The Digital Geographic Information Exchange Standard (DIGEST)

Part 2
THEORETICAL MODEL, EXCHANGE STRUCTURE AND ENCAPSULATION SPECIFICATIONS

Edition 2.1
September 2000

*Produced and issued by the **D**igital **G**eographic **I**nformation **W**orking **G**roup (DGIWG)*

DIGEST Part 2

Theoretical Model, Exchange Structure and Encapsulation Specifications

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NOTICE TO USERS

Refer to the Notice to Users/Record of Amendments in DIGEST Part 1.

RECORD OF AMENDMENTS

NUMBER	DATE	ENTERED BY	REMARKS

FOREWORD

Refer to the Foreword in DIGEST Part 1.

1 SCOPE, PURPOSE, AND FIELD OF APPLICATION

Refer to the Scope, Purpose, and Field of Application in DIGEST Part 1.

2 CONFORMANCE

Refer to the Conformance in DIGEST Part 1.

3 REFERENCES

Refer to the References in DIGEST Part 1.

4 TERMINOLOGY

Refer to the Terminology in DIGEST Part 1.

Section One THEORETICAL MODEL (Clauses 5, 6, 7, and 8)

For any exchange of DGI to be carried out in a practical manner it is necessary that the following semantic aspects be supported:

- a clear definition of the data model to be used for each type of data;
- a commonly understood means of identifying features and their descriptive attributes; and
- a clear statement on the quality and accuracy of the data.

These three issues are described in greater detail in Clauses 5, 6 and 7 respectively below. Clause 8 deals with cartographic text.

5 DATA MODELS

The three types of geographic data supported by DIGEST are:

- **Vector data** which may be organized according to four different topological levels (see Clause 5.1):
  - -- **spaghetti** vector data (Level 0 Topology),
  - -- **chain-node** vector data (Level 1 Topology),
  - -- **planar graph** vector data (Level 2 Topology), and
  - -- **full topological** vector data (Level 3 Topology);
- **Raster data** (radiometric information pertaining to pixels) (see Clause 5.2); and
- **Matrix data** (non-radiometric information pertaining to points at regularly identified intervals) (see Clause 5.3).

5.1 Vector Data

This data structure represents a logical view of the interface format for the transfer of vector DGI by participating nations.

The topology represented in the exchange dataset is defined according to the coordinate system in which the topological entities are geometrically described. It represents topology consistent with the projection of the surface of the earth on the coordinate surface, i.e., the ellipsoid or the cartographic projection plane. When transmitted, the elevations will not be taken into account in defining the topology.

Conceptually, the three possible topological entity types (node, edge, and face) provide a complete and consistent topological representation of the two-dimensional space covered by a given dataset, with well-defined topological relations between different entity types.

The different topological levels of vector data allow choice in the level of detail and constraint in topological relations according to the complexity, completeness, and consistency of the transmitted data (see Clause 5.1.3).

Geographic features in the dataset are then supported by one or more topological elements with a many-to-many mapping between features and topological entities, as shown in Figure 5-1.

In the DIGEST exchange structure, topological entities, and features are linked by a mandatory one-way relation (as shown in Figure 5-2a) and, optionally, the reverse relation (as shown in Figure 5-2b). The use of only the one-way relationships reduces the data volume while preserving the structure of the full conceptual scheme. The use of the reverse relationship will improve computational efficiency.

There are eight logical entity types in the DIGEST vector data model:

- feature entities
    - -- simple point
    - -- simple line
    - -- simple area
    - -- complex

- topological entities
    - -- node (connected, entity, or combined)
    - -- edge
    - -- face

- topological construct
    - -- ring

Note that a "feature entity" is commonly referred to as merely a "feature", a "topological node entity" is commonly referred to as a "node", and so on.

A topological element is either a topological entity or a topological construct.

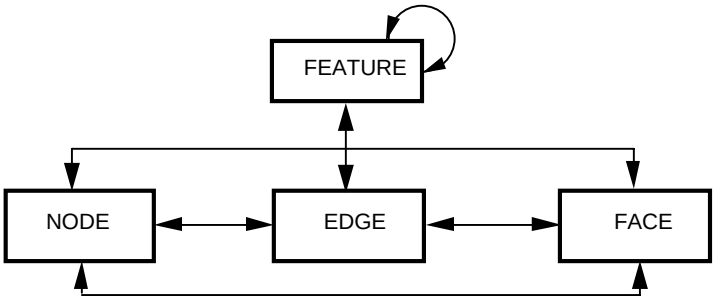


Figure 5-1 Conceptual Scheme (Level 3 - Full Topology)

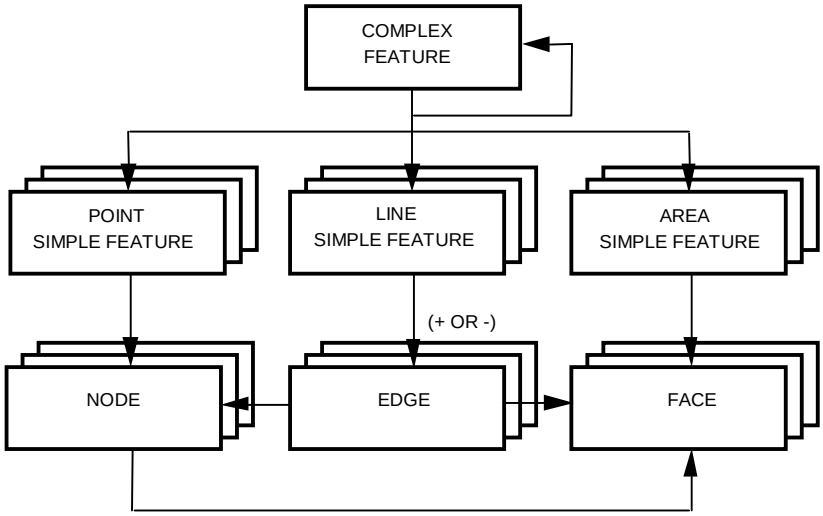


Figure 5-2a Exchange Structure Schema (Mandatory one-way pointers)

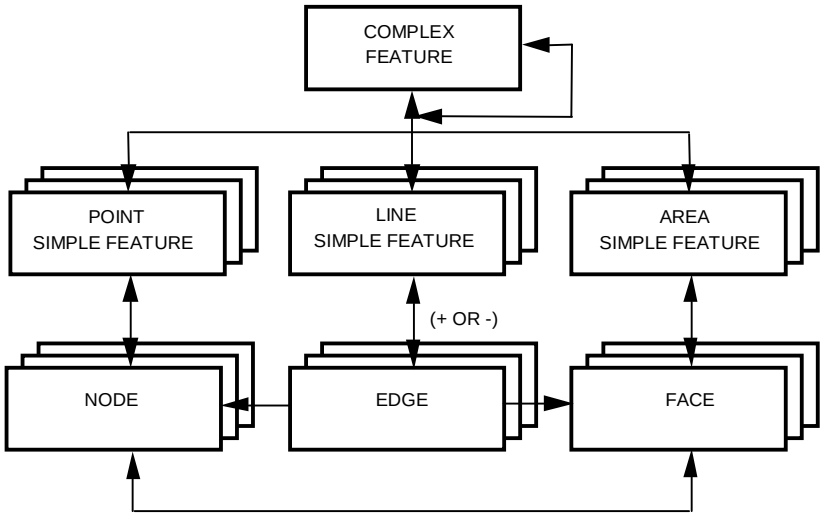


Figure 5-2b Exchange Structure Schema (Optional two-way pointers)

5.1.1 Features

Feature entities shall be used to represent the geographic features, or data about groups of geographic features.

- A feature is a representation of a geographic entity related in some way to the Earth's surface.
- A specific feature is defined by: a unique list of attributes; a unique set of attribute codes and associated values; and relations to other entities.
- Relations between features (with the exception of "alternative representation") will be non-circular.

5.1.1.1 Simple Features

A simple feature is composed of only topological elements.

A simple feature will be composed of topological elements of the same type only (i.e., face, edge or node).

Simple features will be homogeneous in attribution and the attributes carried at the topological level (source, accuracy, up-to-dateness, security) may vary between topological entities. The simple feature referencing these topological entities may also contain attributes for source, accuracy, up-to-dateness, and security that are an overall statement (usually the worst value) of the related topology and the attributes of the feature.

Contiguous simple features homogeneous in attribution are permitted but not encouraged.

The three types of simple features are:

Simple Point Features

- A simple point feature is composed of one (or more) node(s).
- Point features defined at a single (x, y) location with different elevations may be represented in the structure as multiple simple point features composed of the same single isolated node, with elevation defined as the elevation of the surface of the Earth. The actual elevation of each point feature may be computed using attributes attached to the features.

Simple Line Features

- A simple line feature is composed of one (or more) edge(s).
- The composition relation between a simple line feature and its component edges may be oriented and ordered.
- A simple line feature may be closed if required.

Simple Area Features

- A simple area feature is composed of one (or more) face(s) or, when no faces exist in the structure, by one (or more) edge(s) as defined in an area-to-edge table.

5.1.1.2 Complex Features

A complex feature is composed of more than one simple and / or complex features.

No feature is composed of itself, nor of any feature that is ultimately composed of the original feature.

5.1.1.3 Relations Between Features

DIGEST allows for the following relations between feature entities.

Alternative Representation

In some circumstances it may be necessary, or convenient, to represent the same real world entity in more than one form. These different forms are represented by different simple features / complex features and possibly different topological entities. The simple feature/ complex features representing the different forms are "alternative representations" of the same real world entity. (For example, the real world entity of a building could be represented by an area feature, in a high resolution data set, and as a point feature, in a lower resolution dataset.) When alternative representations are defined, they shall be done by assigning a unique identification attribute (UID) to the feature. The UID shall appear whenever and wherever the feature exists in a dataset.

Stacked-on

A simple feature is "stacked-on" another simple feature when it is physically (in the real world) on top of that feature. In a case where more than two features occupy the same horizontal spatial location, the "stacked-on" relationship applies only to the feature in the most immediate proximity. An example of a stacked-on feature would be an antenna on top of a building.

Stacked-under

A simple feature is "stacked-under" another simple feature when it is physically (in the real world) below that feature. As noted above, when more than two features are co-located, only the ones with immediate proximity have the "stacked-under" relationship assigned. An example of a stacked-under feature would be a road passing under a railroad.

To avoid excessive complexity, "stacked-on / under" relations are possible only between Simple Features.

Conjunction / Disjunction

Line features may meet at a node but they may or may not support traffic (or flow) connectivity. To indicate the connectivity relationship between two intersecting line features, the conjunction "CON" or disjunction "DIS" relationship may be assigned. Conjunction means flow-from-first-feature-to-second is allowed. Disjunction means flow-from-first-feature-to-second is not allowed.

For simple situations where line features meet in only one spatial location, the relationship is based only upon pairs of line features. For more complicated situations, where features meet other features in more than one location, the relationship must be keyed to the intersection point. This may still not be sufficient to uniquely define connectivity relationship and the order of encounter during a counter-clockwise cycle (wagonwheel) around the intersection node must be included in the relationship table.

5.1.2 Topological Elements

5.1.2.1 Node Entity

Node entities shall be used to represent the end point of edges (see 5.1.3) or the location of point features.

- A node is a unique point on the Earth’s surface.
- A node may be a "location of" any number of point features.

- A node is defined as an isolated node (called "entity node") if it is not the start or end node of an edge.

There shall be topological relations between connected nodes and edges: "start node" and "end node" (for Levels 1, 2 and 3).

- A node is defined as a connected node if it is the start or end node of an edge.

- A node may be the start or end node of any number of edges.

There shall be a topological relation between entity nodes and faces: "containing face" (for Level 3 only). Connected nodes shall be topologically linked to a "first edge**".**

- An isolated node is contained in only one face.

5.1.2.2 Edge Entity

Edge entities shall be used to represent the topological boundary of a face (see 5.1.3) or the location of line features.

- An edge is defined as the set of straight line segment(s) connecting consecutive coordinates, representing all or part of the extent of a linear feature and/or the boundary of a face.

- Each edge, which is a component of a simple line feature, may be interpreted according to the directional sense of the optional pointer from the line feature (or in the join table that identifies multiple edges required by the simple line feature) to the edge identifying it in, or opposite to, the direction of digitization (i.e. the order of the coordinates in the coordinate list). This allows the topology to define the sense of direction that belongs to the line feature (e.g. one-way roads, air routes, rivers, streams, etc.)

- An edge may be used to describe all or part of the spatial location of any number of simple line features.

- An edge need not be associated with a line feature.

There shall be topological relations between connected nodes and edges: "start node" and "end node" (for Levels 1, 2, and 3).

- An edge is an oriented curve joining a start node and an end node (which may be the same).

- Seen in the direction of digitization, each edge refers to exactly one start, and one end node, which may be identical. The relations "start / end node" must be interpreted depending on the direction of digitization. An edge with the same start and end node must have at least four sets of coordinates.

- The connected node associated with the start node of an edge will be located at the same (x, y) position as the first coordinate of the edge (both the edge and connected node carry these coordinates). The "z" or elevation coordinate must agree, if present.

- The connected node associated with the end node of an edge will be located at the same (x, y) position as the last coordinate of the edge (both the edge and connected node carry these coordinates). The "z" or elevation coordinate must agree, if present.

- Two edges are contiguous if and only if they have a common node.

- An **isolated edge** (see Figure 5-3 for an example) is defined as an edge whose start and end nodes are not connected to any other edges. Isolated edges do not subdivide a face; as a consequence the left and right faces are identical.

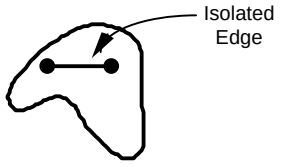


Figure 5-3 Isolated Edge

- A **hanging edge** (see Figure 5-4 for an example) is defined as an edge for which one of its start / end nodes is connected to another edge, while the other is not. Hanging edges do not subdivide a face; as a consequence the left and right faces are identical.

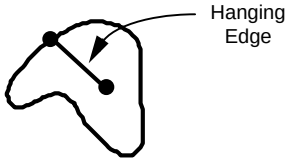


Figure 5-4 Hanging Edge

There shall be topological relations between faces and edges: "left face" and "right face" (for Level 3 only):

- Each edge refers to exactly one left, and one right face, which may be identical. The relations "left / right face" must be interpreted depending on the direction of travel from the start node to the end node.

There shall be topological relations between edges: "left edge" and "right edge" (for Levels 1, 2 and 3):

- Each edge refers to exactly one "left edge" and one "right edge", according to the start and end nodes. The "left edge" and " right edge" may be the same.

- The "left edge" is the first neighbour of the current edge as one moves counterclockwise around the start node of the current edge.

- The "right edge" is the first neighbour of the current edge as one moves counterclockwise around the end node of the current edge.

5.1.2.3 Face Entity

Face entities shall be used to represent topological faces (Level 3 only).

- A face is a maximal, connected area in the complement of the Edge-Node Planar Graph, representing all or part of the extent of a feature or an unattributed area.

- No two faces overlap.

- Any point on the coordinate surface not on an edge or at a connected node is in one (and only one) face.

- Each face can be bounded by any number of edges and contain any number of isolated nodes.

- Two faces are contiguous if they have at least one common edge.

- Each face can be a component of any number of simple area features.

- Faces will not necessarily be components of features (e.g., if the dataset does not contain area features or is sub-divided by line features (and associated edges) in Level 3 topology).

- The first face record in the exchange format is called "Face 1". Face 1 represents all area on the coordinate surface outside the bounds of the dataset.

- Face id 1 is always reserved for the universe face in a face table; it will never correspond to a feature in the feature table. The universe face contains a point at infinity.

The outer ring of the universe face is a topological artifact, which does not have a geometric representation. The outer ring cannot be displayed. The common boundary between the universe face and all other faces constitutes the inner ring or rings of the universe face. Inner rings of the universe face behave the same as the inner rings of other faces.

- An area covered by a face is defined by those edges bounding the face, which may be gathered in rings (see 5.1.2.4).

- A face is "bounded by" one single outer ring and may contain any number of inner rings.

5.1.2.4 Ring Construct

The ring topological construct shall be used to represent the boundaries of topological faces (for Level 3 only).

- A ring is a connected set of edges that composes the border of faces.

- A ring may not intersect itself.

- A ring may compose the outer or the inner border of a face. A face may not be bounded by more than one outer ring.

- A ring pertains to a single topological face or area feature. When the same set of edges is shared by two topological faces or area features, two different rings are composed of the same set of edges.

- A ring is described by a "start edge" and the topological relation between edges (left/right edge) from which an ordered list may be computed.

5.1.2.5 Attribution of Topological Entities

Attributes may be attached to topological entities. The only attributes permitted for topological entities are (these attributes are optional):

- source;

- accuracy;

- up-to-dateness / currency; and

- security classification.

These attributes are described in greater detail in Clause 7.

5.1.3 Topological Levels

Each topological level is defined by:

- a list of mandatory and optional topological elements;
- a list of mandatory and optional topological relations; and
- a list of topological rules or constraints applying to the existing set of topological elements.

5.1.3.1 LEVEL 3 - Full Topology

Topological Elements

- Simple features will be composed of nodes, edges or faces.
- Rings are used to describe the boundaries of faces.

Topological Relations

- The "start/end node", "left/right face", "left/right edge" "start edge" and "containing face" topological relations are mandatory.
- No edge will be transmitted without a consistent description of its start node, end node, left face, right face, left edge, and right edge.
- No isolated node will be transmitted without a consistent description of its containing face.
- No connected node will be transmitted without a consistent description of its first edge.

Topological Rules

- The coordinate surface is considered to be partitioned in a set of mutually exclusive and collectively exhaustive faces. The boundaries of the faces are composed of edges. The faces may contain isolated nodes.
- No two nodes may occupy the same (x, y or long, lat) coordinate point.
- A node will intersect edges only at their start/end point.
- No edge will intersect nor overlap any other edge, or itself.
- No two faces overlap.
- An isolated node is contained in a single face. A face may contain any number of isolated nodes.

- Any location on the coordinate surface not on an edge or at a node is in one (and only one) face.

- As a result of the above rules, topological entities may exist without being a component of any simple feature.

  - Faces will be created to fill the whole extent of the coordinate surface.

  - Edges will be created as part of the border of faces.

  - Nodes will be created as the intersection of two contiguous edges.

5.1.3.2 LEVEL 2 - Planar Graph

Topological Elements

- Simple features will be composed of nodes or edges. There is no face entity.

Topological Relations

- The "start / end node", "left / right edge" and "first edge" topological relations are mandatory.

  - No edge will be transmitted without a consistent description of its start node, end node, left edge and right edge.

  - No connected node will be transmitted without a consistent description of its first edge.

Topological Rules

- The set of nodes and edges will constitute a planar graph.

  - No two nodes may occupy the same (x, y or long, lat) coordinate point.

  - A node will intersect edges only at their start/end point.

  - No edge will intersect or overlap any other edge, or itself.

  - Special tables can be used to transmit area features.

- As a result of the above rules, topological entities may exist without being a component of any simple feature.

  - Topological nodes will be created as the intersection of two contiguous edges.

5.1.3.3 LEVEL 1 - Chain-Node

Topological Elements

- Simple features will be composed of nodes or edges. There is no face entity.

Topological Relations

- The "start/end node", "left/right edge" and "first edge" topological relations are mandatory.

  - No edge will be transmitted without a consistent description of its start node and end node.

  - No connected node will be transmitted without a consistent description of its first edge.

Topological Rules

- The organization of the set of nodes and edges is driven by a semantic point of view, as opposed to a geometric one (e.g. a communication network).

  - Two nodes may occupy the same (x, y or long, lat) coordinate point.

  - A node may intersect an edge at any point.

  - Edges may intersect or overlap any other edge, or itself.

  - Special tables, can be used to transmit area features.

5.1.3.4 LEVEL 0 - Spaghetti

Topological Elements

- Simple features will be composed of nodes or edges. There is no face entity.

Topological Relations

No topological relations will be transmitted. Topological entities are considered to be independent from each other. Special tables can be used to transmit area features.

Topological Rules

An edge record may be defined as "closing on itself" when used for defining the boundary of an area feature. In this case, the first coordinate equals the last coordinate while all other topology remains nodeless. In other cases, a series of edges may be defined in a table to describe area features. The edges do not have start and end nodes identified.

5.1.4 Logical Consistency

A vector dataset is defined as being logically consistent when all of the following conditions are true:

- All mandatory relations between topological entities for the chosen topological level are present and non-null (e.g., pointers to "left face", "right face", "start node", "end node", "first edge, "start edge" and "containing face" are present for Level 3 - Full Topology);

- All topological entities necessary to represent simple features within the exchange dataset are present;

- All relational pointers are satisfied (i.e., the record pointed to will be present in the dataset).

5.2 Raster Data

Raster data includes Raster Graphics and Imagery.

5.2.1 Scope

5.2.1.1 Raster Graphics

Raster Graphics (RGs) are produced to support various uses including air, land, and sea applications, electronic map displays, and mission planning systems. In addition, they may be used as source material for production of other products.

RGs are digital replicas of graphic products or hardcopy image products. To digitally replicate the multiple colours present on many graphic products, each multicolour graphic or its colour separates is scanned and digitally separated into red, green, and blue components, or colour-coded layers. The result can be several image bands that when combined, provide a multicolour digital replica of the original graphic product. The total format of a graphic including margin, border, and legend areas shall be scanned at a resolution to be determined by the producer, dependent upon the digitizing device and the graphic to be scanned. The resultant data which consists of one graphic product is provided with geographic control on the original datum and projection so that transformation and seaming of the data can be performed at user discretion. Scanned data will normally be exchanged at a resolution of 100 microns or better (e.g. 50 microns), unless negotiated otherwise bi-laterally, with digital images consisting of three image bands for RGB (one each for red, green, and blue) or at least one image band for colour-coded data.

RGs consist of scanned graphic data, a support file that contains geographic coordinates with which to register the digital data to the original graphic's projection, a map information file that contains textual information about the graphic, and optional supplementary text that contains textual descriptions of selected items depicted on the original graphic.

Raster data collected from source graphics at scales of 1:100,000 or smaller may retain the horizontal accuracy of the original source graphic, since the inaccuracy added as a result of digitization is generally less than the error tolerances built into the original source graphics' horizontal accuracy figure.

Raster Graphics are a collection of red, green and blue, or colour-coded digital images in unsigned binary integer format. The total format of a graphic product may be scanned including margin, border and legend areas. Each image, which nominally consists of one graphic product, is provided with geographic control on the original datum or projection so that transformation and seaming of the data can be performed at user discretion.

A raster image is usually an RGB digital image consisting of three image bands or a colour-coded image consisting of at least one image band.

