support (NGS) Range & Naval Gunfire Support (NGS) Impact Area

Multiple naval gunfire support NGS impact areas should be associated to their respective naval gunfire support NGS range using the C_ASSO collection object.

4W Disposition Grid and Grid Segments

The 4W Disposition Grid provides a framework for operating forces in widely dispersed groups. The grid is usually sub-divided into 10NM x10NM grid segments.

A network of 4W Disposition Grid Segments forming a single 4W Disposition Grid should be aggregated by using the 'Patrol Area Composite' feature and associated attribution

N.I. Sealion Patrol Areas

Use the collection object C_ASSO to associate the General/Operational Patrol Areas to helicopter reporting points and RV location points.

Q-Route, Q-Route Leg, Q-Route Waypoint

An entire Q-Route comprises of consecutive Q-Route Legs defined by start and end Waypoints.

Multiple Q-Route Legs, forming a single Q-Route feature, should be aggregated using the 'Q-Route' feature and associated attribution.

A Q-Route Leg is identified by its start and end waypoint identifiers (e.g. AB, BC, CD etc). Therefore, the collection object C_ASSO should be used to associate a Q-Route Leg with its start and end waypoints

Radar Coverage

Areas of differing radar coverage should be associated to their respective radar station using the C_ASSO collection object.

Maritime Safety Information

This category includes the coding of search and rescue areas and the broadcast of various forms of maritime safety information.

Radio Stations and broadcast areas

For encoding of radio stations refer to S-57 APPENDIX B.1 ANNEX A – Use of the Object Catalogue Section 12.9.

Small Bottom Object

The collection object C_ASSO should be used to associate a ’Small Bottom Object’ that is associated with a ’Viewpoint’

Contact History

This must be encoded as a slave to the master object Small Bottom Object, the last ten observations are to be held.

Viewpoint

The object viewpoint is to be slaved to the relevant Small Bottom Object master object.

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