Horizontal accuracy for raster data collected from source graphics at scales larger than 1:100,000 may be determined after the image has been rectified (if needed) using the method detailed below:

- Coordinates of control points are determined in terms of the nominal sampling interval times the reciprocal scale of the graphic (i.e. the ground distance defined by the number of pixels from the origin of the cartographic image). The measure of their deviations at the 90% confidence level, from the cartometrically-derived coordinates, is calculated for both X and Y. These are compounded with "Source Graphic's Horizontal Accuracy Value" (AAH) to form the total "Raster Horizontal Accuracy Value" (HAV) as follows:

  $$HAV = \text{sqrt}\ (AAH^2 + X_{ERROR}^2 + Y_{ERROR}^2\ )$$

  An example is for a 1:50,000 scale map where AAH = 50 metres and the sampling interval is 100 microns.

- The accuracy at 90% confidence level is 200 microns (i.e. 2 pixels) which gives 2 x 100 x 50,000 = 10 metres in both X and Y.

  This would give a total HAV = $(50^2 + 10^2 + 10^2)^{1/2}$ = 52 metres

Ninety percent of the points per graphic will fulfil the above condition.

5.2.1.2 Imagery

Imagery data are derived from different kinds of sensors. DIGEST allows the transmission of processed imagery which has been formatted into image pixel format, enhanced to remove detected anomalies and georeferenced to a defined coordinate system.

A transmission usually consists of one to several images.

5.2.2 Overview of Data Model

The image is considered to comprise of one or more image bands (see Figure 5-5). An image is a two-dimensional rectangular array of pixels indexed by row and column. A pixel is represented by an n-vector of sample values; where n corresponds to the number of bands comprising the image. The i^{th} entry of the pixel (vector) is the pixel value for the i^{th} band sample of the image. Therefore, the i^{th} band of the image is the rectangular array of i^{th} sample values from the pixel vectors. For an image I with R rows and C columns, the coordinates of the image pixel located in the c^{th} column of the r^{th} row shall be denoted by an ordered pair (r,c), $0 <= r < R$, $0 <= c < C$, where the first number, r, indicates the row and the second number, c, indicates the column in the image array. This notation is standard for addressing arrays and matrices. The pixel located at (r,c) is denoted by I(r,c).

For example, a typical 24-bit RGB image is an array of R rows and C columns, where each pair of indices (r,c), $0 <= r < R$, $0 <= c < C$, identifies a pixel I(r,c) consisting of three single byte values (a three-vector) corresponding to the red, green, and blue samples. The image has three bands, each consisting of a R-by-C array of single byte sample values. One band comprises all the red, one band comprises all the green, and the third band comprises all the blue pixel sample values. Specifically, the value at position r,c in the green band, for example, contains the green byte from the pixel I(r,c) three-vector at position r,c in the image.

The convention adopted for sequencing (numbering) pixels within an image is analogous to the Cartesian coordinate system. For a normally-oriented image (i.e. North at the top and west on the left) the origin is at the SW corner and the columns are numbered from left to right (x-axis), the rows from bottom to top (y-axis). The positive directions of the x and y axes (rows and columns) may be reversed in relation to a normally-oriented image but not exchanged (see 11.2.3 for details). For images intended to be displayed the origin is usually at the NW corner and the columns are numbered from left to right (x-axis), the rows from top to bottom (y-axis).

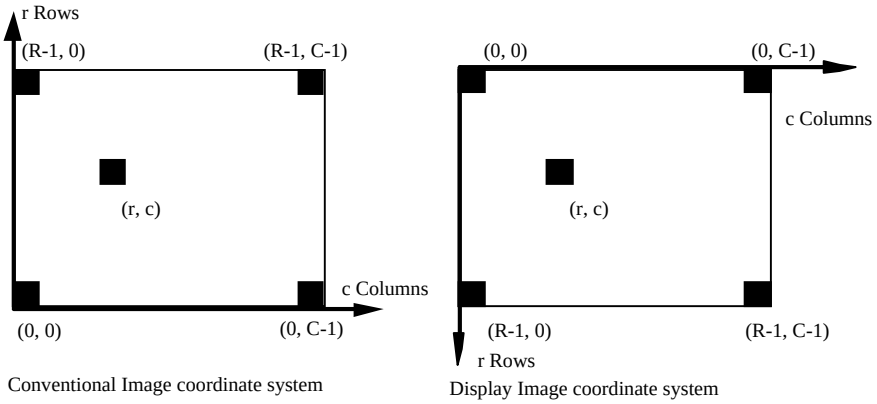


Figure 5-5 Image Coordinate System

The image bands will be formatted into **N** columns of subblocks in the east-west direction and **M** rows of subblocks in the north-south direction. The subblock size is **P** pixels (north-south) by **Q** pixels (east-west).

For the conventional case the sequence of the subblock numbers begins at the lower left corner (SW corner) of the image/graphic. That position will be (1), and subblock numbers are incremented by 1 along the row to N. Therefore the subblock to the east will be (2). The subblock to the north of Subblock (1) will be Subblock (N+1). The subblock in the northeast corner will be Subblock (N*M). Pixel values within a subblock are recorded in the same order, P rows by Q columns. Each line of Q pixels within a subblock is a separate "scan line" and is ordered as defined in the above three paragraphs. That is in order of row (0) to (P-1) for Subblock (1), followed similarly by Subblocks (2) to (N*M) for each image band.

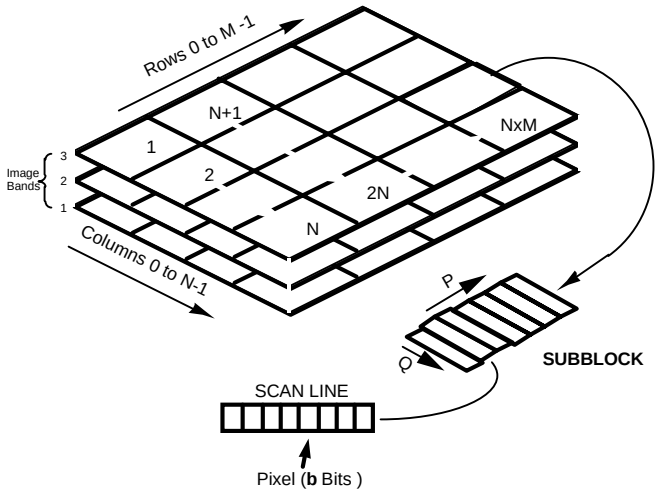


Figure 5-6 Raster Logical Structure (Conventional Orientation)

If the number of rows in an image is not initially an integer multiple of the Number of Rows per Block (P), or if the number of columns is not an integer multiple of the Number of Columns per Block (Q), an application that creates the blocked image shall "pad" the image to an appropriate number of rows and columns so the divisibility condition is met by adding rows and/or columns to the side of the image, as viewed in Figure 5-7. The result is that a blocked image may have a block(s) (subarray(s)) comprised of pixel values from the original image and “pad” pixels inserted to meet block boundary conditions. Zero fill is defined as zero intensities for RGB, or the colour code zero. Zero fill will be used within a subblock at the beginning or end of each line or column.

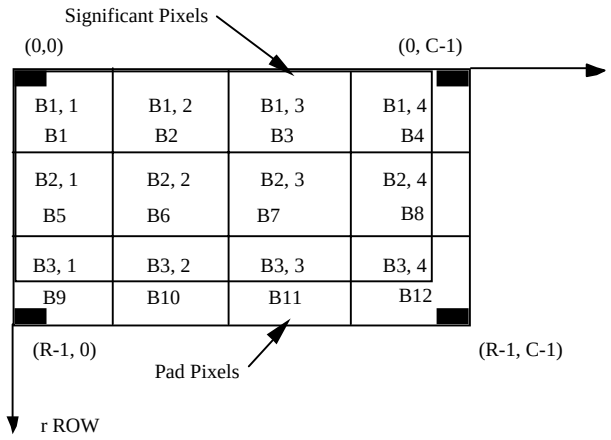


Figure 5-7 A Blocked, Padded Image (Display Orientation)

5.3 Matrix Data

Matrix data are arrays of non-radiometric information pertaining to points at regularly identified intervals (e.g. grid, Cartesian, latitude/longitude) and characteristics which are present at that particular location. Such characteristics could be soil type or elevation. Each array of matrix information will consist of a uniform number of locations as described in the clauses which follow. The basic structure described in these clauses are identical to the raster structure.

The matrix is considered to comprise of one or more attribute bands (see Figure 5-9). A matrix is a two-dimensional rectangular array of elements indexed by row and column. An element is represented by an n-vector of attribute values; where n corresponds to the number of attribute bands comprising the matrix. The i^{th} entry of the element (vector) is the element value for the i^{th} attribute band of the matrix. Therefore, the i^{th} attribute band of the matrix is the rectangular array of i^{th} attribute values from the element vectors. For a matrix A with R rows and C columns, the coordinates of the element located in the c^{th} column of the r^{th} row shall be denoted by an ordered pair (r,c), $0 <= r < R$, $0 <= c < C$, where the first number, r, indicates the row and the second number, c, indicates the column in the matrix. This notation is standard for addressing arrays and matrices. The element located at (r,c) is denoted by A(r,c).

The convention adopted for sequencing (numbering) elements within a matrix is analogous to the Cartesian coordinate system. For a normally-oriented matrix (i.e., North at the top and west on the left) the origin is at the SW corner and the columns are numbered from left to right (x-axis), the rows from bottom to top (y-axis). The positive directions of the x and y axes (rows and columns) may be reversed in relation to a normally-oriented image but not exchanged (see Clause 11.2.3 for details).

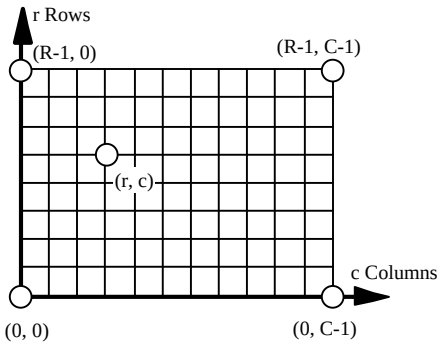


Figure 5-8 Matrix Coordinate System (Conventional)

The matrix is considered to be comprised of one or more bands (see Figure 5-8). The bands will be formatted into **N** columns of subblocks in the east-west direction and **M** rows of subblocks in the north-south direction. The subblock size is **P** elements (north-south) by **Q** elements (east-west).

The convention adopted for sequencing (numbering) subblocks within a matrix, and elements within a subblock, is analogous to the Cartesian coordinate system. For a normally-oriented matrix (i.e. North at the top and west on the left) the origin is at the SW corner and the columns are numbered from left to right (x-axis), the rows from bottom to top (y-axis), and the bands from lower to higher (z-axis).

The positive direction of the x- and y-axis (rows and columns) may be reversed in relation to a normally-oriented matrix but not exchanged (see 11.3.3 for details). For the conventional case the sequence of the subblock numbers begins at the lower left corner (SW corner) of the matrix. That position will be (1), and subblock numbers are incremented by 1 along the row to **N**. Therefore the subblock to the east will be (2). The subblock to the north of Subblock (1) will be Subblock (**N**+**1**). The subblock in the northeast corner will be Subblock (**N*M**). Element values within a subblock are recorded in the same order, **P** rows by **Q** columns.

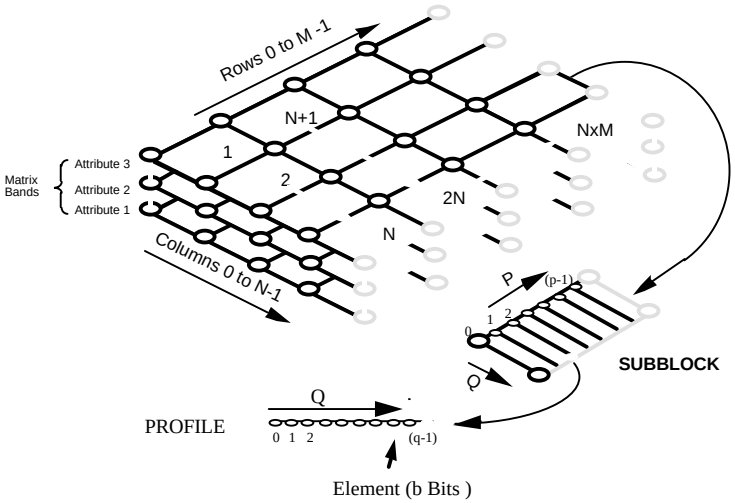


Figure 5-9 Matrix Dataset Logical Structure

A value for null data may be defined by the user. If the actual number of elements per line is not an integer multiple of **Q**, null values will be added to produce the next integer multiple of **Q** elements. Null values will be used preceding the first line or following the last line of actual matrix data in a subblock. If the actual number of lines is not an integer multiple of **P**, null values will be added to produce the next integer multiple of **P** lines. Therefore, null values for a matrix may be on any edge.

Each line of **Q** elements within a subblock is a separate "profile" and the lines are ordered as defined in the above three paragraphs. That is in order of row 0 to **P-1** for Subblock (1), followed similarly by Subblocks (2) to (**N*M**) for each matrix band.

The standard allows variations on this order to be specified in a dataset.

6 FEATURE, ATTRIBUTE, AND RELATION CODING

Standards for DGI exchange require a method for documenting features and attributes, along with relationships, necessary to distinguish those features commonly found in a GIS and for the orderly exchange of such data between MC&G organizations.

6.1 Feature and Attribute Coding Catalogue

DIGEST Part 4 is the Feature and Attribute Coding Catalogue (FACC) Data Dictionary. Features and attributes shall be encoded in conformance with the FACC Data Dictionary.

The product specification determines which features and attributes will be collected as well as defining specific collection criteria such as positional accuracy and feature granularity.

6.2 Rules Governing Attributes and Relations

6.2.1 Attribute Values

Attributes are used to describe some characteristic of vector data. Within DIGEST, attributes may have real or coded values. Typically, real values are measurements like height, width, etc. and coded values have meaning given in a look-up table. Coded values are permitted to have more than one occurrence for a particular attribute for a given feature. Both real and coded attributes can occur hierarchically (that is, one can attribute attributes). An example of an attribute of an attribute would be security. In other words, one could indicate if an attribute value is SECRET or UNCLASSIFIED. Each attribute is described within DIGEST using a unique three-character alphanumeric code (label) to represent a category of information. These three character-designated attributes are also given a value format (e.g., real, alphanumeric, etc.) which are statements to allow computer interpretation of the attribute value data type.

6.2.1.1 Range Value Attributes

The implementation of range value attributes is described in Part 4 Clause 5.2.2.

6.2.2 Relation Coding

A relation coding describes how one feature is related to another. For example, the "stacked-on" relationship indicates that the feature is in the same horizontal location as another feature and occupies a higher vertical (i.e., stacked-on) position. By definition, relations are not a necessary part of the basic exchange structure and their inclusion is optional and to be agreed bi-laterally between interested parties.

The names of currently defined relations (see clause 5.1.1.3) are as follows:

Relation	Name
Alternative Representation	ALT
Stacked-on	STK
Stacked-under	STU
Conjunction	CON
Disjunction	DIS

6.3 Data Dictionary

The purpose of the Data Dictionary, as described in Part 2 Clause 11.1.10, is to permit the definition (and therefore the use) of features and attributes which cannot be represented with an existing combination of feature and attribute codes in FACC. For this use, the feature or attribute is being defined in a FACC format temporarily until such time as it is proposed for inclusion in FACC (see Part 4 Clause 5.3). A second possible use of the Data Dictionary is to describe the features and attributes contained in a dataset so that a receiver of a dataset would have a complete description of all features and attributes as part of the dataset.

The Data Dictionary is implemented through the:

- Feature/Attribute Entry Record (see Clause 11.1.10.1);
- Feature/Attribute Association Record (see Clause 11.1.10.2); and
- Attribute/Value Association Record (see Clause 11.1.10.3).

Any non-FACC features and attributes used in such a Data Dictionary must comply with Part 4 Clause 5.3).

7 DATA QUALITY

7.1 Data Quality Descriptors

Data quality descriptors are necessary in order to evaluate the quality of exchanged Geo Data referring to features / attributes and geometry and to integrate them into a receiving database without ambiguity. Therefore, quality statements are required for a single datum as well as for certain data levels. Special statements are required for:

- specification;
- source;
- accuracy (positional and attribute);
- up-to-dateness / currency;
- logical consistency;
- completeness (feature and attribute);
- clipping indicator*;
- security classification*; and
- releasability*.

*Included in this clause because of their logical similarity to data quality descriptors.

Data is organized in structures that comprise several levels, e.g.:

- Digest Information Package level;
- Dataset [Library] level;
- Feature level;
- Topological / Spatial Data Records (Face, Edge, Node) level; and
- Attribute level.

These data structures are described in greater detail in Section Two.

Quality descriptors may be assigned to each of these levels. Some quality statements are of a general nature and are required on a high level (e.g., dataset). They may be computed average values, or the security classification, for example, in which case the higher level inherits the descriptor from lower level entities. (If one feature is CLASSIFIED, the whole dataset will be CLASSIFIED at the same classification level.)

Other Data Quality Descriptors (e.g., attribute accuracy) make sense only for a limited number, or even one feature. If all occurrences of a feature class (e.g., Bridges) have their attribute (e.g., width) from the same source and evaluation method, the feature may carry a pointer to an accuracy statement in the quality file. If bridges stem from various sources and are captured by various methods, each single feature will require its own descriptor for this attribute.

On the lower levels, i.e. feature, topological, and attribute level, a descriptor will normally refer to only one Geo-datum, as opposed to the higher levels, where descriptors refer to large number of Geo-datum (e.g., Tiles, Files, Volumes etc.).

Data descriptors are assigned to the neutral Geo Data and will be provided during data exchange.

7.2 Assignment of Data Quality Descriptors to the Structure Levels

Corresponding to the rule "as deep as necessary, but as high as possible" (without losing any information), data quality descriptors are assigned to the various levels. Data descriptors on a higher level are "optional", if their information can be computed by interpretation of lower level data descriptors (except security classification).

Table 7-1 shows the assignment of data quality descriptors to the structure levels supported by the exchange format.

Table 7-1 Data Quality Matrix

Quality Descriptor	Volume Level	Dataset Level	Feature Level	Topology/ Spatial Level	Attribute Level
Specification	X	X	-	-	-
Source	-	X	X	X	X
Positional Accuracy	-	X	X	X	-
Attribute Accuracy	-	-	-	-	X
Up-to-Dateness/ Currency	-	X	X	X	X
Logical Consistency	-	X	-	-	-
Attribute Completeness	-	X	-	-	-
Feature Completeness	-	X	-	-	-
Security Classification	X	X	X	X	X
Clipping Indicator	-	-	X	-	-
Releasability	X	X	X	X	X

7.3 Definition of Data Quality Descriptors

The quality descriptors are implemented as attributes, and are defined as follows.

7.3.1 Specification

The Specification explicitly describes, if relevant, the specific Edition and Amendment number of the Dataset or Product Specification against which the data within the Dataset or Information Package was transformed for exchange. It also describes the specific Edition and Amendment number of DIGEST against which, directly or indirectly, the data within the Dataset was transformed for exchange.

7.3.2 Source

The Source describes the origin / derivation of a single datum or Dataset with regard to processing techniques and of data source used.

Source information consists of:

- data source used (e.g., chart, air photograph, statistics);
- name, designation;
- scale;
- producer / editor;
- edition number;
- edition date / source date;
- accuracy indication;
- other documents; and
- control and check data.

Source processing statements consist of:

- date of processing;
- operator;
- hardware used;
- program used; and
- transformation algorithm.

The Descriptor Value consists of the Key indicating the identity of the source record.

7.3.3 Positional Accuracy

Positional Accuracy describes the geometry of a real-world object referring to its horizontal accuracy (e.g., X-value,Y-value = +/-1 m) and its vertical accuracy (e.g., Z- value = +/-1 m). Positional Accuracy must be specified without relation to scale and should contain all errors influenced by source documents, data capture, transformation, etc. Accuracy may be assigned individually for each primitive at the Edge or Node record level or may be described in an aggregate manner in metadata. When accuracy is assigned to a Feature, it pertains to the association of the Feature to its underlying topology.

The Descriptor Value for Positional Accuracy is expressed as a circular error for X,Y-value and as a linear error for Z-value or a key identifying an accuracy recorded in the Quality Section.

Refer to Part 2 Clause 10 for a discussion of horizontal and vertical accuracy regions.

7.3.4 Attribute Accuracy

The Attribute Accuracy describes the accuracy / reliability of the data capture for an attribute. Attribute Accuracy of quantitative attributes is a quantitative value, which expresses the standard deviation of the attribute value (e.g. height = 1 m).

Attribute Accuracy of qualitative attributes is a qualitative value, which expresses the reliability of the attribute value (e.g., red = 90%).

The Descriptor Value is the standard deviation of the quantitative attribute value (e.g., height = +/- 1 m) or the reliability of the qualitative attribute value in percentage (e.g., red = 90%) or a key identifying an accuracy record in the Quality Section.

7.3.5 Up-To-Dateness / Currency

The Currency represents the date at which the data was introduced or modified in the database. This date of entry is used as a proof of modification for a single datum, permits statistical interpretation of several data and supports localization of defective data. Further information pertaining to Currency is contained in the source data.

The Descriptor Value for Up-to-Dateness is YYYYMMDD but may be augmented by HH (hours), i.e., YYYYMMDDHH. Refer to ISO 8601 for further information.

7.3.6 Logical Consistency

Consistency means that the logical rules of structure and attribute rules are followed and it describes the compatibility of a datum with other data of the dataset. Only consistent data is recommended for exchange.

The Descriptor Value is of the form of Text (Test performed and / or inconsistencies identified). Individual inconsistencies may be identified by the feature code ZD003.

7.3.7 Attribute Completeness

Completeness expresses the completeness of the attribute values assigned to a feature. It is 100% if all the relevant attributes of a feature are captured in accordance with a given capture specification.

The Descriptor Value is the percentage of attribute values other than "Unknown" assigned to features.

7.3.8 Feature Completeness

Feature completeness refers to the degree to which database features have been captured in accordance with the data capture specification.

The Descriptor Value is the Feature Completeness as a percentage.

7.3.9 Clipping Indicator

The clipping indicator consists of a descriptor value, which will indicate the number of times the remaining feature has been clipped. Zero or null indicates no clipping.

7.3.10 Security Classification

Security Classification expresses the degree of protection against unauthorized access to data. Volumes, features and single attributes may be security classified.

The Descriptor Value is the Security Classification as given by Security Classification Code:

T = **T**OP SECRET
S = **S**ECRET
C = **C**ONFIDENTIAL
R = **R**ESTRICTED or alternatively "FOR OFFICIAL USE ONLY"
(Administrative Classification only)
U = **U**NCLASSIFIED

7.3.11 Releasability

Releasability is information or instructions related to distributing or releasing data to other internal and/or external organization(s).

The Descriptor Value is text or a key indicating the releasability information or instructions.

8 CARTOGRAPHIC TEXT

The DIGEST exchange data models for vector data (Part 2 Clause 5) each provide a complete representation of the dataset to be transferred. However, in many applications it is also necessary to carry cartographic text for the purposes of annotation. This annotation will typically involve both text that is related to specific features in the dataset and "free floating" or isolated text that is not related to any feature.

It is important to note that text annotation is an aspect of symbolization that is independent of the particular DIGEST spatial data model used for a given dataset. Accordingly, the structure used to support cartographic text has been defined so that the logical consistency and completeness of the DIGEST spatial data model is maintained, irrespective of the presence or absence of cartographic text records in the dataset. In practical terms, this implies that the text records must contain elements pointing to records in the existing data model rather than the other way round.

In addition to the text string itself and the relation (if any) with a specific feature, it is also necessary to define the position and presentation attributes (e.g. text character cell size) for the text. The general part of the DIGEST standard (Part 2 Clause 11.1.9) allows for this. The implementation of text placement is handled differently for each encapsulation.

8.1 Usage of Cartographic Text

Cartographic text can be stored as either stand-alone (floating) text with no association to spatial features or it may carry an explicit link between the cartographic text feature and the spatial feature. For example, the Rocky Mountains typically are not collected as a spatial feature because they do not have a well-defined boundary. In this case, a floating text feature can be used to identify the presence of the Rocky Mountains. The method of text association might apply to something such as the Mississippi River, which is collected as spatial feature(s) but with an associated displayable text feature. In the first case, the name "Rocky Mountains" may be carried as an attribute of the Text Placement Record. There is no relationship to any actual feature entity. In the second case, the name "Mississippi River" may be carried either in the Text Placement Record or in the actual geographic feature entities that compose the river. A relationship is maintained between the Text Placement Record and the attributes of the geographic features. The manner by which this attribute is handled in each of the three encapsulations supporting vector data is described in the following sub-clauses.

Maintaining a relationship between the Text Placement Record and the associated geographic features can be very useful. An application could use such information to allow a query on a name to access the associated feature. For example, if one were to select the name of the city of "London" on an electronic map display generated from DIGEST in which the relationship between the text placement of the name and the associated feature was maintained, then it would be possible to access the related feature information and highlight the outline of the city.

Similarly, such relationships could be used to implement alternate names or names in different languages. The text placement record relationship to geographic features should not be used in lieu of the complex feature structure. With respect to the Mississippi River example given above, it is best to aggregate the parts of the river together using a complex feature and then to refer to the complex feature from the Text Placement Record.

8.1.1 Cartographic Text in DIGEST Annex A and B Encapsulations

The DIGEST A and B encapsulations implement Text Placement by establishing an explicit record called the Text Placement Record. This record supports two different types of attributes. The first type of attribute is an **Explicit-Attribute** that may optionally carry the string of text. The second type of attribute is an optional **Implicit-Relations-Pointer-Field** that allows a relation to a spatial feature (or type Point, Line, Area or Complex) to be described. Other explicit attributes carry the geometric information to describe the size and to position this string of text. This is described in more detail in Part 2 Clause A.3.6 and Clause B.9.5.

8.1.2 Cartographic Text in DIGEST Annex C Encapsulation (VRF)

In the VRF encapsulation Cartographic text is handled through the relationship between several tables. The Text Primitive Table (see Part 2 Clause C.2.3.2.4) defines the size and orientation of a string of text in terms of a set of coordinates specifying a shape line. The actual string of text characters may also be defined in the Text Primitive Table for use with floating text. The Text Feature Table (*.tft) (see Part 2 Clause C.2.3.3.1) usually contains additional attributes, such as font, color, and font size. Font type, color, and size may also be included in a related attribute table. Text not associated with a feature (floating text) is implemented easily using the text feature table and the text primitive. If text is associated with spatial features (point, line, area or complex), the link will be made using Text Join Tables (see Part 2 Clause C.2.3.3.2) derived from the spatial feature tables (e.g., roadl.tjt).

Section Two EXCHANGE STRUCTURE (Clauses 9, 10, and 11)

DIGEST allows the definition of sets of geographic information to be exchanged as a standard DIGEST database. The interchange unit is called a "DIGEST Information Package". A standard DIGEST database can be composed of one or more DIGEST Information Packages.

A DIGEST Information Package may contain different data types as described in the theoretical model and / or use different encapsulations as described in the Annexes A through D ("Transmittal" was used instead of "DIGEST Information Package" in former editions of DIGEST and can still be found in some places within encapsulation annexes). In all cases the logical structure remains the same.

The guiding philosophy has been to organize the required information for the DIGEST Information Package of any geo data into the following logical sets of data:

- the **DIGEST Information Package Metadata Subset** which describes the contents of the DIGEST Information Package (which may comprise one or several Geo Datasets [Libraries]) and identifies its parent standard DIGEST database.

- the **Geo Datasets [Libraries]** included within this DIGEST Information Package, each of them organized into the following logical sets of data:

    - the **Dataset [Library] Metadata Subset** which provides the supporting information specific to each included Geo dataset [Library]

    - the **Geo Data Subset** composed of one or more layers [coverages], defined as a collection of digital information representing physical and cultural characteristics of the Earth's surface; the collection of information shall be geographically contiguous except for raster insets which may not be contiguous to the primary source; these items of data must utilize the same geographic reference system and projection.

    - optionally, the **Supporting Data Subset** composed of one or more layers [coverages] such as Legend graphics, Colour patch and Location grids.

The DIGEST Information Package Metadata Subset occurs once for each DIGEST Information Package. A DIGEST Information Package contains one or more of the Datasets [Libraries] composing its parent standard DIGEST database. Each Geo Dataset [Library] consists of two and possibly three subsets of data: a Dataset [Library] Metadata Subset, a Geo Data Subset composed of one or more layers [coverages] and possibly a Supporting Data Subset composed of one or more layers [coverages].

Though the data in each layer [coverage] must be represented by the same data structure, the Geo Data Subset may be composed of layers [coverages] of different data structure types utilizing the same geographic reference system and projection. The Supporting Data Subset is composed of Raster or Matrix layers [coverage]. Each layer [coverage] consists of two subsets of data:

- the **Layer [Coverage] Metadata Subset** which provides the supporting information specific to each layer [coverage]; and
- the **Actual data** of each included layer [coverage].

The logical structure of a DIGEST Information Package is depicted in Figure 9-1.

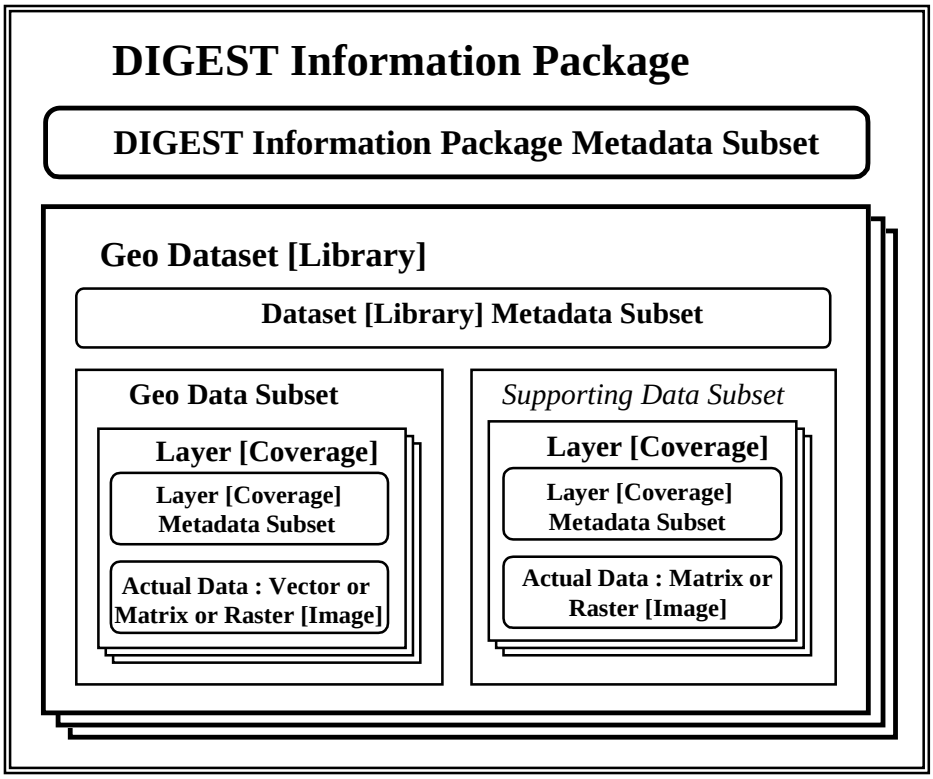


Figure 9-1 Logical Structure of a DIGEST Information Package

In Clauses 9, 10, and 11, the description of the included information consists of the description of logical sets. Each logical set is given a hierarchical rank in the description tree and is composed of simple data element(s) and / or other logical set(s). Simple data elements may not be sub-divided.

Logical sets of simple data element are documented as boxed lines consisting of:

- the hierarchical rank of the logical set within the description tree (1 to 9), preceded by (*) indicating that the logical set of simple data elements may repeat within its parent logical set of simple data elements;
- the DIGEST use code between brackets [] composed of the applicable DIGEST data type, followed by the DIGEST requirement code as defined below;
- the name of the logical set; and
- and a text description.

Simple data elements are documented as simple lines consisting of:

- the hierarchical rank of the simple data element within the description tree (1 to 9), preceded by (*) indicating that the simple data element may repeat within its parent logical set of simple data elements;
- the DIGEST use code between brackets [] composed of the applicable DIGEST data type, followed by the DIGEST requirement code as defined below;
- the name of the element; and
- the simple data element type, followed by a text description.

DIGEST data type codes:

C = Common to all data types
V = Applicable to Vector data type at all topological data levels
Vn = Applicable to Vector data type at topological data level n
R = Applicable to Raster data type
A = Applicable to mAtrix data type

DIGEST Requirement codes:

M= **Mandatory**
Mandatory logical sets will be present. Mandatory simple data elements will be present and will be filled with meaningful values. Their absence or inadequate completion would gravely reduce the uses of the dataset.

S= **Strongly recommended**
Strongly recommended logical sets should be present. Strongly recommended simple data elements should be present and should be filled with meaningful values because:

a. their absence or inadequate completion could reduce the possible uses of the dataset, or

b. their presence is required for administrative / security handling.

O= **Optional**
Optional logical sets are not required. Optional simple data elements are not required, but if present, will be filled with meaningful values or null values.

D= **Dependent**
The presence or absence of dependent logical sets or simple data elements will depend upon a specified value or values being present in one or more other specified simple data elements; or upon special characteristics of the dataset being transferred. The conditions for inclusion will be explicitly stated.

Simple data element types:

INTEGER	an integer number
REAL	a real number
DATE	a local calendar date
FULL DATE	a local calendar date and time
DATE, TYPE OF DATE	a calendar date together with a type of date code (See Part 4, Annex B for date codes: CDP)
BASIC TEXT	an arbitrary-length string of ASCII characters
GENERAL TEXT	an arbitrary-length string of characters including accents and special characters

The simple data element type is followed by (L) when it takes its value within a list of allowed values

For instance:

1[C,O]	Data Item A

denotes that the item is an optional logical set at rank 1 and is common to all DIGEST data types;

2[C,M]	Data Item B

denotes that the item is a mandatory logical set at rank 2 and is common to all DIGEST data type;

3[C,O]	Data Item C

denotes that the item an optional logical set at rank 3 and is common to all DIGEST data type;

4[C,M] Data Item D INTEGER

denotes that the item is a mandatory simple data element of INTEGER type at rank 4 and is common to all DIGEST data type.

Each encapsulation described in Annexes A through D may use a different physical implementation mechanism and order for encoding the information. A correspondence mapping between the logical structure and its encapsulation is provided for each annex within Clause 12.2.

9 DIGEST INFORMATION PACKAGE METADATA

The DIGEST information package metadata is contained in a specific set of information, which occurs only once for each DIGEST information package. The DIGEST information package metadata defines the contents of the DIGEST information package and identifies its parent database. A DIGEST information package may comprise one or several datasets, encoded on one or more media volumes.

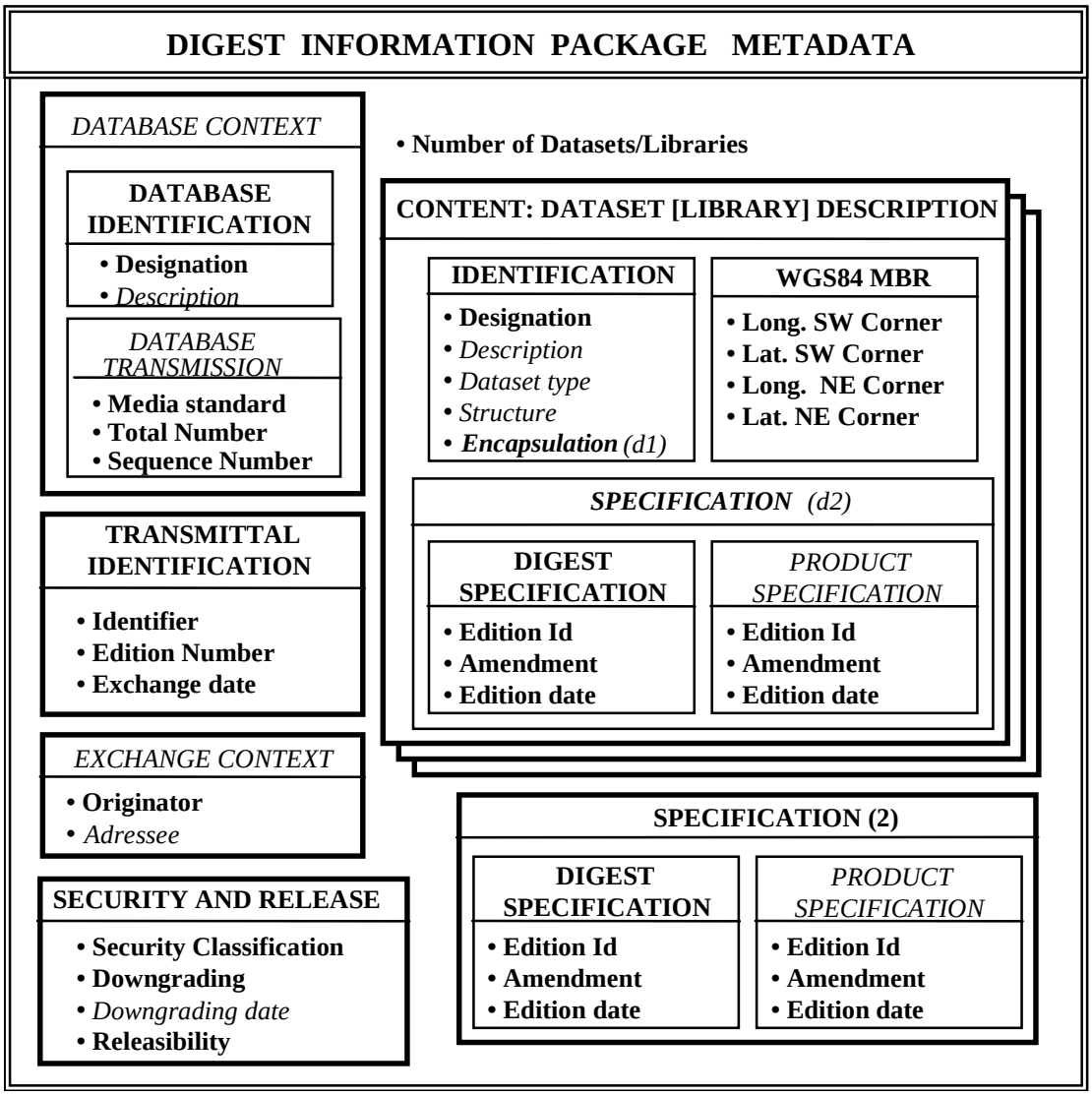


Figure 9-2 DIGEST Information Package Metadata Subset

The DIGEST information package metadata is intended to enable the following:

- production of the "Volume Transmittal Form" (see Part 3 Clause 9) with the minimum of error (clerical or otherwise);
- rapid determination of the security classification covering the media volumes part of the DIGEST information package; and
- rapid determination of the data type and coverage of any dataset in the DIGEST information package and its parent database, as well as its location in the sequence of datasets (i.e., an index to the datasets). Coverage is always given in this location in WGS84 longitude and latitude to enable easy reference.

For each DIGEST information package, there will be a single DIGEST Information Package Metadata Subset. That subset supplements rather than replaces the normal volume labels (Section Three). The logical entities of the DIGEST Information Package Metadata Subset are as follows:

- DIGEST INFORMATION PACKAGE METADATA
  - DATABASE CONTEXT
  - DIGEST INFORMATION PACKAGE IDENTIFICATION
  - EXCHANGE CONTEXT
  - NUMBER OF DATASETS/LIBRARIES
  - CONTENT for each dataset / library in the DIGEST information package:
    - IDENTIFICATION
    - WGS84 MBR
    - SPECIFICATION
  - SPECIFICATION
  - SECURITY AND RELEASE

1[C,M]	DIGEST INFORMATION PACKAGE METADATA	
2 [C,O]	DATABASE CONTEXT	
3[C,M]	DATABASE IDENTIFICATION	Identifies the database
4[C,M]	**designation**	BASIC TEXT Short unique designation of the database.
4[C,O]	**description**	GENERAL TEXT Full description of the database.

3[C,O]	DATABASE TRANSMISSION	Provides information about the DIGEST information packages composing the database.
4[C,M]	**media standard**	BASIC TEXT identifies the media standard used for the database.
4[C,M]	**total number of DIGEST information packages**	INTEGER identifies the total number of DIGEST information packages composing the database.
4[C,M]	**sequence number**	identifies the sequence number of this DIGEST information package within the database.
2[C,M]	DIGEST INFORMATION PACKAGE IDENTIFICATION	Identifies the DIGEST information package.
3[C,M]	**identifier**	BASIC TEXT Unique ID for this DIGEST information package.
3[C,M]	**edition number**	BASIC TEXT Edition Number for this DIGEST information package.
3[C,M]	**exchange date**	DATE Creation date of this DIGEST information package.
2[C,O]	EXCHANGE CONTEXT	Identifies the originator and addressee of the DIGEST information package.
3[C,M]	**originator**	GENERAL TEXT Free text for title and address of originator. (A back slash "\" is used as a line separator.)
3[C,O]	**addressee**	GENERAL TEXT Free Text for title and address of addressee. (A back slash "\" is used as a line separator.) The use of the addressee field is intended for cases when there is a single addressee. For multiple addressees or data products the addressee field should not be used.
2[C,M]	**number of Datasets/Libraries**	INTEGER Number of Datasets [Libraries] within this database.

*2[C,M]	CONTENT: DATASET [LIBRARY] DESCRIPTION	Provides the description of a Dataset [Library]. Occurs once for each Dataset [Library] in the database.

3[C,M]	IDENTIFICATION	Provides an identification of the Dataset [Library]

4[C,M]	**designation**	BASIC TEXT Short unique designation of this Dataset [Library].
4[C,O]	**description**	GENERAL TEXT Full description of this Dataset [Library].
4[C,O]	**dataset type**	BASIC TEXT Series Designator or Product type and level.
4[C,O]	**structure**	INTEGER (L) Code of Data Structure used primarily for this Dataset [Library] 1 = Matrix (values) 2 = Matrix (Coded) 3 = Raster (RGB) 4 = Raster (Colour Coded) 5 = Vector (Level 0 Topology - Spaghetti) 6 = Vector (Level 1 Topology - Chain-node) 7 = Vector (Level 2 Topology - Planar Graph) 8 = Vector (Level 3 Topology - Full Topology) 9 = Mixed data Structures.
4[C,D]	**encapsulation**	BASIC TEXT (L) Code identifying the encapsulation primarily used for the transmission of this Dataset [Library] A = ISO 8211 (Annex A) B = ISO 8824 (Annex B) C = VRF (Annex C) D = IIF(Annex D) X = Mixed encapsulations Must be present when the encapsulation is not homogeneous within the DIGEST information package (d1).

3[C,M]	WGS84 MBR	Provides the approximate location of the Dataset [Library] using the WGS84 reference system. It will mainly be used to compare the location of different datasets. This set contains latitude and longitude according to WGS84 datum. There is no accuracy requirement on the four values.

4 [C,M]	**Longitude of SW Corner**	REAL Westernmost Longitude of Minimum Bounding Rectangle of this Dataset [Library].
4 [C,M]	**Latitude of SW Corner**	REAL Southernmost Latitude of Minimum Bounding Rectangle of this Dataset [Library].
4 [C,M]	**Longitude of NE Corner**	REAL Easternmost Longitude of Minimum Bounding Rectangle of this Dataset [Library].
4 [C,M]	**Latitude of NE Corner**	REAL Northernmost Latitude of Minimum Bounding Rectangle of this Dataset [Library].

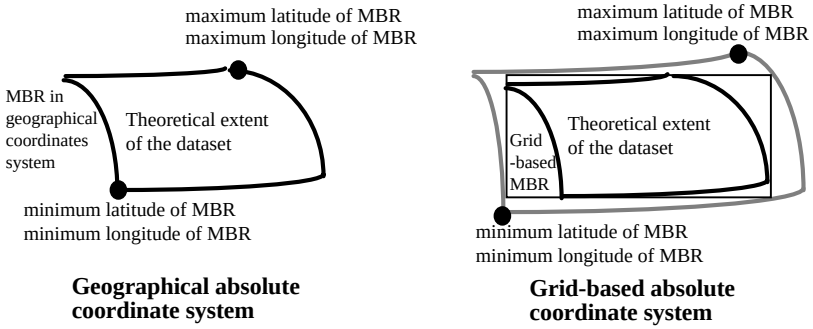


Figure 9-3 Approximate Location of a Dataset [Library]

3[C,D]	SPECIFICATION	Identifies the Format and Product specifications according to which the Dataset [Library] has been produced. This set of information is omitted when all the Datasets [Libraries] composing the DIGEST information package are produced using the same specification. It must be present otherwise. (d2)

4[C,M]	DIGEST SPECIFICATION	Identifies the edition of DIGEST used for producing the Dataset [Library]
5[C,M]	**edition id**	BASIC TEXT Identifier of DIGEST edition number used for this Dataset (e.g., the identification of this edition would be DIGEST 2.0).
5[C,M]	**amendment**	BASIC TEXT DIGEST amendment number (e.g., the number of this amendment will be 0).
5[C,M]	**edition date**	DATE Publication date of that edition of DIGEST (e.g. the date of this edition would be 19961231).

4[C,O]	PRODUCT SPECIFICATION	Identifies the product specification used for producing the Dataset [Library] if any.
5[C,M]	**edition id**	BASIC TEXT Identifier of the product specification (with edition number) used for this dataset (e.g. ASRP 1.2).
5[C,M]	**amendment**	BASIC TEXT The product specification amendment number (e.g. 6).
5[C,M]	**edition date**	DATE Publication date of the product specification (e.g., 19921031).

2[C,D]	SPECIFICATION	Identifies the Format and Product specifications according to which the whole DIGEST information package has been produced. This set of information is omitted when the specification used for producing each Datasets [Libraries] composing the DIGEST information package is present. It must be present otherwise. (d2)

3[C,M]	DIGEST SPECIFICATION	Identifies the edition of DIGEST used for producing the whole DIGEST information package
4[C,M]	**edition id**	BASIC TEXT Identifier of DIGEST edition number used for this Dataset (e.g., the identification of this edition would be DIGEST 2.0).
4[C,M]	**amendment**	BASIC TEXT DIGEST amendment number (e.g. the number of this amendment will be 0).
4[C,M]	**edition date**	DATE Publication date of that edition of DIGEST (e.g., the date of this edition would be 19961231).

3[C,O]	PRODUCT SPECIFICATION	Identifies the product specification used for producing the whole DIGEST information package
4[C,M]	**edition id**	BASIC TEXT Identifier of product specification used for this Dataset (e.g. VMap LV1 MILSPEC MIL-V-89033).
4[C,M]	**amendment**	BASIC TEXT Amendment number of product specification used for this Dataset (e.g. 0).
4[C,M]	**edition date**	DATE Publication date of product specification used for this Dataset (e.g., 19950601).

2[C,M]	SECURITY AND RELEASE	Identifies the security and release restriction for the complete DIGEST information package
3[C,M]	**Security Classification**	BASIC TEXT (L) Security classification of DIGEST information package. (Never lesser than the highest security classification of any dataset comprising the DIGEST information package.) T = TOP SECRET S = SECRET C = CONFIDENTIAL R = RESTRICTED (or alternatively "FOR OFFICIAL USE ONLY" (Administrative classification only)) U = UNCLASSIFIED.
3[C,M]	**Downgrading**	BASIC TEXT (L) Originator's permission for downgrading required. (Yes or No)
3[C,O]	**Downgrading date**	DATE Date of downgrading. (Blank if answer to previous entity is YES or if security classification is equal to "U")
3[C,M]	**Releasability**	BASIC TEXT Releasability restrictions for this DIGEST information package. If no release restriction exists, "UNRESTRICTED" shall be entered in this entity.

10 DATASET [LIBRARY] AND LAYER [COVERAGE] METADATA SUBSETS

Supporting information relating to the Geo Data Subset is contained in Dataset [Library] Metadata Subset. Such items as projection, quality, control parameters and datums are included in this subset providing the information necessary to interpret all the Geo Data Layers(s) [Coverage(s)] composing the Geo Data Subset. Supporting information specific to each Layer [Coverage] is included in the Layer [Coverage] metadata subset within each Layer [Coverage].

10.1 Dataset [Library] Metadata Subset

The Dataset [Library] Metadata Subset is composed of different logical sets, which are utilized depending on the nature of the transmitted Dataset [Library]. As a general rule, the Dataset [Library] Metadata Subset is composed of the following logical sets:

- GENERAL INFORMATION

  The GENERAL INFORMATION identifies the Dataset [Library] and its content as a list of Layers [Coverages]. Each Dataset [Library] Metadata Subset contains a single GENERAL INFORMATION.

- GEO REFERENCE DESCRIPTION

  The GEO REFERENCE DESCRIPTION applies to the whole Geo Data Subset and contains parametric information used to transform and / or integrate the data into existing data bases by evaluation of the given geodetic parameters. Each Dataset [Library] Metadata Subset contains a single GEO REFERENCE DESCRIPTION.

- SOURCE DESCRIPTION(S)

  The SOURCE DESCRIPTION(S) provide information about documents, images, or data used as sources for the Layer(s) [Coverage(s)]. Each Dataset [Library] Metadata Subset may contain many SOURCE DESCRIPTIONS, corresponding to multiple sources.

- QUALITY DESCRIPTION

  The QUALITY DESCRIPTION gives information about the Dataset [Library] quality in conformance with recommendations made in clause 7. Each Dataset [Library] Metadata Subset contains a single QUALITY DESCRIPTION.

Figure 10-1 is a graphic representation of the logical structure of the Dataset [Library] Metadata Subset

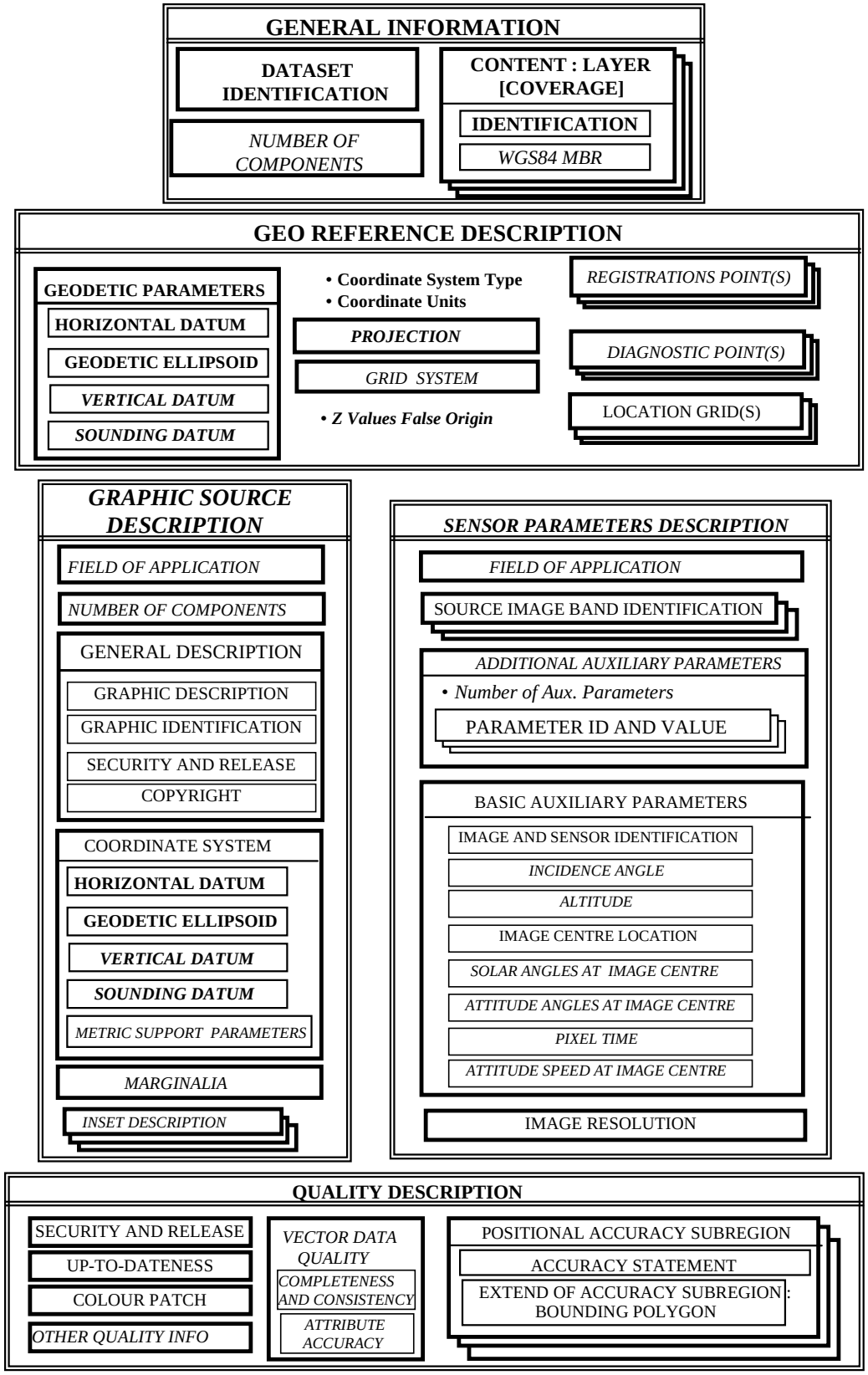


Figure 10-1 Dataset [Library] Metadata

10.1.1 General Information

The possible logical sets composing the General Information are as follows:

- GENERAL INFORMATION
  - DATASET IDENTIFICATION
  - CONTENT with for each layer [coverage] in the dataset [library]:
    - IDENTIFICATION
    - WGS84 MBR
  - NUMBER OF COMPONENTS

Figure 10-2 contains a graphic representation of the logical structure of the GENERAL INFORMATION.

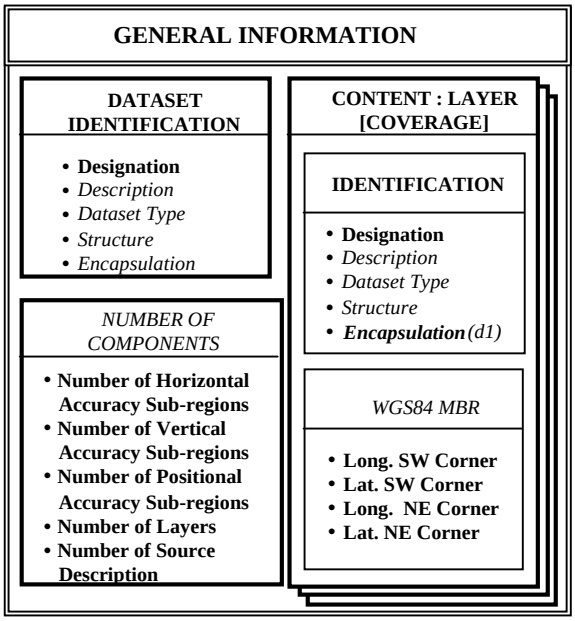


Figure 10-2 General Information

1[C,M]	**GENERAL INFORMATION**	
2[C,M]	DATASET IDENTIFICATION	Provides an identification of the Dataset [Library]. Simple data elements contained in this logical set may be redundant and should then be consistent, i.e. exactly the same, with the identification of the Dataset [Library] contained in the DIGEST Information Package Metadata Subset.
3[C,M]	**designation**	BASIC TEXT Short unique designation of this Dataset [Library]
3[C,O]	**description**	GENERAL TEXT Full description of this Dataset [Library].
3[C,O]	**dataset type**	BASIC TEXT Series Designator or Product type and level
3[C,O]	**structure**	INTEGER (L) Code of Data Structure used primarily for this Dataset [Library] 0 = Monochrome Raster 1 = Matrix (Values) 2 = Matrix (Coded) 3 = Multiband Raster (RGB or YCbCr or other multiband imagery) 4 = Colour Coded Raster 5 = Vector (Level 0 Topology – Spaghetti) 6 = Vector (Level 1 Topology – Chain-node) 7 = Vector (Level 2 Topology – Planar Graph) 8 = Vector (Level 3 Topology – Full Topology) 9 = Mixed data Structures
3[C,O]	**encapsulation**	BASIC TEXT (L) Code identifying the encapsulation primarily used for the encoding of this Dataset [Library] A = ISO 8211 (Annex A) B = ISO 8824 (Annex B) C = VRF (Annex C) D = IIF (Annex D) X = Mixed encapsulations

*2[C,M]	CONTENT LAYER [COVERAGE]	Provides the description of a Layer [Coverage]. Occurs once for each Layer [Coverage] of the Dataset [Library].

3[C,M]	IDENTIFICATION	Provides an identification of the Layer [Coverage]

4[C,M]	**designation**	BASIC TEXT Short unique designation of this Layer [Coverage]
4[C,O]	**description**	GENERAL TEXT Full description of this Layer [Coverage]
4[C,M]	**structure**	INTEGER (L) Code of Data Structure used for this Layer [Coverage] 0 = Monochrome Raster 1 = Matrix (Values) 2 = Matrix (Coded) 3 = Multiband Raster (RGB or YCbCr or other multiband imagery) 4 = Colour Coded Raster 5 = Vector (Level 0 Topology – Spaghetti) 6 = Vector (Level 1 Topology – Chain-node) 7 = Vector (Level 2 Topology – Planar Graph) 8 = Vector (Level 3 Topology – Full Topology)
4[C,D]	**encapsulation**	BASIC TEXT(L) Code identifying the encapsulation used for the encoding of this Layer [Coverage] A = ISO 8211 (Annex A) B = ISO 8824 (Annex B) C = VRF (Annex C) D = IIF (Annex D) Must be present when the encapsulation is not homogeneous within the Dataset [Library] (d1).

3[C,O]	WGS84 MBR	Provides the approximate location of the Layer [Coverage] using the WGS84 reference system.
4[C,M]	**Longitude of SW Corner**	REAL Westernmost Longitude of Minimum Bounding Rectangle of this Layer [Coverage].
4[C,M]	**Latitude of SW Corner**	REAL Southernmost Latitude of Minimum Bounding Rectangle of this Layer [Coverage].
4[C,M]	**Longitude of NE Corner**	REAL Easternmost Longitude of Minimum Bounding Rectangle of this Layer [Coverage].
4[C,M]	**Latitude of NE Corner**	REAL Northernmost Latitude of Minimum Bounding Rectangle of this Layer [Coverage].
2[C,O]	NUMBER OF COMPONENTS	Provides information about the number of sub-regions of accuracy, Layers [Coverages] and source descriptions.
3[C,M]	**Number of Horizontal Accuracy Sub-regions**	INTEGER Identifies the number of Horizontal Accuracy Sub-regions appearing in the dataset.
3[C,M]	**Number of Vertical Accuracy Sub-regions**	INTEGER Identifies the number of Vertical Accuracy Sub-regions appearing in the dataset.
3[C,M]	**Number of Positional Accuracy Sub-regions**	INTEGER Identifies the number of Positional Accuracy Sub-regions appearing in the dataset.
3[C,M]	**Number of Layers**	INTEGER Identifies the number of Layers appearing in the dataset.
3[C,M]	**Number of Source Descriptions**	INTEGER Identifies the number of Source Descriptions appearing in the dataset.

10.1.2 Geo Reference Description

DIGEST is designed to enable the exchange of geographic information. Most of the information contained in a DIGEST information package is located on, above or below the earth surface. Its location is transmitted using one or more coordinate sets. In order to have a consistent description of the space, there must be a one-to-one mapping between a coordinate set and the location it represents. This mapping is called coordinate system.

All the information contained in a DIGEST Dataset [Library], whatever number of Layers [Coverages] it contains, is located using the same coordinate system. This coordinate system is described in the GEO REFERENCE DESCRIPTION which must be used by the receiver's application for parametering its application.

There are three types of coordinate systems allowed in DIGEST which are described below in terms of their horizontal components:

- GEOGRAPHIC COORDINATE SYSTEM (GEO):

  When using a geographic coordinate system, a coordinate set will contain the longitude and latitude of a location. A geographic coordinate system is based on a geodetic datum, which includes a geodetic ellipsoid and the zero meridian. In DIGEST the zero meridian will be defaulted to GREENWICH. The other parameters are described in the GEODETIC PARAMETERS logical set.

  Longitude and Latitude are expressed as either (+/-) decimal seconds of arc [SEC] or (+/-) decimal degrees of arc [DEG] where for longitude, "+" represents the eastern hemisphere (and "-" for western) and for latitude, "+" represents northern hemisphere (and "-" for southern).

- CARTOGRAPHIC COORDINATE SYSTEM (MAP)

  When using a cartographic (grid) coordinate system, a coordinate set will contain the easting and northing of a location in the projection plane. The projection defines a one-to-one mapping between the geodetic ellipsoid and the projection plane. A cartographic (grid) coordinate system is based on a projection (with values for its associated parameters) applied to a geodetic datum. The projection parameters are described in the PROJECTION logical set. The cartographic coordinate system may not be described using only the the PROJECTION logical set. The geodetic datum to which the projection is applied must be described in the GEO PARAMETERS logical set.

  Easting and Northing are expressed as (+/-) metres [M], where Easting and Northing signs are dependent on the cartographic (grid) system used.

- RELATIVE COORDINATE SYSTEM (DIG)

  DIGEST allows the use of a relative coordinate system (usually linked to the result of using a digitizing tool, or raw collection from a sensor). A coordinate set will not represent a real location unless the relative coordinate system is registered to an absolute coordinate system.

In this case, the GEODETIC PARAMETERS and, if necessary, PROJECTION logical sets describe the absolute coordinate system to which the relative coordinate system is registered. The units used will indicate whether the absolute coordinate system is a cartographic coordinate system (M) or a geographic one (DEG or SEC). The absolute coordinate system will be described using the GEODETIC PARAMETERS logical set if it is a geographic coordinate system, or both the GEODETIC PARAMETERS and PROJECTION logical sets if it is a cartographic coordinate system.

The registration between the relative and the absolute coordinate system will be defined either by the description of registration points (generally three or more) in the REGISTRATION POINT(S) logical set, or by the description of location grid(s) in the LOCATION GRID(S) logical set.

For vector or matrix data, DIGEST allows the transmission of an elevation (or depth) value attached to horizontal coordinates, hence the coordinate triplets (E, N, Z) or (Lon, Lat, Z). If at least one elevation and/or depth value is transmitted in the dataset, the vertical and/or sounding datum will be described in the GEODETIC PARAMETERS logical set. For raster data, the GEODETIC PARAMETERS logical set will not be used to define the vertical or sounding datum for elevation or depth information which may eventually be found on source maps, this information being found within the source map description. When using a cartographic coordinate system and transmitting the elevation (or depth) value, a Z false origin may be defined. When using a relative coordinate system for vector data, the registration points must have an elevation or depth value in both absolute and relative systems. Depth and elevation are expressed as (+/-) metres [M].

The possible logical sets and simple data elements composing the GEO REFERENCE DESCRIPTION are as follows:

- GEO REFERENCE DESCRIPTION
  - COORDINATE SYSTEM TYPE
  - COORDINATE UNITS
  - GEODETIC PARAMETERS
    - HORIZONTAL DATUM
    - GEODETIC ELLIPSOID
    - VERTICAL DATUM
    - SOUNDING DATUM
  - PROJECTION
  - GRID SYSTEM
  - Z VALUES FALSE ORIGIN
  - REGISTRATION POINT(S)
  - DIAGNOSTIC POINT(S)
  - LOCATION GRID(S)

Figure 10-3 contains a graphic representation of the logical structure of GEO REFERENCE DESCRIPTION.

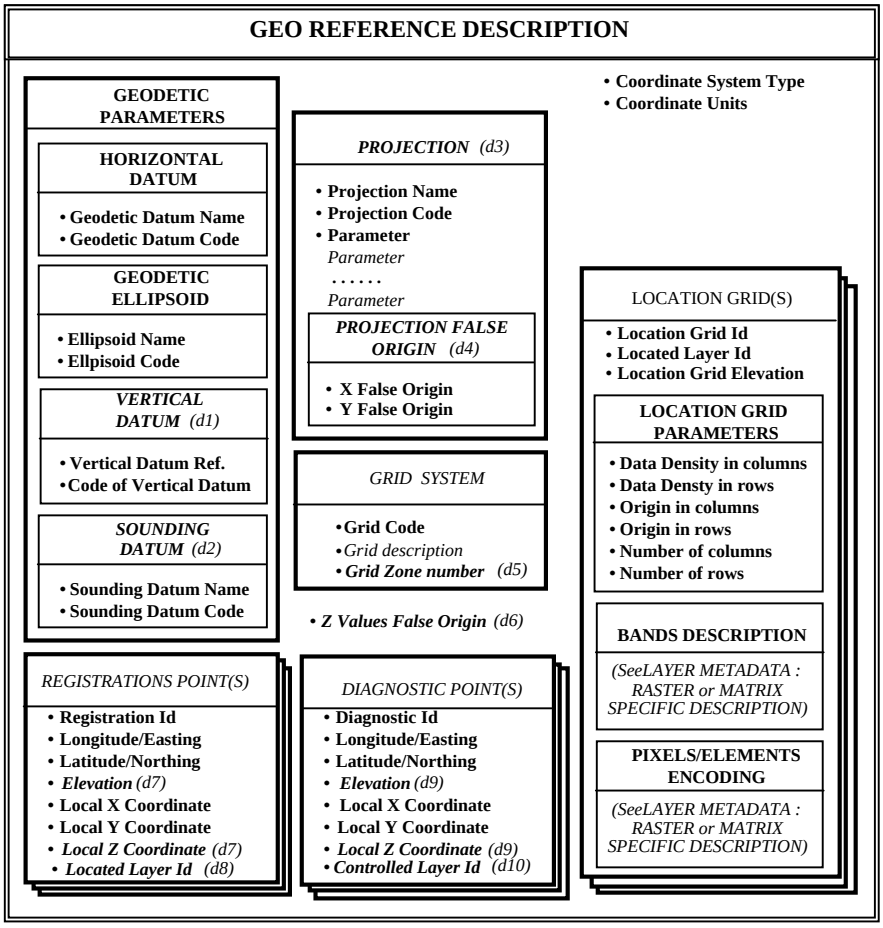


Figure 10-3 Geo Reference Description

1[C,M]	**GEO REFERENCE DESCRIPTION**	
2[C,M]	**Coordinate System Type**	BASIC TEXT (L) Type of coordinate system used within the Dataset [Library]. (Geographic (GEO), Table or Relative (DIG), Grid (MAP))
2[C,M]	**Coordinate Units**	BASIC TEXT (L) Units of measure used for coordinates in this Dataset. Must be consistent with the Coordinate System Type. (Decimal seconds of arc(SEC), Decimal degrees (DEG), Metres (M))
2[C,M]	GEODETIC PARAMETERS	This logical set defines the geodetic system used for defining the absolute coordinate system for the Dataset [Library].
3[C,M]	HORIZONTAL DATUM	
4[C,M]	**Geodetic Datum Name**	BASIC TEXT (L) Name of Geodetic Datum. (see Part 3- 6, Table 6.2)
4[C,M]	**Geodetic Datum Code**	BASIC TEXT (L) Code of Geodetic Datum. (see Part 3 Clause 6, Table 6.2)
3[C,M]	GEODETIC ELLIPSOID	
4[C,M]	**Ellipsoid Name**	BASIC TEXT (L) Name of ellipsoid to which the Dataset refers. (see Part 3 Clause 6 Table 6.1)
4[C,M]	**Ellipsoid Code**	BASIC TEXT (L) Code of ellipsoid to which the Dataset refers. (See Part 3 Clause 6 Table 6.1)

3[V/A,D]	VERTICAL DATUM	Must be present if elevation values appear in data (d1).
4[V/A,M]	**Vertical Datum Reference**	BASIC TEXT (L) Name of vertical datum reference used for the Dataset. (see Part 3 Clause 6 Table 6.3)
4[V/A,M]	**Code (Category) of Vertical Reference**	BASIC TEXT (L) Code (Category) of vertical datum reference. (see Part 3 Clause 6, Table 6.3)
3[V/A,D]	SOUNDING DATUM	Must be present if soundings appear in data (d2).
4[V/A,M]	**Sounding Datum Name**	BASIC TEXT (L) Name of sounding datum. (see Part 3- 6 Table 6.4)
4[V/A,M]	**Sounding Datum Code**	BASIC TEXT (L) Category of vertical datum reference used for soundings. (see Part 3 Clause 6 Table 6.4)
2[C,D]	PROJECTION	This logical set describes the projection used for defining the absolute coordinate system of the Dataset [Library]. Mandatory when the coordinate system is of MAP type or when the coordinate system is DIG and the absolute coordinate system units are metres (d3).
3[C,M]	**Projection Name**	BASIC TEXT Name of the projection used in the Dataset.
3[C,M]	**Projection Code**	BASIC TEXT (L) Code of the projection. (see Part 3 Clause 6, Table 6.5)
3[C,M]	PROJECTION PARAMETER(S)	Provides the appropriate parameters to accurately describe the projection. Occurs as many times as necessary depending on the Projection Code value (see Part 3 Clause 6, Table 6.5)
*4[C,M]	**Parameter**	REAL Projection Parameter.

3[C,D]	PROJECTION FALSE ORIGIN	Mandatory in the usual case where the Projection uses a false origin (d4).
4[C,M]	**X false origin**	REAL X (easting) false origin of projection.
4[C,M]	**Y false origin**	REAL Y (northing) false origin of projection.

2[C,O]	GRID SYSTEM	This logical set describes the grid system used for defining the absolute coordinate system of the Dataset [Library].
3[C,M]	**Grid code**	BASIC TEXT(L) Unique Code identifying the grid system (see Part 3 Clause 6, Table 6.6).
3[C,O]	**Grid description**	BASIC TEXT Description of the grid.
3[C,D]	**Grid Zone Number**	INTEGER Grid Zone number. Mandatory when the grid system comprise more than one zone (see Part 3 Clause 6 Table 6.6) (d5).
2[C,D]	**Z Values False Origin**	REAL Elevation and depth false origin for Z values. Mandatory if a Z false origin is used within the Dataset [Library] (d6).

*2[C,O]	REGISTRATION POINT(S)	Provides the description of a registration point. Occurs once for each registration point.

Each registration point is described by two coordinate sets: one describes the position of the point using the absolute coordinate system (as described in the GEODETIC PARAMETERS logical set and possibly the PROJECTION logical set), the other describes the position of the same point in the relative coordinate system (as used in the dataset). The positional accuracy will be affected by the mathematical function used to convert coordinates from the relative coordinate system to the absolute one.

3[C,M]	**Registration Point ID**	BASIC TEXT Registration Point ID.
3[C,M]	**Longitude/Easting**	REAL Longitude/Easting of Registration Point.
3[C,M]	**Latitude/Northing**	REAL Latitude/Northing of Registration Point.
3[C,D]	**Elevation**	REAL Elevation or depth of Registration Point. Mandatory if the elevation is transmitted within the Dataset [Library] (d7).
3[C,M]	**Local X coordinate**	REAL X coordinate of Registration Point in the coordinate system used in Geo Data file (column number for raster and matrix).
3[C,M]	**Local Y coordinate**	REAL Y coordinate of Registration Point in the coordinate system used in Geo Data file (row number for raster and matrix).
3[C,D]	**Local Z coordinate**	REAL Z coordinate of Registration Point in the coordinate system used in Geo Data file. Mandatory for vector data if the elevation is transmitted within the Dataset [Library] (d7).
3[C,D]	**Located Layer ID**	BASIC TEXT Identification of the Layer [Coverage] which is located by the Registration Point. Mandatory if the Registration Point does not apply to the whole Dataset [Library] (d8).

*2[C,O]	DIAGNOSTIC POINT(S)	Provides the description of a diagnostic point. Occurs once for each diagnostic point.

Each diagnostic point is described by two coordinate sets: one describes the reference position of the point using the absolute coordinate system (as described in the GEODETIC PARAMETERS logical set and possibly the PROJECTION logical set), the other describes the position of the same point in the dataset coordinate system.

3[C,M]	**Diagnostic Point ID**	BASIC TEXT Diagnostic Point ID.
3[C,M]	**Longitude/Easting**	REAL Longitude/Easting of Diagnostic Point.
3[C,M]	**Latitude/Northing**	REAL Latitude/Northing of Diagnostic Point.
3[C,D]	**Elevation**	REAL Elevation and depth false origin for Z values. Mandatory if the elevation is transmitted within the Dataset [Library] (d9).
3[C,M]	**Local X coordinate**	REAL X coordinate of Diagnostic Point in the coordinate system used in Geo Data file (column number for raster and matrix).
3[C,M]	**Local Y coordinate**	REAL Y coordinate of Diagnostic Point in the coordinate system used in Geo Data file (row number for raster and matrix).
3[C,D]	**Local Z coordinate**	REAL Z coordinate of Diagnostic Point in the coordinate system used in Geo Data file. Mandatory if the elevation is transmitted within the Dataset [Library] (d9).
3[C,D]	**Controlled Layer ID**	BASIC TEXT Identification of the Layer [Coverage] which is controlled by the Diagnostic Point. Mandatory if the Diagnostic Point does not apply to the whole Dataset [Library] (d10).

*2[R/A,O]	LOCATION GRID(S)	Provides the description of a Location grid. Occurs once for each Location grid used to register the raster / image to the absolute coordinate system.

Each location grid consists of a grid of spatial location information superimposed on top of the raster / image or matrix Layer [coverage] for which the spatial information applies. The grid consists of two bands of values identified as "CGX", "CGY" for the cartographic X (Easting) and Y (Northing) bands, or "GGX", "GGY" for the geographic X (longitude) and Y (latitude) bands.

For example, the grid could have location information (coordinates) at every 10th pixel (N-S) and (E-W). Then for every pixel, one could interpolate, using surrounding grid pixels, to estimate its actual geospatial location. This scheme eliminates the need to re-sample the Layer [coverage] to place it in a rectified form. This is important if Layer [coverage] was a map scanned at a relatively low resolution (e.g., 100 dots per inch) and the re-sampling process would tend to make the resultant raster map too blurred to read. This process also allows a very non-linear stretch within the Layer [coverage] space to be georeferenced with reasonable accuracy, for example, aircraft reconnaissance using low-scan angles. Another advantage of the use of location grids is the simplification of the application software. By using the same location grid scheme for various types of imagery, the application software can use the same logic and does not require a library of algorithms for various projection and sensor parameter solutions.

Let (lso, pso) be the origin of the location grid in columns and rows within the image, (lod, lad) the interval (measured in image pixels) between 2 consecutive elements of grid (in columns, rows), also being the ratio of image pixels to grid pixels, by column and row. Let (r,c) be the row and column numbers, of a pixel of interest, within the image. The location of the pixel (r,c) can be interpolated from the four grid points that surround it. Let (lgr, lgc) be the row and column numbers (in grid numbers) of the upper left corner of the grid square that surrounds the image pixel of interest.

These values can be computed as follows:

lgr = [(r-pso)/lad] where in each case [x] means integer part of x.
lgc = [(c-lso)/lod]

Let the four corners of the grid square be numbered 1, 2, 3, 4, as shown on Figure 10-4. The upper left corner (corner number 1) column and row indexes are (R_1, C_1) = (lgr, lgc). The column and row numbers (R_i, C_i) (i = 2, 3, 4) of the other corners are:

(R_2, C_2) = (lgr, lgc+1), (R_3, C_3) = (lgr+1, lgc), (R_4, C_4) = (lgr+1, lgc+1).

For the example in Figure 10-4 the solutions are:

(R_1, C_1) = (0,1) (R_2, C_2) = (0,2) (R_3, C_3) = (1,1) (R_4, C_4) = (1,2)

The image pixel coordinates of the 4 grid corners (r_i, c_i), (i = 1,2,3,4) can be computed as:

(r_i, c_i) = (pso + R_i*lad, lso + C_i*lod).

For the example the solutions are:

(r_1, c_1) = (3,5) (r_2, c_2) = (3,8) (r_3, c_3) = (7,5) (r_4, c_4) = (7,8)

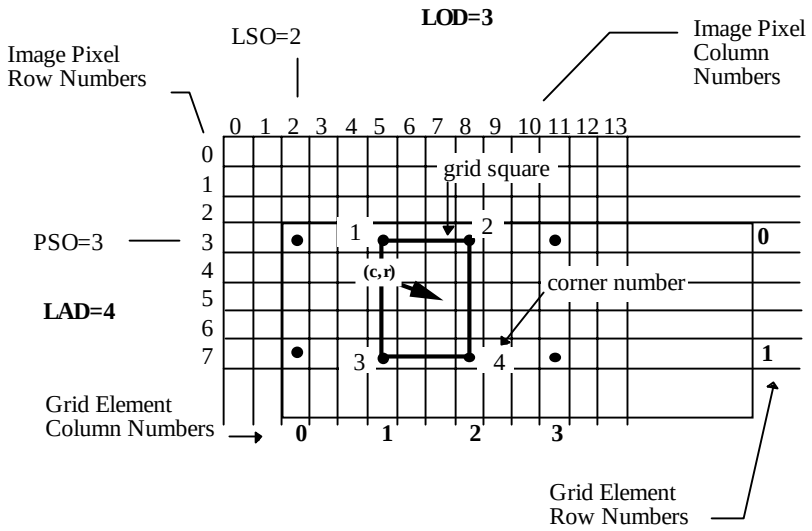


Figure 10-4 Example of a Location Grid

In this example, the pixel of interest is (r, c) = (5,7).

The location information provided by grid data at each of the four corners (X_i, Y_i), (i = 1,2,3,4) is given by:

$(X_i, Y_i) = (\text{BandX}(R_i, C_i), \text{BandY}(R_i, C_i))$.

The interpolation algorithm is a bilinear interpolation between the 4 corners of the grid square. The column and row deltas (alpha) and (beta), for c and r, are computed as follows:

alpha = $(c - c_1)/lod = (c - (lso + C_1*lod))/lod$

beta = $(r - r_1)/lad = (r - (pso + R_1*lad))/lad$

and alpha and beta lie between 0 and 1.

The location (X,Y) of the pixel (r,c) is then given by :

$X = (1-alpha)*(1-beta)*X_1 + alpha*(1-beta)*X_2 + (1-alpha)*beta*X_3 + alpha*beta*X_4$

$Y = (1-alpha)*(1-beta)*Y_1 + alpha*(1-beta)*Y_2 + (1-alpha)*beta*Y_3 + alpha*beta*Y_4$

For the example, the values of (alpha) and (beta) are;

alpha = $(c - c_1)/lod = (7 - 5)/3 = 2/3$

beta = $(r - r_1)/lad = (5 - 3)/4 = 1/2$

giving the interpolation algorithm the following weighted sum:

$X = X_1/6 + X_2/3 + X_3/6 + X_4/3$

$Y = Y_1/6 + Y_2/3 + Y_3/6 + Y_4/3$

Note that the sum of the weights (1/6 + 1/3 + 1/6 + 1/3) is equal to 1 and that must always be true.

Applying to imagery, a location grid is computed at a given elevation, and is valid for that elevation. In most cases, the location given by a grid varies smoothly with this elevation. If the surface covered by the image is flat, its associated grid should be computed at the average ground elevation in this area.

In case of significant elevation variations over the spot covered by the grid, the image is associated with two grids, one at minimum elevation Zmin, and the other at maximum elevation Zmax**.** A more accurate location of the pixel of interest can be computed by a linear interpolation between the locations computed with the two grids taking into account the elevation derived from additional data (such as digital terrain model or maps).

The interpolation process is then the following :

- compute the location with the two grids : (Xmin , Ymin) at Zmin , (Xmax , Ymax) at Zmax **.**
- derive the elevation **Z** of the pixel (whose location can be estimated as ((Xmin +Xmax)/2, (Ymin +Ymax)/2) from additional source (e.g Digital Terrain Model, map ...).
- compute : $\mu = (Z - Zmin)/(Zmax - Zmin)$ (note that $0 <= \mu <= 1$).
- compute the final location (X, Y) by linear interpolation :
  $(X, Y) = ((1-\mu)*Xmin + \mu*Xmax , (1-\mu)*Ymin + \mu*Ymax)$

This solution is robust only when the elevation varies smoothly (i.e., the elevation gradient is continuous).

3[R/A,M]	**Location Grid ID**	BASIC TEXT Identification of the Layer [Coverage] which describes the Location Grid.
3[R/A,M]	**Located Layer ID**	BASIC TEXT Identification of the Layer [Coverage] which is located by the Location Grid.
3[R/A,O]	**Location Grid Elevation**	INTEGER Elevation to which the Location Grid has been computed.

3[R/A,M]	Location Grid Prameters	Provides the necessary parameters to register the Location Grid to the Matrix/Raster Layer [Coverage].

4 [R/A,M]	**Data density in columns**	INTEGER (lod) Interval (measured in image pixels) between two consecutive elements of the grid (in columns), also being the ratio of image pixels to grid pixels.
4 [R/A,M]	**Data density in rows**	INTEGER (lad) Interval (measured in image pixels) between two consecutive elements of the grid (in rows), also being the ratio of image pixels to grid pixels.
4 [R/A,M]	**Origin in columns**	INTEGER (lso) Column Number of the Origin of the Location Grid.
4 [R/A,M]	**Origin in rows**	INTEGER (pso) Row Number of the Origin of the Location Grid.
4 [R/A,M]	**Number of columns**	INTEGER Number of columns in the Location Grid.
4 [R/A,M]	**Number of rows**	INTEGER Number of rows in the Location Grid.

3[R/A,M]	BANDS DESCRIPTION	Provides the description of the bands constituting the raster or matrix layers Location Grid contains exactly two bands: CGX, CGY for the cartographic X (Easting) and Y (Northing) bands, or GGX, GGY for the geographic X (longitude) and Y (latitude) bands.

(See LAYER METADATA: RASTER-OR-MATRIX-SPECIFIC DESCRIPTION)

3[R/A,M]	PIXELS/ELEMENTS ENCODING	Provides the description of the ordering, tiling system and encoding compression mechanism used when encoding the actual set of elements of the Location Grid.

(See LAYER METADATA: RASTER-OR-MATRIX-SPECIFIC DESCRIPTION)

10.1.3 Source Description

The SOURCE DESCRIPTION in DIGEST may be either a SOURCE GRAPHIC DESCRIPTION or a SENSOR PARAMETERS DESCRIPTION. The SOURCE GRAPHIC DESCRIPTION provides the description of a map or chart used as a source of the data. The SENSOR PARAMETERS DESCRIPTION provides sensor parameters values for imagery data.

10.1.3.1 Source Graphic Description

The SOURCE GRAPHIC DESCRIPTION shall occur once for each source graphic used for producing the data within the whole Dataset [Library] or within a single Layer [Coverage] of the Dataset [Library].

The possible logical sets and simple data elements composing the SOURCE GRAPHIC DESCRIPTION are as follows:

- SOURCE GRAPHIC DESCRIPTION
  - FIELD OF APPLICATION :
    - •DERIVED LAYER
    - •EXTENT OF DERIVED DATA
  - NUMBER OF COMPONENTS
  - GENERAL DESCRIPTION :
    - •GRAPHIC IDENTIFICATION
    - •GRAPHIC DESCRIPTION
    - •SECURITY AND RELEASE
    - •COPYRIGHT INFORMATION
  - MARGINALIA :
    - •MAGNETIC INFORMATION(S)
    - •SUPPLEMENTARY TEXT(S)
    - •LEGEND DESCRIPTION(S)
  - COORDINATE SYSTEM :
    - •GEODETIC PARAMETERS
    - •PROJECTION
    - •GRID SYSTEM
    - •METRIC SUPPORT PARAMETERS
  - INSET DESCRIPTION(S)
    - •INSET IDENTIFICATION
    - •RECIPROCAL SCALE
    - •NAME
    - •ABSOLUTE COORDINATES
    - •RELATIVE COORDINATES

Figure 10-5 contains a graphic representation of the logical structure of the SOURCE GRAPHIC DESCRIPTION.

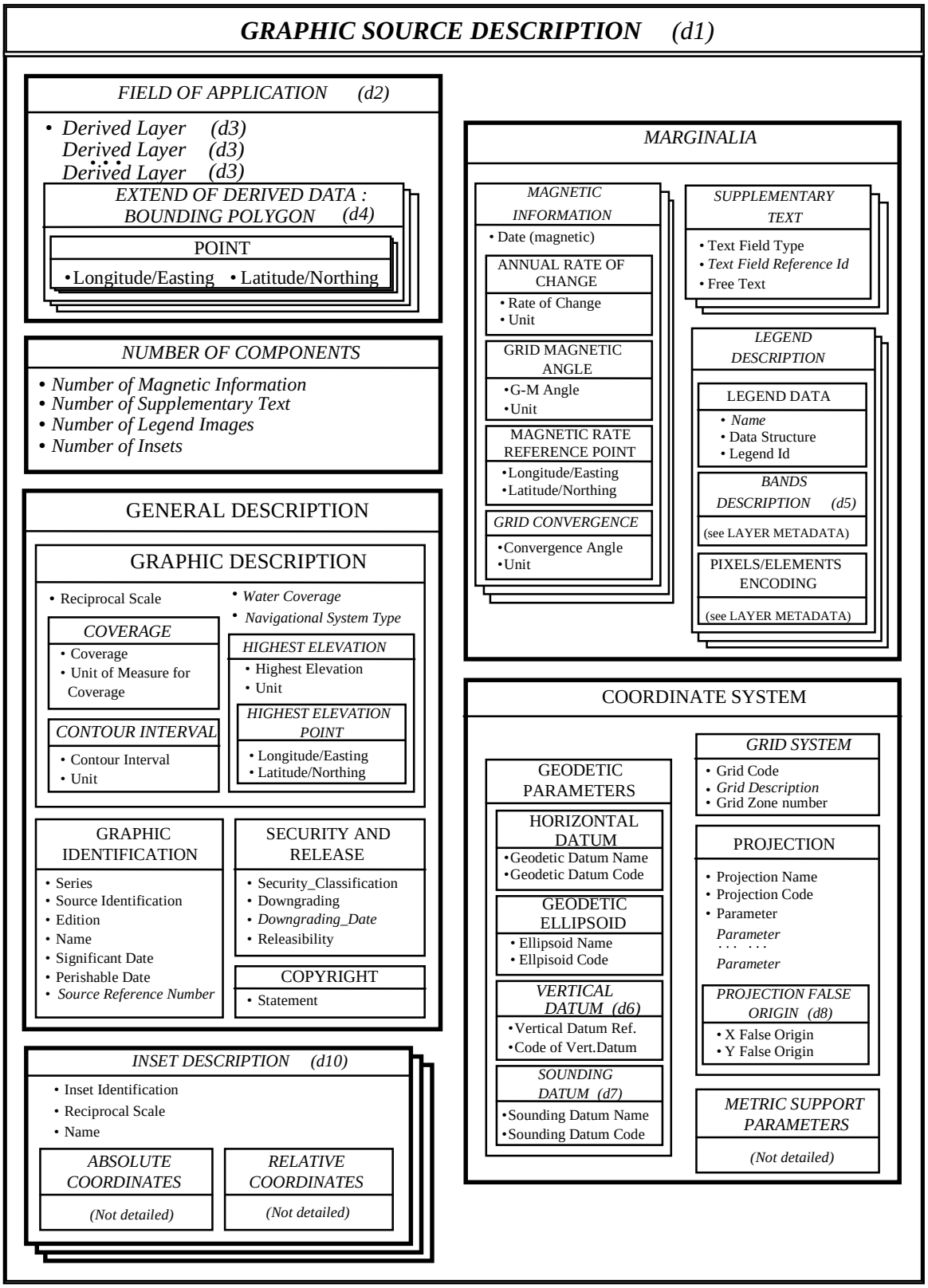


Figure 10-5 Source Graphic Description

*1[C,D]	SOURCE GRAPHIC DESCRIPTION	There must be one Source Graphic Description for each graphic used as source of the Data. Must be present if Source Graphic are used for the dataset (d1).

2[C,D]	FIELD OF APPLICATION	Provides the appropriate restriction in terms of Layers[Coverages], and geographic extent, to the field of application of the source graphic. Must be Present if the Source graphic does not apply to content and extent of the Whole Dataset[Library] (d2)

*3[C,D]	**Derived Layer**	BASIC TEXT Name of the particular layer derived from this source. Must be present if the graphic is not used as source for the whole Dataset [Library]. Occurs once for each Layer [Coverage] derived from the source (d3).

*3[C,D]	EXTENT OF DERIVED DATA: BOUNDING POLYGON	Provides the description of a bounding polygon for the Source. Occurs once for each bounding polygon necessary to define the extent of derived data. Must be present if the Source graphic does not apply to the whole extent of the Dataset [Library] (d4).

*4[R,M]	Point	Repeats as necessary. First and last point must be the same. Coordinate set must refer to the coordinate system defined in the GEO REFERENCE DESCRIPTION.
5[C,M]	**Longitude/Easting**	REAL Longitude/ Easting coordinate.
5[C,M]	**Latitude/Northing**	REAL Latitude/ Northing coordinate.

2[C,O]	NUMBER OF COMPONENTS	Provides information about the number of Magnetic Information, Legend Image, Supplementary Texts and Insets.

3[R,O]	**Number of Magnetic Information**	INTEGER Number of Magnetic Information derived from the source.
3[C,O]	**Number of Supplementary Text**	INTEGER Number of Supplementary Text derived from the source.
3[R,O]	**Number of Legend Images**	INTEGER Number of legend images derived from the source.
3[R,O]	**Number of Insets**	INTEGER Number of insets kept in the Raster Layer[Coverage] derived from the source.

2[C,M]	GENERAL DESCRIPTION	Provides a general description of the graphic used as a source.

3[C,M]	GRAPHIC IDENTIFICATION	Provides the identification of the graphic used as a source.

4[C,S]	**Series**	BASIC TEXT Series Designator (e.g., 1501).
4[C,M]	**Source Identification**	BASIC TEXT Source ID - Number or name which when used in conjunction with the Series and Edition will identify a unique source.
4[C,M]	**Edition**	BASIC TEXT Source Edition Number.
4[C,S]	**Name**	GENERAL TEXT Full Name of Source Document.
4[C,M]	**Significant Date**	DATE, TYPE OF DATE A significant date is a designated date that most accurately describes the basic date of the product for computation of the probable obsolescence date. It can be the compilation date, revision date, or other depending on the product and circumstances. (See Part 4 Annex B for date codes (CDP).
4[C,S]	**Perishable Date**	DATE Perishable information date code.
4[C,O]	**Source Reference Number**	BASIC TEXT Library/Source (or history) Reference Number.

3[C,M]	GRAPHIC DESCRIPTION	Provides the description of the graphic used as a source.

4[C,S]	**Reciprocal Scale**	INTEGER Reciprocal of cartographic scale (e.g., 50000 for 1/50,000 scale).
4[C,O]	Coverage	
5[C,M]	**Coverage**	INTEGER Area Coverage of the source graphic. A number, with unit below, specifying how many square units of area coverage (e.g. 43000 in the case of 43,000 km^2)
5[C,M]	**Unit of Measure for Coverage**	BASIC TEXT (L) Unit of measure for area coverage. (See Part 3- 7)
4[C,O]	Contour Interval	
5[C,M]	**Contour Interval**	INTEGER Predominant contour interval.
5[C,M]	**Unit**	BASIC TEXT (L) Unit of measure for contour interval.(See Part 3 -7)
4[C,O]	**Water Coverage**	INTEGER Percentage covered by water. (0 to 100, 999 = Unknown)
4[C,O]	**Navigational System Type**	INTEGER (L) Navigational system type (e.g. LORAN). (See Annex B to Part 4)
4[R,O]	Highest Elevation	
5[R,M]	**Highest Elevation**	INTEGER Highest known elevation (on the source).
5[R,M]	**Unit**	BASIC TEXT (L) Units of the highest known elevation. (see Part 3-7)
5[R,S]	Highest Elevation Point	Coordinate set must refer to the coordinate system defined in the GEO REFERENCE DESCRIPTION.
6[R,M]	**Longitude/Easting**	REAL Longitude/Easting of the highest known elevation.
6[R,M]	**Latitude/Northing**	REAL Latitude/Northing of the highest known elevation.

3[C,S]	SECURITY AND RELEASE	Identifies the security and release restriction for source graphic
4[C,M]	**Security_Classification**	BASIC TEXT (L) Security classification of source graphic. T = TOP SECRET S = SECRET C = CONFIDENTIAL R = RESTRICTED (or alternatively "FOR OFFICIAL USE ONLY" (Administrative classification only)) U = UNCLASSIFIED
4[C,M]	**Downgrading**	BASIC TEXT (L) Originator's permission for downgrading required. (Yes or No)
4[C,O]	**Downgrading_date**	DATE Date of downgrading. (Blank if answer to previous simple data element is YES or if security classification is equal to "U")
4[C,M]	**Releasability**	BASIC TEXT Releasability restrictions for this source graphic. If no release restriction exists, "UNRESTRICTED" shall be entered in this simple data element.
3[C,S]	COPYRIGHT	Provides information about the copyright restrictions (if any) for the source
4[C,M]	**Statement**	GENERAL TEXT Free text for the copyright statement. If no copyrights exist, "UNCOPYRIGHTED" shall be placed in this simple data element.
2[C,O]	MARGINALIA	Provides a description of marginalia and legend found on the used source graphic.
*3[R,O]	**MAGNETIC INFORMATION**	Provides magnetic information on a given source. Occurs once per magnetic information which applies for a source. Magnetic variation is the sum of Convergence angle and GM angle. Therefore the annual rate of change is the same for magnetic variation as for GM Angle.
4[R,M]	**Date (magnetic)**	DATE Date of magnetic information.

4[R,M]	Annual rate of change	
5[R,M]	**Rate of Change**	REAL Annual angular magnetic rate of change.
5[R,M]	**Unit**	BASIC TEXT (L) Units for magnetic rate of change. (See Part 3 Clause 7)
4[R,M]	Grid Magnetic angle	
5[R,M]	**G-M Angle**	REAL Grid Magnetic Angle (GMA): Grid North to Magnetic North (clockwise regarded as positive).
5[R,M]	**Unit**	BASIC TEXT (L) Units of GMA. (See Part 3 Clause 7)
4[R,S]	Magnetic rate reference Point	Coordinate set must refer to the coordinate system defined in the GEO REFERENCE DESCRIPTION.
5[R,M]	**Longitude/Easting**	REAL Longitude/Easting of the GMA reference point.
5[R,M]	**Latitude/Northing**	REAL Latitude/Northing of the GMA reference point.
4[R,O]	Grid convergence	
5[R,M]	**Convergence Angle**	REAL Grid convergence angle.
5[R,M]	**Unit**	BASIC TEXT (L) Units of grid convergence angle. (See Part 3 Clause 7)
*3[C,O]	**SUPPLEMENTARY TEXT**	Provides information about supplementary text records that cannot be captured graphically and / or are additional information not specified by other simple data elements. Occurs once per text.

4[C,M]	**Text Field Type**	BASIC TEXT (L) Supplementary text record type. Type Description: CONV: Convergence table information CPYZ: Extended copyright notice DATM: Datum subregion identifier (the subfield DCD in the SOURCE_ FIELD of the SOURCE_RECORD in the SOURCE_FILE contains the first three characters of the datum code) MISC Miscellaneous NOTE Textual CHUM notes XXXX Other codes (when mutually agreed upon).
4[C,O]	**Text Field Reference ID**	BASIC TEXT This is a unique identifier that is usually used to identify the type of text specified. The rules for this text field reference identifier are specified in a dataset specification.
4[C,M]	**Free text**	GENERAL TEXT Free text .

*3[R,O]	LEGEND DESCRIPTION	

Legend images are data contained in a separate supporting raster layer. They are explanatory graphics that fall outside the neat line on the scanned source. Legend images generally contain information that cannot be easily represented textually. A legend image has no direct relationship to geographic location. Each legend image is contained in its own file and is related to the source graphic by the LEGEND DESCRIPTION logical set in the SOURCE GRAPHIC DESCRIPTION.

4[R,M]	LEGEND DATA	Provides information on the name, identifier and structure of the legend.

5[R,O]	**Name**	BASIC TEXT Legend name.
5[R,M]	**Data Structure**	INTEGER (L) Data Structure code. 3 = Multiband Raster (RGB or YCbCr or other multiband imagery) 4 = Colour Coded Raster.
5[R,M]	**Legend ID**	BASIC TEXT Identification of the Layer [Coverage] which describes the Legend.

4[R,D]	BANDS DESCRIPTION	Provides the description of the bands constituting the raster file. May be omitted when the dataset contains a single geo raster layer and the legend file uses exactly the same bands (d5).

(See LAYER METADATA: RASTER-OR-MATRIX-SPECIFIC DESCRIPTION)

4[R,M]	PIXELS/ELEMENTS ENCODING	Provides the description of the ordering, tiling system and encoding compression mechanism used when encoding the actual set of pixels of the legend file.

(See LAYER METADATA: RASTER-OR-MATRIX-SPECIFIC DESCRIPTION)

2[R,S] [V/A,O]	COORDINATE SYSTEM	Provides the description of the Cartographic (grid) system used for the source graphic.

This description is meant to allow the application software to transform the coordinate sets from the absolute coordinate system used for the Dataset [Library] to the source graphic coordinate system. When the primary grid displayed on the map is not strictly registered to the map projection, it is strongly recommended that the map projection selected for description is the projection to which the primary grid is registered. This will allow the application to use the parameters of the source file for transforming the coordinates from the coordinate system of the dataset to the coordinate system displayed on the grid.

3[C,M]	GEODETIC PARAMETERS	This logical set defines the geodetic system used for defining the absolute coordinate system for the source graphic.

4[C,M]	HORIZONTAL DATUM	
5[C,M]	**Geodetic Datum Name**	BASIC TEXT (L) Name of Geodetic Datum. (see Part 3 - 6 Table 6.2)
5[C,M]	**Geodetic Datum Code**	BASIC TEXT (L) Code of Geodetic Datum. (see Part 3 - 6, Table 6.2)

4[C,M]	GEODETIC ELLIPSOID	
5[C,M]	**Ellipsoid Name**	BASIC TEXT (L) Name of ellipsoid to which the source graphic refers. (see Part 3 - 6, Table 6.1)
5[C,M]	**Ellipsoid Code**	BASIC TEXT (L) Code of ellipsoid to which the source graphic refers. (See Part 3 - 6, Table 6.1)

4[C,D]	VERTICAL DATUM	Must be present if elevation values appear on the source graphic (d6).
5[C,M]	**Vertical Datum Reference**	BASIC TEXT Name of vertical reference used for the source graphic. (see Part 3 - 6 Table 6.3)
5[C,M]	**Code (Category) of Vertical Reference**	BASIC TEXT (L) Code (Category) of vertical datum reference. (see Part 3 - 6 Table 6.3)
4[C,D]	SOUNDING DATUM	Must be present if soundings appear on the source graphic (d7).
5[C,M]	**Sounding Datum Name**	BASIC TEXT (L) Name of sounding datum. (see Part 3 - 6 Table 6.4)
5[C,M]	**Sounding Datum Code**	BASIC TEXT Category of vertical datum reference used for soundings. (see Part 3 Clause 6 Table 6.4)
3[C,M]	PROJECTION	This logical set describes the projection used for the source graphic. (See Part 3 Clause 6 Table 6.5 for appropriate codes and parameters)
4[C,M]	**Projection Name**	BASIC TEXT Name of the projection used in the source graphic.
4[C,M]	**Projection Code**	BASIC TEXT (L) Code of the projection. (see Part 3 Clause 6 Table 6.5)
4[C,M]	PROJECTION PARAMETER(S)	Provides the appropriate parameters to accurately describe the projection. Occurs as many times as necessary depending on the Projection Code value (see Part 3 Clause 6 Table 6.5)
*5[C,M]	**Parameter**	REAL Projection Parameter.
4[C,D]	PROJECTION FALSE ORIGIN	Mandatory in the usual case where the Projection uses a false origin (d8).
5[C,M]	**X false origin**	REAL X (easting) false origin of projection.
5[C,M]	**Y false origin**	REAL Y (northing) false origin of projection.

3[C,S]	GRID SYSTEM	This logical set describes the grid system used for the Source Graphic.
4[C,M]	**Grid code**	BASIC TEXT (L) Unique Code identifying the grid system (see Part 3 Clause 6 Table 6.6)
4[C,O]	**Grid description**	BASIC TEXT Description of the grid.
4[C,D]	**Grid Zone Number**	INTEGER Grid Zone number. Mandatory when the grid system comprises more than one zone (see Part 3 Clause 6 Table 6.6) (d9).
3[R/A,O]	METRIC SUPPORT PARAMETERS	Provides the appropriate parameters to compute the longitude, latitude, easting, northing of a pixel / element in a specific datum using polynomial computation. May only be used with ARC or UTM/UPS system
4[R/A,O]	ARC SYSTEM METRIC SUPPORT PARAMETERS	To be used only with the ARC system.

When raster or matrix data are rectified using the ARC system, the metric support parameters provide parameters to compute latitude, longitude referring to the Source Datum and Easting and Northing pertaining to the Source graphic's projection graticules. Note that the following formulae are only suitable for non-polar zones.

Normalized WGS 84 Coordinates $(Lat_1, Long_1)$ at $(Lat_{84}, Long_{84})$

$Lat_1 = tsf * (Lat_{84} - ttt)$

$Long_1 = gsf * (Long_{84} - gtt)$

Normalized Source Datum Coordinates $(Lat_2, Long_2)$ at $(Lat_1, Long_1)$

$Lat_2 = ax_1 + ax_2*Lat_1 + ax_3*Long_1 + ax_4*Lat_1*Long_1 + ax_5*Long_1*Long_1 + ax_6*Lat_1*Long_1*Long_1 + ax_7*Long_1*Long_1*Long_1$

$Long_2 = bx_1 + bx_2*Lat_1 + bx_3*Long_1 + bx_4*Lat_1*Long_1 + bx_5*Long_1*Long_1 + bx_6*Lat_1*Long_1*Long_1 + bx_7*Long_1*Long_1*Long_1$

Denormalized Source Datum Coordinates $(Lat_{SD}, Long_{SD})$ at $(Lat_2, Long_2)$

$Lat_{SD} = Lat_2/tsf + ttt$

$Long_{SD} = Long_2/gsf + gtt$

Normalized Source Datum Coordinates $(Lat_2, Long_2)$ at $(Lat_{SD}, Long_{SD})$

$Lat_2 = tsf * (Lat_{SD} - ttt)$

$Long_2 = gsf * (Long_{SD} - gtt)$

Normalized Northing and Easting (NN, EN) at $(Lat_2, Long_2)$

$$NN = cx_1 + cx_2*Lat_2 + cx_3*Long_2 + cx_4*Lat_2*Lat_2 + cx_5*Lat_2*Long_2 + cx_6*Long_2*Long_2 + cx_7*Lat_2*Lat_2*Lat_2 + cx_8*Lat_2*Lat_2*Long_2 + cx_9*Lat_2*Long_2*Long_2 + cx_{10}*Long_2*Long_2*Long_2$$

$$EN = dx_1 + dx_2*Lat_2 + dx_3*Long_2 + dx_4*Lat_2*Lat_2 + dx_5*Lat_2*Long_2 + dx_6*Long_2*Long_2 + dx_7*Lat_2*Lat_2*Lat_2 + dx_8*Lat_2*Lat_2*Long_2 + dx_9*Lat_2*Long_2*Long_2 + dx_{10}*Long_2*Long_2*Long_2$$

Denormalized Northing and Easting (N , E) at (NN, EN)

N = (NN/nsf) + ntt

E = (EN/esf) + ett

5[R/A,M]	NORMALIZATION CONSTANTS
6[R/A,M]	Latitude Scale Factor REAL (tsf)
6[R/A,M]	Longitude Scale Factor REAL (gsf)
6[R/A,M]	Latitude Translation Term REAL (ttt)
6[R/A,M]	Longitude Translation Term REAL (gtt)
6[R/A,M]	Northing Scale Factor REAL (nsf)
6[R/A,M]	Easting Scale Factor REAL (esf)
6[R/A,M]	Northing Translation Term REAL (ntt)
6[R/A,M]	Easting Translation Term REAL (ett)

5[R/A,M]	SOURCE DATUM COEFFICIENTS
6[R/A,M]	Latitude Coefficient 1 REAL (ax1)
6[R/A,M]	Latitude Coefficient 2 REAL (ax2)
6[R/A,M]	Latitude Coefficient 3 REAL (ax3)
:	:
6[R/A,M]	Latitude Coefficient 7 REAL (ax7)
6[R/A,M]	Longitude Coefficient 1 REAL (bx1)
6[R/A,M]	Longitude Coefficient 2 REAL (bx2)
6[R/A,M]	Longitude Coefficient 3 REAL (bx3)
:	:
6[R/A,M]	Longitude Coefficient 7 REAL (bx7)

5[R/A,M]	MAP PROJECTION COEFFICIENTS	
6[R/A,M]		Northing Coefficient 1 REAL (cx1)
6[R/A,M]		Northing Coefficient 2 REAL (cx2)
6[R/A,M]		Northing Coefficient 3 REAL (cx3)
:	:	
6[R/A,M]		Northing Coefficient 10 REAL (cx10)
6[R/A,M]		Easting Coefficient 1 REAL (dx1)
6[R/A,M]		Easting Coefficient 2 REAL (dx2)
6[R/A,M]		Easting Coefficient 3 REAL (dx3)
:	:	
6[R/A,M]		Easting Coefficient 10 REAL (dx10)

4[R/A,O]	UTM/UPS SYSTEM METRIC SUPPORT PARAMETERS To be used only with the UTM/UPS system.

When raster or matrix data are rectified using the UTM/UPS system, the metric support parameters provide parameters to compute latitude, longitude referring to WGS84 from latitude, longitude referring the source datum and Easting and Northing pertaining to the Source graphic's grid.

Normalized Source Datum Coordinates $(Lat_2, Long_2)$ at $(Lat_{SD}, Long_{SD})$ (DEG)

$Lat_2 = nzt*(Lat_{SD}\text{-tof})$

$Long_2 = nzt*(Long_{SD}\text{-gof})$

WGS84 Coordinates $(Lat_{84}, Long_{84})$ at $(Lat_{SD}, Long_{SD})$ (DEG)

$$Lat_{84} = Lat_{SD} + \sum_{i=0}^{i=n} \sum_{j=0}^{j=n,\,(i+j)<=n} (a_{i,j} * Lat_2^{\,i} * Long_2^{\,j}) / 3600$$

$$Long_{84} = Long_{SD} + \sum_{i=0}^{i=n} \sum_{j=0}^{j=n,\,(i+j)<=n} (b_{i,j} * Lat_2^{\,i} * Long_2^{\,j}) / 3600$$

Easting and northing pertaining to source graphic (ES, NS) at (E_{84}, N_{84})

$ES = nes + E_{84}*\cos(aor) - N_{84}*\sin(aor)$

$NS = nns + E_{84}*\sin(aor) + N_{84}*\cos(aor)$

5[R/A,M]	DATUM CHANGE CONSTANTS	
6[R/A,M]	**Latitude normalizing offset**	REAL (tof) In decimal degrees
6[R/A,M]	**Longitude normalizing offset**	REAL (gof) In decimal degrees
6[R/A,M]	**Normalizing factor**	REAL (nzt) Normalizing factor
6[R/A,M]	**Eastern limit of validity**	REAL Eastern limit of validity to use multiple regression equations in decimal degrees
6[R/A,M]	**Western limit of validity**	REAL Western limit of validity to use multiple regression equations in decimal degrees
6[R/A,M]	**Northern limit of validity**	REAL Northern limit of validity to use multiple regression equations in decimal degrees
6[R/A,M]	**Southern limit of validity**	REAL Southern limit of validity to use multiple regression equations in decimal degrees
5[R/A,M]	SOURCE DATUM COEFFICIENT COUNTERS	
6[R/A,M]	**Number of longitude coefficients**	INTEGER Number of longitude coefficients.
6[R/A,M]	**Number of latitude coefficients**	INTEGER Number of latitude coefficients.
*5[R/A,M]	SOURCE DATUM LONGITUDE COEFFICIENTS	Occurs once per transmitted longitude coefficient
6[R/A,M]	**i long index**	INTEGER i index of the coefficient of MRE $b_{i,j}$
6[R/A,M]	**j long index**	INTEGER j index of the coefficient of MRE $b_{i,j}$
6[R/A,M]	**Coefficient of MRE $b_{i,j}$**	REAL Coefficient of MRE $b_{i,j}$. ($b_{i,j}$ coefficients are ordered with respect to increasing i then j).
*5[R/A,M]	SOURCE DATUM LATITUDE COEFFICIENTS	Occurs once per transmitted latitude coefficient
6[R/A,M]	**i lat index**	INTEGER i index of the coefficient of MRE $a_{i,j}$.
6[R/A,M]	**j lat index**	INTEGER j index of the coefficient of MRE $a_{i,j}$.
6[R/A,M]	**Coefficient of MRE $a_{i,j}$**	REAL Coefficient of MRE $a_{i,j}$ ($a_{i,j}$ coefficients are ordered with respect to increasing i then j).

5[R/A,O]	GRID ROTATION COEFFICIENTS	
6[R/A,M]	**Normalized Eastings shift**	REAL (nes) Normalized Eastings shift.
6[R/A,M]	**Normalized Northings shift**	REAL (nns) Normalized Northings shift.
6[R/A,M]	**Angle of orientation**	REAL (aor) Angle of orientation from source datum grid to WGS84 UTM grid. (positive if clockwise)

*2[R,D]	INSET(S): INSET DESCRIPTION	Provides specific registration parameters for the insets. Required when insets are present. Occurs once per inset

Insets on a significantly different projection from the overall map or chart should be treated as follows.

- Replace the pixels in the area which contained the inset on the chart or map with pixels having a user selected value (e.g. black).
- Create a completely new dataset containing the inset data with the appropriate general information, geo reference, source and quality descriptions.

Insets which are on the same projection or a projection which is not significantly different from the overall map or chart should be treated as follows.

- The actual pixels which represent the Inset should remain in the same position as they exist on the chart or map and should be part of the dataset.
- The INSET DESCRIPTION will be used to describe the coordinate characteristics of the inset.

DIGEST allows the definition of a specific coordinate system for each inset. The mechanism is the same as for relative coordinate system, with the four corners of the inset as registration points. Relative coordinates will give the location of the out-side of the corners (as computed from the row and column number of each corner). Absolute coordinates will give the location of the in-side of the corners. Both locations will be described in the same coordinate system, defined in the GEO REFERENCE DESCRIPTION. The only conversion allowed is change of scale and offset.

3[R,M]	**Inset Identification**	BASIC TEXT Unique ID for the inset. Dependent on presence of inset.
3[R,M]	**Reciprocal Scale**	INTEGER Reciprocal of cartographic scale of Inset (e.g. 50000 for 1:50,000). Mandatory if inset is present.
3[R,M]	**Name**	GENERAL TEXT Name of Inset. Mandatory if inset is present.

3[R,M]	ABSOLUTE COORDINATES	Absolute coordinates of lower and upper left corners and lower and upper right corners of the inset as stated in the host graphic coordinates.
4[R,M]	**longitude of lower left corner**	REAL Absolute longitude of lower left corner.
4[R,M]	**latitude of lower left corner**	REAL Absolute latitude of lower left corner.
4[R,M]	**longitude of upper left corner**	REAL Absolute longitude of upper left corner.
4[R,M]	**latitude of upper left corner**	REAL Absolute latitude of upper left corner.
4[R,M]	**longitude of upper right corner**	REAL Absolute longitude of upper right corner.
4[R,M]	**latitude of upper right corner**	REAL Absolute latitude of upper right corner.
4[R,M]	**longitude of lower right corner**	REAL Absolute longitude of lower right corner.
4[R,M]	**latitude of lower right corner**	REAL Absolute latitude of lower right corner.
3[R,M]	RELATIVE COORDINATES	Relative longitude and latitude coordinates of lower and upper left corners and lower and upper right corners of the inset as stated in the host graphic coordinates.
4[R,M]	**longitude of lower left corner**	REAL Relative longitude of lower left corner.
4[R,M]	**latitude of lower left corner**	REAL Relative latitude of lower left corner.
4[R,M]	**longitude of upper left corner**	REAL Relative longitude of upper left corner.
4[R,M]	**latitude of upper left corner**	REAL Relative latitude of upper left corner.
4[R,M]	**longitude of upper right corner**	REAL Relative longitude of upper right corner.
4[R,M]	**latitude of upper right corner**	REAL Relative latitude of upper right corner.
4[R,M]	**longitude of lower right corner**	REAL Relative longitude of lower right corner.
4[R,M]	**latitude of lower right corner**	REAL Relative latitude of lower right corner.

10.1.3.2 Sensor Parameters Description

The SENSOR PARAMETERS DESCRIPTION shall occur once for each source image used for producing the data within the whole Dataset [Library] or within a single Layer [Coverage] of the Dataset [Library].

The possible logical sets and simple data elements composing the SENSOR PARAMETERS DESCRIPTION are as follows:

- SENSOR PARAMETERS DESCRIPTION
  - FIELD OF APPLICATION:
    •DERIVED LAYER
    •EXTENT OF DERIVED DATA
  - SOURCE IMAGE BAND IDENTIFICATION(S):
    •BAND DESIGNATION
    •BAND DESCRIPTION
  - IMAGE RESOLUTION
  - BASIC AUXILIARY PARAMETERS:
    •IMAGE AND SENSOR IDENTIFICATION
    •INCIDENCE ANGLE
    •ALTITUDE
    •IMAGE CENTRE LOCATION
    •SOLAR ANGLES AT IMAGE CENTRE
    •ATTITUDE ANGLES AT IMAGE CENTRE
    •PIXEL TIME
    •ATTITUDE SPEED AT IMAGE CENTRE
  - ADDITIONAL AUXILIARY PARAMETERS :
    •NUMBER OF AUXILIARY PARAMETERS
    • PARAMETER ID(S) AND VALUE(S)

Figure 10-6 contains a graphic representation of the logical structure of the SENSOR PARAMETERS DESCRIPTION.

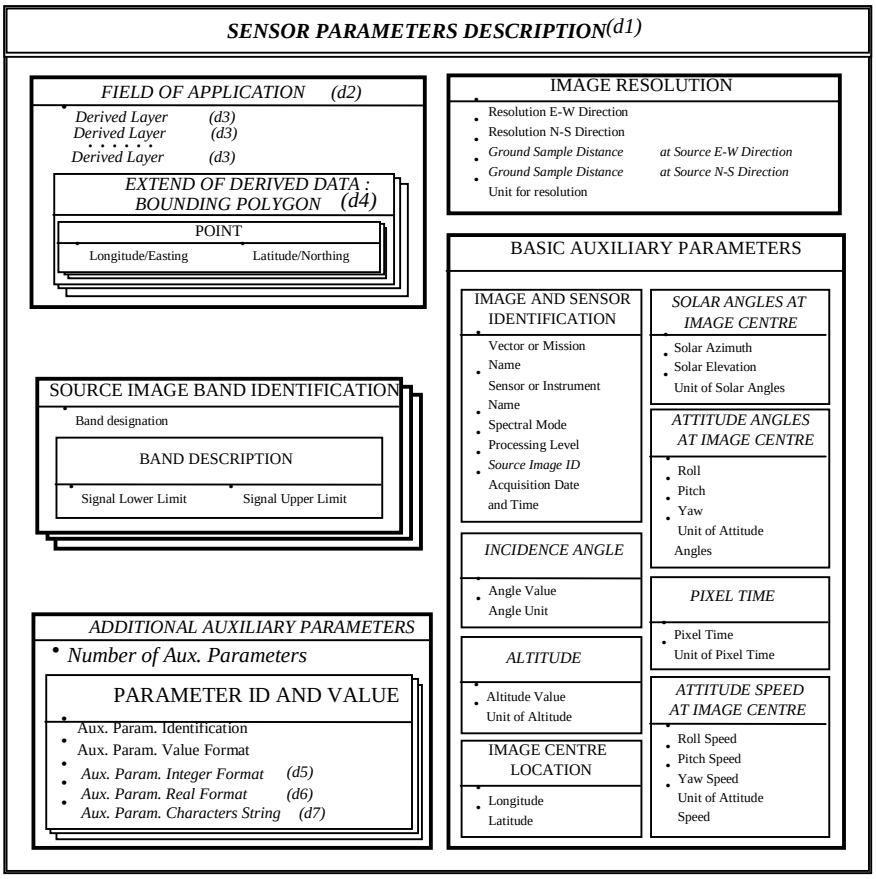


Figure 10-6 Sensor Parameters Description

*1[R,D]	SENSOR PARAMETERS DESCRIPTION	There must be one Sensor Parameters Description for each set of Sensor Parameters used as source of the Data. (d1).

2[R,D]	FIELD OF APPLICATION	Provides the appropriate restriction in terms of Layers [Coverages], and geographic extent, to the field of application of the source image. Must be Present if the Source image does not apply to content and extent of the Whole Dataset [Library] (d2).

*3[R,D]	**Derived Layer**	BASIC TEXT Name of the particular layer derived from this source. Must be present if the image is not used as source for the whole Dataset [Library]. Occurs once for each Layer [Coverage] derived from the source (d3).

*3[R,D]	EXTENT OF DERIVED DATA: BOUNDING POLYGON	Provides the description of a bounding polygon for the Source. Occurs once for each bounding polygon necessary to define the extent of derived data. Must be present if the image does not apply to the whole extent of the Dataset [Library].
*4[R,M]	Point	Repeats as necessary. First and last point must be the same. Coordinate set must refer to the coordinate system defined in the GEO REFERENCE DESCRIPTION.
5[R,M]	**Longitude/Easting**	REAL Longitude/ Easting coordinate.
5[R,M]	**Latitude/Northing**	REAL Latitude/ Northing coordinate.
*2[R,M]	SOURCE IMAGE BAND IDENTIFICATION	This logical set occurs once for each band in the image used as Source.
3[R,M]	**Band designation**	BASIC TEXT Identification of the band (e.g., RED).
3[R,M]	Band description	Provides the caracteristics of the signal of the band.
4[R,M]	**Signal Lower Limit**	INTEGER Lower limit of the signal (wavelength, amplitude or phase of the signal, ...). In Nanometers for Wavelength.
4[R,M]	**Signal Upper Limit**	INTEGER Upper limit of the signal (wavelength, amplitude or phase of the signal). In Nanometers for Wavelength.

2[R,M]	IMAGE RESOLUTION	Provides the resolution of the image.
3[R,M]	Resolution in columns	REAL
3[R,M]	Resolution in rows	REAL
3[R,O]	Ground Sample Distance at Source in columns	REAL Measured before any rectification.
3[R,O]	Ground Sample Distance at Source in rows	REAL Measured before any rectification.
3[R,O]	Location of Pixel for Ground Sample Distances	BASIC TEXT Location within the image of the pixel where the ground sample distances and resolutions have been measured. It is usually an approximate indication, such as UPPER LEFT, LOWER RIGHT or CENTRE.
3[R,M]	Unit for resolution	BASIC TEXT (see Part 3 Clause 7)
2[R,M]	BASIC AUXILIARY PARAMETERS	Provides the basic characteristics of the sensor.
3[R,M]	Image and sensor identification	
4[R,M]	**Vector or Mission Name**	BASIC TEXT Name of the vector or mission used to produce the Source image.
4[R,M]	**Sensor or Instrument Name**	BASIC TEXT Name of the sensor or instrument used to produce the Source image.
4[R,M]	**Spectral Mode**	BASIC TEXT
4[R,M]	**Processing Level**	BASIC TEXT
4[R,O]	**Source image ID**	BASIC TEXT Unique identification of the Source Image.
4[R,M]	**Acquisition Date and Time**	FULL DATE
3[R,O]	Incidence Angle	
4[R,M]	**Angle value**	REAL
4[R,M]	**Angle unit**	BASIC TEXT Defaulted to decimal degrees (DEG). (see Part 3 Clause 7)
3[R,O]	Altitude	
4[R,M]	**Altitude value**	REAL
4[R,M]	**Unit of Altitude**	BASIC TEXT (see Part 3 Clause 7)

3[R,M]	Image Centre Location	Provides the location of the centre of the Source image referring to WGS84 datum in seconds of arc.
4[R,M]	**Longitude**	REAL
4[R,M]	**Latitude**	REAL
3[R,O]	Solar angles at Image Centre	
4[R,M]	**Solar Azimuth**	REAL
4[R,M]	**Solar Elevation**	REAL
4[R,M]	**Unit of Solar Angles**	BASIC TEXT Defaulted to decimal degrees (DEG). (see Part 3 Clause 7)
3[R,O]	Attitude angles at Image Centre	
4[R,M]	**Roll**	REAL
4[R,M]	**Pitch**	REAL
4[R,M]	**Yaw**	REAL
4[R,M]	**Unit of Attitude Angles**	BASIC TEXT Defaulted to decimal degrees (DEG). (see Part 3 Clause 7)
3[R,O]	Pixel Time	
4[R,M]	**Pixel Time**	REAL
4[R,M]	**Unit of Pixel Time**	BASIC TEXT Defaulted to seconds (S). (see Part 3 Clause 7)
3[R,O]	Attitude speed at Image Centre	
4[R,M]	**Roll Speed**	REAL
4[R,M]	**Pitch Speed**	REAL
4[R,M]	**Yaw Speed**	REAL
4[R,M]	**Unit of Attitude Speed**	BASIC TEXT (see Part 3 Clause 7)

2[R,O]	ADDITIONAL AUXILIARY PARAMETERS	Provides a description of additional auxiliary parameters specific to each sensor
3[R,O]	**Number of Aux. Parameters**	INTEGER
*3[R,M]	PARAMETER ID AND VALUE	Occurs once for each auxiliary parameter to be transmitted
4[R,M]	**Aux. Param. Identification**	BASIC TEXT
4[R,M]	**Aux. Param. Value Format**	BASIC TEXT (L) I = Integer R = Real A = Alphanumeric
4[R,M]	**Unit of Auxiliary Parameter**	Basic Text (L) (See Part 3 Clause 7)
4[R,D]	**Aux. Param. Integer Value**	INTEGER Mandatory when Format is I (d5).
4[R,D]	**Aux. Param. Real Value**	INTEGER Mandatory when Format is R (d6).
4[R,D]	**Aux. Param. Characters String**	INTEGER Mandatory when Format is A (d7).

10.1.4 Quality Description

The QUALITY DESCRIPTION gives information about the Dataset [Library] quality in conformance with recommendations made in Clause 7. The logical sets composing the QUALITY DESCRIPTION are as follows:

- QUALITY DESCRIPTION
  - SECURITY AND RELEASE
  - UP-TO-DATENESS
  - VECTOR QUALITY:
    •COMPLETNESS AND CONSISTENCY
    •ATTRIBUTE ACCURACY
  - POSITIONAL ACCURACY SUBREGION(S):
    • ACCURACY STATEMENT
    • EXTENT OF ACCURACY SUBREGION
  - COLOUR PATCH:
    • COLOUR PATCH REFERENCE
    • COLOUR PATCH IDENTIFICATION
    • COLOUR IDENTIFIER(S)
    • BANDS DESCRIPTION
    • PIXELS/ELEMENTS ENCODING
  - OTHER QUALITY INFO

Figure 10-7 contains a graphic representation of the logical structure of the QUALITY DESCRIPTION.

1[C,M]	QUALITY DESCRIPTION	
2[C,M]	SECURITY AND RELEASE	identifies the security and release restriction for the complete Dataset [Library]
3[C,M]	**Security Classification**	BASIC TEXT (L) Security classification of Dataset [Library]. (Never lower than the highest security classification of any Layer comprising the dataset.) T = TOP SECRET S = SECRET C = CONFIDENTIAL R = RESTRICTED (or alternatively "FOR OFFICIAL USE ONLY" (Administrative classification only)) U = UNCLASSIFIED
3[C,M]	**Downgrading**	BASIC TEXT (L) Originator's permission for downgrading required. (Yes or No)
3[C,O]	**Downgrading date**	DATE Date of downgrading. (Blank if answer to previous simple data element is YES or if security classification is equal to "U")
3[C,M]	**Releasability**	BASIC TEXT Releasability restrictions for this dataset [library]. If no release restriction exists, "UNRESTRICTED" shall be entered in this simple data element.

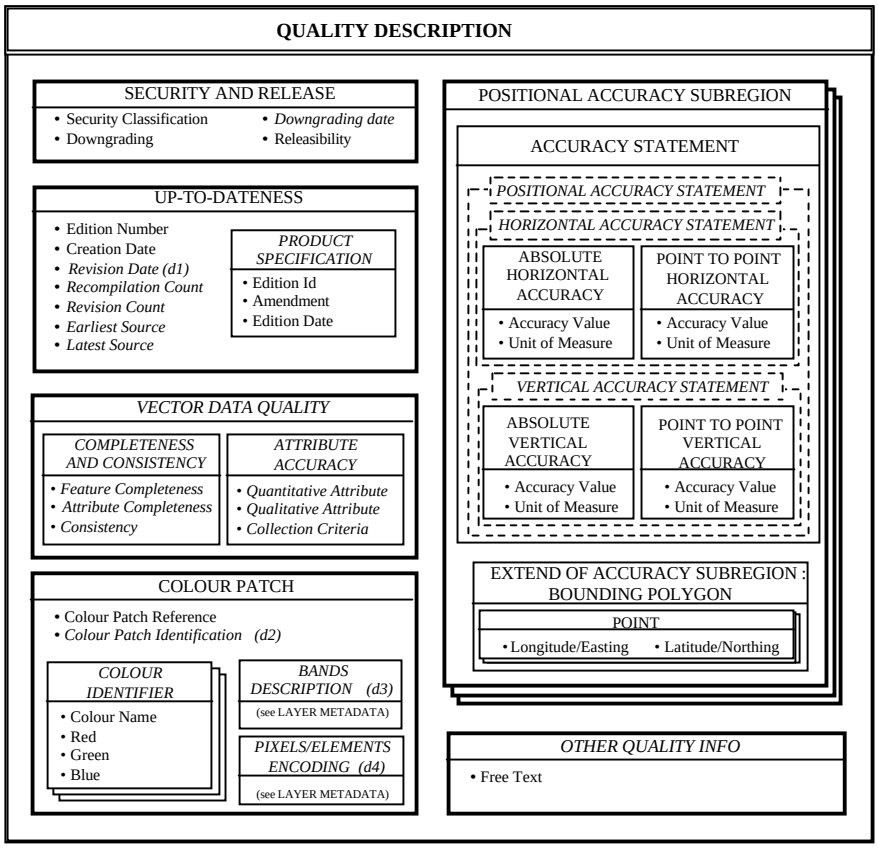


Figure 10-7 Quality Description

2[C,M]	UP-TO-DATENESS	Provides information about the currency and the product specification of the Dataset [Library]

3[C,M]	**Edition Number**	BASIC TEXT Edition number of dataset.
3[C,M]	**Creation Date**	DATE Date of creation of dataset.
3[C,D]	**Revision Date**	DATE Date of revision of dataset. Must be present if Dataset has been revised (d1).
3[C,O]	**Recompilation Count**	INTEGER Number of times the dataset has been recompiled.
3[C,O]	**Revision Count**	INTEGER Number of times the dataset has been revised.

3[C,O]	**Earliest Source**	DATE Date of earliest source.
3[C,O]	**Latest Source**	DATE Date of latest source.

3[C,O]	PRODUCT SPECIFICATION	Identifies the product specification used for producing the Dataset [Library]

4[C,M]	**edition id**	BASIC TEXT Free text -Identifier of product specification used for this Dataset (e.g., VMap LV1 MILSPEC MIL-V-89033).
4[C,M]	**amendment**	BASIC TEXT Amendment number of product specification used for this Dataset (e.g., 0).
4[C,M]	**edition date**	DATE Publication date of of product specification used for this Dataset (e.g., 19950601).

2[V,O]	VECTOR DATA QUALITY	Provides information about the attribute accuracy, completeness and consistency of the vector data included in the Dataset [Library].

The same logical set may be included within the Layer [coverage] metadata in order to provide a specific description of the quality of a Layer [Coverage]

3[V,O]	COMPLETENESS AND CONSISTENCY	Provides information about the consistency and completeness the Dataset [Library].

4[V,O]	**Feature Completeness**	INTEGER Feature completeness (percentage). (See Clause 7.3.8)
4[V,O]	**Attribute Completeness**	INTEGER Attribute completeness (percentage). (See Clause 7.3.7)
4[V,O]	**Consistency**	BASIC TEXT Logical consistency (Text). (See Clause 7.3.6)

3[V,O]	ATTRIBUTE ACCURACY	Gives information about standard deviation of quantitative values and reliability of qualitative values of the Dataset [Library] attributes.

4[V,O]	**Quantitative Attribute**	INTEGER Standard deviation of quantitative attributes.
4[V,O]	**Qualitative Attribute**	INTEGER Percentage reliability of qualitative attributes.
4[V,O]	**Collection Criteria**	BASIC TEXT Name of collection specification.

*2[C,M]	POSITIONAL ACCURACY SUBREGION	This logical set occurs as many times as necessary depending on the number of sources and accuracy subregions.

The same logical set may be included within the Layer [coverage] metadata in order to provide a specific description of the accuracy of a Layer [Coverage].

There must be 100% areal coverage of the MBR of the Dataset [Library] for the total area of the horizontal accuracy regions and 100% areal coverage of the MBR of the dataset for the sum of the vertical accuracy regions. Where the information is unknown or not applicable, it will be noted with "Not a Number" value (see Part 3 Clause 5). Where the region or subregion boundaries are coincident with both horizontal and vertical accuracy regions then the accuracy regions may be combined in the same accuracy record (Figure 10-8a). Where the horizontal and vertical boundaries differ in whole or in part, then either totally distinct horizontal and vertical subregions may be defined (e.g. Figure 10-8b), or the two approaches may be mixed (e.g., Figure 10-8c).

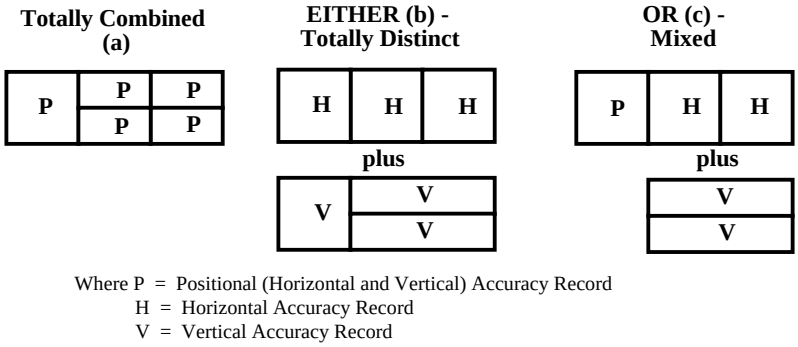


Figure 10-8 Alternatives for Defining Mixed Positional Accuracy Subregions

3[C,M]	ACCURACY STATEMENT	Provides information about positional accuracy of the Dataset [Library].

This logical set is either a POSITIONAL ACCURACY STATEMENT (combining horizontal and vertical accuracy) or a HORIZONTAL ACCURACY STATEMENT (horizontal only) or a VERTICAL ACCURACY STATEMENT (vertical only).

(3)	POSITIONAL ACCURACY STATEMENT	
4[C,M]	Absolute Horizontal Accuracy	
5[C,M]	**Accuracy value**	REAL Absolute horizontal accuracy of data within the Subregion.
5[C,M]	**Unit of Measure**	BASIC TEXT (L) Unit of measure for absolute horizontal accuracy. (see Part 3 Clause 7)
4[C,M]	Absolute Vertical Accuracy	
5[C,M]	**Accuracy value**	REAL Absolute vertical accuracy of data within the Subregion.
5[C,M]	**Unit of Measure**	BASIC TEXT (L) Unit of measure for absolute vertical accuracy. (see Part 3 Clause 7)
4[C,M]	Point-to-Point Horizontal Accuracy	
5[C,M]	**Accuracy value**	REAL Point-to-point horizontal accuracy of data within the Subregion.
5[C,M]	**Unit of Measure**	BASIC TEXT (L) Unit of measure for point-to-point horizontal accuracy. (see Part 3 Clause 7)
4[C,M]	Point-to-Point Vertical Accuracy	
5[C,M]	**Accuracy value**	REAL Point-to-point vertical accuracy of data within the Subregion.
5[C,M]	**Unit of Measure**	BASIC TEXT (L) Unit of measure for point-to-point vertical accuracy. (see Part 3 Clause 7)
	HORIZONTAL ACCURACY STATEMENT	
4[C,M]	Absolute Horizontal Accuracy	
5[C,M]	**Accuracy value**	REAL Absolute horizontal accuracy of data within the Subregion.
5[C,M]	**Unit of Measure**	BASIC TEXT (L) Unit of measure for absolute horizontal accuracy. (see Part 3 Clause 7)

4[C,M]	Point-to-Point Horizontal Accuracy	
5[C,M]	**Accuracy value**	REAL Point-to-point horizontal accuracy of data within the Subregion.
5[C,M]	**Unit of Measure**	BASIC TEXT (L) Unit of measure for point to point horizontal accuracy. (see Part 3 Clause 7)

VERTICAL ACCURACY STATEMENT

4[C,M]	Absolute Vertical Accuracy	
5[C,M]	**Accuracy value**	REAL Absolute vertical accuracy of data within the Subregion.
5[C,M]	**Unit of Measure**	BASIC TEXT (L) Unit of measure for absolute vertical accuracy. (see Part 3 Clause 7)

4[C,M]	Point-to-Point Vertical Accuracy	
5[C,M]	**Accuracy value**	REAL Point-to-point vertical accuracy of data within the Subregion.
5[C,M]	**Unit of Measure**	BASIC TEXT (L) Unit of measure for point to point vertical accuracy. (see Part 3 Clause 7)

3[C,M]	EXTENT OF ACCURACY SUBREGION:	Provides the description of a bounding polygon for the accuracy region/ subregion. Occurs once for each polygon bounding the accuracy region / subregion.

*4[C,M]	Point	Repeats as necessary. First and last point must be the same. Coordinate set must refer to the coordinate system defined in the GEO REFERENCE DESCRIPTION.
5[C,M]	**Longitude/Easting**	REAL Longitude/ Easting coordinate.
5[C,M]	**Latitude/Northing**	REAL Latitude/ Northing coordinate.

2[R,O]	COLOUR PATCH	Allows the identification and the transmission of a colour patch together with a raster file.

3[R,M]	**Colour Patch Reference**	BASIC TEXT Standard colour patch reference.
3[R,D]	**Colour Patch Identification**	BASIC TEXT Identifies the Support Layer [Coverage] containing the colour patch raster file. Mandatory if the colour patch raster file is present (d2).

*3[R,O]	COLOUR IDENTIFIER	Gives Red, Green, Blue values, each averaged over pixels scanned from uniform intensity colour and / or grey scales. Occurs once for each colour in the colour patch.

4[R,M]	**Colour Name**	BASIC TEXT Colour name within the colour patch (e.g., RED).
4[R,M]	**Red**	REAL Patch intensity value for the RED.
4[R,M]	**Green**	REAL Patch intensity value for the GREEN.
4[R,M]	**Blue**	REAL Patch intensity value for the BLUE.

3[R,D]	BANDS DESCRIPTION	Provides the description of the bands constituting the raster file. Must be omitted if Colour Patch Identification is. May be omitted when the dataset contains a single geo raster layer and the colour patch uses exactly the same bands (d3).

(See LAYER METADATA: RASTER-OR-MATRIX-SPECIFIC DESCRIPTION)

3[R,D]	PIXELS/ELEMENTS ENCODING	Provides the description of the ordering, tiling system and encoding compression mechanism used when encoding the actual set of pixels of the colour patch file. Must be present if Colour Patch Identification is present (d4).

(See LAYER METADATA: RASTER-OR-MATRIX-SPECIFIC DESCRIPTION)

2[C,O]	OTHER QUALITY INFO	Provides information defining specific descriptors related to data quality.

3[C,M]	**Free text**	GENERAL TEXT Free text

10.2 Layer [Coverage] Metadata Subset

The possible logical sets and simple data elements composing the LAYER [COVERAGE] METADATA Subset are as follows:

- LAYER [COVERAGE] METADATA

  - GENERAL DESCRIPTION
    - IDENTIFICATION
    - RECIPROCAL SCALE
    - GEOGRAPHIC EXTENT
    - GENERAL COMMENT
    - LAYER POSITION ACCURACY SUBREGION(S)

  - DATA-TYPE-SPECIFIC DESCRIPTION which may be either

    VECTOR-SPECIFIC DESCRIPTION:
    - LOCAL COORDINATE SYSTEM
    - VECTOR COMPONENTS
    - MBR/GRP UNITS
    - LAYER-SPECIFIC VECTOR DATA QUALITY

    or

    RASTER-OR-MATRIX-SPECIFIC DESCRIPTION:
    - LOCAL COORDINATE SYSTEM
    - BANDS DESCRIPTION
    - PIXELS/ELEMENTS ENCODING
    - DATA-TYPE-SPECIFIC PARAMETERS which may be either

      MATRIX-SPECIFIC PARAMETERS:
      - MATRIX UNITS
      - NOMINAL CODE IDENTIFIER

      or

      RASTER-SPECIFIC PARAMETERS:
      - COLOUR CODE IDENTIFIER
      - COLOUR PATCH
      - SCANNING PARAMETERS

Figures 10-9, 10-10 and 10-11 contain a graphic representation of the logical structure of the LAYER [COVERAGE] METADATA Subset.

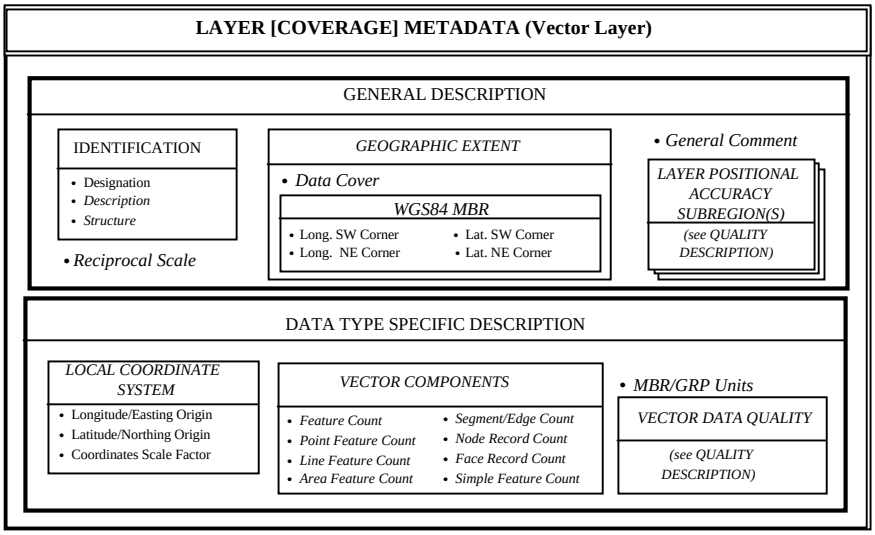


Figure 10-9 Layer [Coverage] Metadata (Vector Layer)

1[C,M]	LAYER [COVERAGE] METADATA	

2[C,M]	GENERAL DESCRIPTION	Provides a general description of the Layer [Coverage].

3[C,M]	IDENTIFICATION	Provides an identification of the Layer [Coverage]; If Present, this identification is redundant and should be consistent, i.e. exactly the same with the identification of the Layers [Coverages] described in the Dataset [Library] Metadata.
4[C,M]	**designation**	BASIC TEXT Short unique designation of this Layer [Coverage].
4[C,O]	**description**	BASIC TEXT Full description of this Layer [Coverage].
4[C,O]	**structure**	INTEGER (L) Code of Data Structure used for this Layer [Coverage] 1 = Matrix (values) 2 = Matrix (Coded) 3 = Raster (Values e.g. RGB) 4 = Raster (Colour Coded) 5 = Vector (Level 0 Topology - Spaghetti) 6 = Vector (Level 1 Topology - Chain-node) 7 = Vector (Level 2 Topology - Planar Graph) 8 = Vector (Level 3 Topology - Full Topology).
3[R,D] [V/A,O]	**reciprocal scale**	INTEGER Reciprocal scale of Layer (e.g. 50000 for 1:50,000). This is usually the scale of the source material. Mandatory for raster maps.
3[C,O]	GEOGRAPHIC EXTENT	Provides the approximate location and the percentage of data cover within this extent.
4[V/A,O]	**Data Cover**	INTEGER Percentage data cover within the dataset MBR. (“Total Area” minus “Void Area”) times 100 divided by “Total Area”: ((TA-VA)*100)/TA.

4[C,O]	WGS84 MBR	Provides the approximate location of the Layer [Coverage] using the WGS84 reference system.
5 [C,M]	**Longitude of SW Corner**	REAL Westernmost Longitude of Minimum Bounding Rectangle of this Layer [Coverage].
5 [C,M]	**Latitude of SW Corner**	REAL Southernmost Latitude of Minimum Bounding Rectangle of this Layer [Coverage].
5 [C,M]	**Longitude of NE Corner**	REAL Easternmost Longitude of Minimum Bounding Rectangle of this Layer [Coverage].
5 [C,M]	**Latitude of NE Corner**	REAL Northernmost Latitude of Minimum Bounding Rectangle of this Layer [Coverage].
3[C,O]	**General comment**	LEXICAL TEXT Free text (e.g., description of digitizing equipment).
*3[C,O]	LAYER POSITIONAL ACCURACY SUBREGION (S)	This logical set occurs as many times as necessary depending on the number of sources and accuracy subregions.

(See QUALITY DESCRIPTION)

2[V,O] [A/R,M]	DATA-TYPE-SPECIFIC DESCRIPTION	Provides the supporting information pertaining to formatting and organization within the Layer [Coverage]which is helpful for the user and machine reading of actual data.

This logical set depends on the data type. The following are two definitions of this logical set, one for the vector Layers [Coverages], and one for the raster or matrix Layers [Coverages].

(2)	VECTOR-SPECIFIC DESCRIPTION

3[V,O]	LOCAL COORDINATE SYSTEM	Local coordinate system for the Layer/Coverage.

For codification purposes, DIGEST allows the definition of a local coordinate system for each layer. The local coordinate system is strictly registered to the coordinate system of the dataset to which the layer belongs, called global coordinate system, as defined in the GEO REFERENCE DESCRIPTION. The local coordinate system is based on a scale-offset mathematical function. It may be used in order to facilitate the codification of each coordinate value (e.g. each coordinate value will be coded as a short integer without any loss of accuracy).

If the global coordinate system is a cartographic (grid) coordinate system (E_G, N_G), the local coordinate system will be of the same type (E_L, N_L); the offset factors will be given as the Easting and Northing of the origin of the layer (LSO,PSO) in the global coordinate system and a local scale factor (CSF) is defined.

$$E_G = LSO + (E_L * CSF)$$
$$N_G = PSO + (N_L * CSF)$$

If the global coordinate system is a geographic coordinate system (Lon_G, Lat_G), the local coordinate system will be of the same type (Lon_L, Lat_L); the offset factors will be given as the longitude and latitude of the origin of the layer (LSO,PSO) in the global coordinate system and a local scale factor (CSF) is defined.

$$Lon_G = LSO + (Lon_L * CSF)$$
$$Lat_G = PSO + (Lat_L * CSF)$$

4[V, M]	**Longitude/Easting of Origin**	REAL Longitude/Easting of origin of the local coordinate system in the absolute reference system of the Datastet [Library].
4[V, M]	**Latitude/Northing of Origin**	REAL Latitude/Northing of the local coordinate system in the absolute reference system of the Datastet [Library].
4[V,M]	**Coordinates scale factor**	REAL Value used to scale the coordinates.

3[V,O]	VECTOR COMPONENTS	Number of each type of elements within the Layer [Coverage]
4[V,O]	**Feature Count**	INTEGER Total number of features in the Layer.
4[V,O]	**Point Feature Count**	INTEGER Number of point features in the Layer.
4[V,O]	**Line Feature Count**	INTEGER Number of line features in the Layer.
4[V,O]	**Area Feature Count**	INTEGER Number of area features in the Layer.
4[V,O]	**Segment/Edge Count**	INTEGER Number of segments in the Layer.
4[V,O]	**Node Record Count**	INTEGER Number of node records in the Layer.
4[V,O]	**Face Record Count**	INTEGER Number of face records in the Layer.
4[V,O]	**Simple Feature Count**	INTEGER Number of simple feature records in the Layer.
3[V,O]	**MBR/GRP Units**	Units of measure used for the Minimum Bounding Rectangle (MBR) and for the Geographic Reference Point (GRP) of each individual feature and topological entity (see Part 3 Clause 7 for appropriate code). This simple data element is required when relative or local coordinates are used to store data.
3[V,O]	VECTOR DATA QUALITY	Provides information about the attribute accuracy, completeness and consistency of the vector data included in the Layer [Coverage].

(see QUALITY DESCRIPTION)

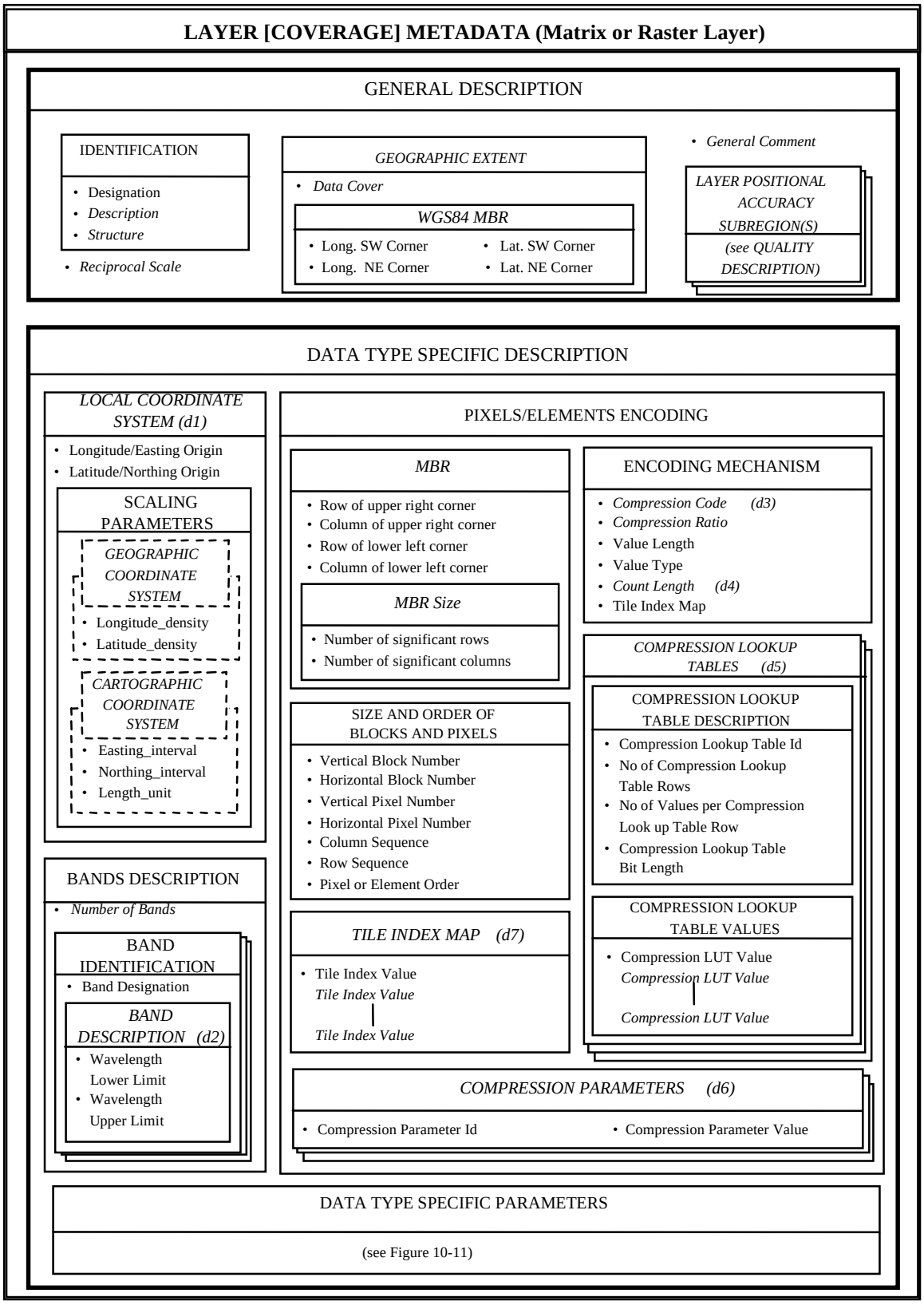


Figure 10-10 Layer [Coverage] Metadata (Matrix or Raster Layer)

(2)	RASTER-OR-MATRIX-SPECIFIC DESCRIPTION	
3[A/R,D]	LOCAL COORDINATE SYSTEM	Provides the parameters that define the local coordinate system registering the column and row number within the layer [Coverage] with the absolute coordinate system of the Dataset [Library] to which it belongs. Mandatory when the Dataset [Library] coordinate system is an absolute one (MAP or GEO).

The raster and matrix data are based on the definition of a regular tesselation of the extent of the layer. Each pixel or element is identified by a row number and a column number (R,C). The order in which line and column are numbered, may be the same or opposite to the coordinate positive direction. These orders (row sequence ROD, column sequence COD) are described in the SIZES AND ORDERS subset of ORGANISATION subset of the PIXELS/ELEMENTS MECHANISMS AND SIGNIFICATION logical set.

When the coordinate system of the dataset to which the layer belongs, called global coordinate system and defined in the GEO REFERENCE DESCRIPTION, is an absolute coordinate system, the boundaries of the tesselation form a regular grid whose axes are parallel to the axes of the global coordinate system. The exact location of each pixel or element can then be located using the coordinates of the origin of the grid in the global coordinate system and scaling parameters.

When the coordinate system of the dataset to which the layer belongs, called global coordinate system and defined in the GEO REFERENCE DESCRIPTION, is a relative coordinate system, the origin of the grid may be defaulted to (0,0) or to the approximate location of the origin in the global coordinate system.

4[A/R, M]	**Longitude/Easting of Origin**	REAL Longitude/Easting of origin of the local coordinate system in the absolute reference system of the Dataset [Library]
4[A/R, M]	**Latitude/Northing of Origin**	REAL Latitude/Northing of the local coordinate system in the absolute reference system of the Dataset [Library]

4[A/R,M]	SCALING PARAMETERS	Provides the size of the pixels or of the interval between elements; the set of parameters to be used depends on the type of absolute coordinate system of the Dataset [Library]

(4)	Geographic Coordinate System

If the global coordinate system is a geographic coordinate system (Lon_g, Lat_g), the longitude and latitude of the origin of the grid (LSO,PSO), and the number of lines and columns in 360° (longitude density ARV, latitude density BRV) will be given.

$$Lon_g = LSO + (-2*COD +1)*C*(360°)_{uni}/ARV$$

$$Lat_g = PSO + (-2*ROD +1)*L*(360°)_{uni}/BRV$$

where $(360°)_{uni}$ stands for 360 when the coordinate system unit is DEG or for 1296000 when the coordinate system unit is SEC.

5[R/A,M]	**longitude density**	INTEGER Pixel ground spacing in E/W direction. (Number of pixels or element intervals in 360°)
5[R/A,M]	**latitude density**	INTEGER Pixel ground spacing in N/S direction. (Number of pixels or element intervals in 360°)

(4) Cartographic(Grid) Coordinate system

If the global coordinate system is a cartographic (grid) coordinate system (E_g, N_g), the easting and northing of the origin of the grid (LSO,PSO) will be given, and the line and column width (LOD,LAD) will be expressed using a linear unit (UNIloa). If the global coordinate system is a relative coordinate system, the line and column width (LOD,LAD) may be defaulted using the reciprocal scale and pixel size in micron with the proper linear unit (UNIloa).

$$E_g = LSO + (-2*COD +1)*C*LOD*(1_{uni} / 1_{uni\ loa})$$

$$N_g = PSO + (-2*ROD +1)*R*LAD*(1_{uni} / 1_{uni\ loa})$$

where $(1_{uni} / 1_{uni\ loa})$ stands for the multiplicating factor necessary to convert UNIloa in meters.

5[R/A,M]	**easting interval**	INTEGER Data Density in E/W direction.
5[R/A,M]	**northing interval**	INTEGER Data Density in N/S direction.
5[R/A,M]	**length unit**	BASIC TEXT (L) Unit of measure used for Data Density in E/W and N/S directions. (see Part 3-7 for appropriate code to be used)

3[R/A,M]	BANDS DESCRIPTION	Provides the description of the bands constituting the raster or matrix layers

4[R/A,O]	**Number of bands**	INTEGER

*4[R/A,M]	BAND IDENTIFICATION	This logical set occurs once for each band in the Layer [Coverage], and defines the content of each band of an image or a matrix.
5[R/A,M]	**Band designation**	BASIC TEXT Raster: Identification of the band (e.g., RED). Matrix: Identification of the Nominal code of the band.
5[R,D]	Band description	This logical set is required if ON/OFF colour coded or multi-spectral data are transmitted
6[R,M]	**Wavelength Lower Limit**	INTEGER Lower limit of wavelength span or "ON" colour code.
6[R,M]	**Wavelength Upper Limit**	INTEGER Upper limit of wavelength span or "OFF" colour.
3[R/A,M]	PIXELS/ELEMENTS ENCODING	Provides the description of the ordering, tiling system and encoding compression mechanism used when encoding the actual set of pixels or elements to be transmitted
4[R/A,O]	MBR	Provides the MBR of the useful area within the raster or matrix Layer [Coverage]
5[R/A,M]	**row of upper right corner**	INTEGER Row number, upper right corner of the MBR in pixels / elements
5[R/A,M]	**column of upper right corner**	INTEGER Column number, upper right corner of the MBR in pixels / elements
5[R/A,M]	**row of lower left corner**	INTEGER Row number, lower left corner of the MBR in pixels / elements.
5[R/A,M]	**column of lower left corner**	INTEGER Column number, lower left corner of the MBR in pixels / elements.
5[R/A,O]	MBR size	Provides the size of the useful area within the raster or matrix Layer [Coverage]
6[R/A,M]	**number of significant rows**	INTEGER Total number of significant rows
6[R/A,M]	**number of significant columns**	INTEGER Total number of significant columns

4[R/A,M]	SIZE AND ORDER OF BLOCKS AND PIXELS	
5[R/A,M]	**vertical block number**	INTEGER Number of Subblocks Vertically (Bottom to Top)
5[R/A,M]	**horizontal block number**	INTEGER Number of Subblocks Horizontally (Left to Right)
5[R/A,M]	**vertical pixel number**	INTEGER Number of pixels / elements per subblock left to right.
5[R/A,M]	**horizontal pixel number**	INTEGER Number of scan lines per subblock.
5[R/A,M]	**Column Sequence**	INTEGER (L) Numbering sequence of the columns: 0 = left to right 1 = right to left
5[R/A,M]	**Row Sequence**	INTEGER (L) Numbering sequence of the rows columns: 0 = bottom to top 1 = top to bottom
5[R/A,M]	**Pixel or element Order**	INTEGER (L) Order of pixels or elements: 0 = Column in row in band in subblock 1 = Row in column in band in subblock 2 = Column in row in subblock in band 3 = Row in column in subblock in band 4 = Column in band in row in subblock 5 = Row in band in column in subblock 6 = Band in column in row in subblock 7 = Band in row in column in subblock

4[R/A,M]	ENCODING MECHANISM	Provides the appropriate parameters describe the actual encoding of pixel or element values for each band; the required set of parameters depend on the compression mechanism used within the Layer [Coverage].
5[R/A,D]	**Compression Code**	BASIC TEXT A code which uniquely identifies the compression mechanism used. Compression mechanism is encapsulation-dependent; refer to the appropriate encapsulation for values allowed. If this value is not given, but compression is used, then runlength compression is assumed. This is for backward compatibility.
5[R/A,O]	**Compression ratio**	BASIC TEXT The average value of the compression ratio.
5[R/A,M]	**Value Length**	INTEGER Number of bits per pixel or element value (before compression if compressed).
5[R/A,M]	**Value Type**	BASIC TEXT Specifies the pixel value type: INT = integer SI = 2's complement signed integer INT and SI data types shall be limited to 16 bits, beginning with the most significant bit (MSB) and ending with the least significant bit (LSB). R = real values represented according to IEEE 32-bit or 64-bit floating point representation. C = complex values represented with the Real and Imaginary parts, each represented in IEEE 32-bit floating point representation and appearing in adjacent four-byte blocks, first Real, then Imaginary. B = single bit (bi-level)
5[R/A,D]	**Count Length**	INTEGER Number of bits per pixel or element count. Mandatory if RLE-compressed.
5[R/A,M]	**Tile Index Map Flag**	INTEGER (L) Flag (Y or N) indicating presence or absence of Tile/Subblock Index.

*4[R/A,D]	COMPRESSION LOOKUP TABLES	Occurs once for each lookup table. Required when the compression mechanism uses look-up tables
5[R/AM]	COMPRESSION LOOKUP TABLE DESCRIPTION	Identifies the name and dimensions of the given compression lookup table.
6[R/A,M]	**Compression Lookup Table Id**	BASIC TEXT Name of the compression lookup table.
6[R/A,M]	**Number of Compression Lookup Table Rows**	INTEGER Number of rows in the compression lookup table.
6[R/A,M]	**Number of Values per Compression Lookup Table Row**	INTEGER Number of values (columns) per row of the compression lookup table. This number is constant for all the rows of the table.
6[R/A,O]	**Compression Lookup Table Value Bit Length**	INTEGER Length in bits of the compression lookup table values. Defaulted to 16 bits.
5[R/A,M]	COMPRESSION LOOKUP TABLE VALUES	Gives the different values of the rows of the given compression lookup table.
*6[R/A,M]	**Compression LUT Value**	One value of one row of the compression lookup table. Occurs as many times as necessary for each value (column) of each row of the table.
*4[R/A,D]	COMPRESSION PARAMETER(S)	Gives the name (Id) and value of the parameters used to define the given compression. Occurs as many times as necessary for each parameter.
5[R/A,M]	**Compression Parameter Id**	Name of the compression parameter. See Product Specifications for allowed values.
5[R/A,M]	**Compression Parameter Value**	Value of the compression parameter.
4[R/A,D]	TILE INDEX MAP	Provides information about presence or omission and / or address of a Tile / Subblock. This logical set is required only if the Tile Index Map Flag = “Y”

Full tiles of zero (null) pixels may be omitted from an image. Tiles (subblocks) containing non-zero (non-null) pixels are placed into the image file in sequential order, as defined in the SIZE AND ORDER OF BLOCKS AND PIXELS logical set, but without leaving space for omitted tiles. A rectangular array of integers, the Tile Index Map ($M_{c,r}$), is used to indicate which tiles are present. There is one row of integers in the tile map for each row of tiles in the image, and each integer in the row corresponds with a tile in the row of tiles in the image. The value of each entry $M_{c,r}$ indicates whether or not tile (c,r) of the image is present in the image file, and for a tile which is present, tells the tile's sequence position, if the image is uncompressed, or starting byte address, if the image is compressed, in the image file. $M_{c,r}$ is defined by:

$M_{c,r}$ = 0 or null means that tile (c,r) is omitted

$M_{c,r}$ > 0 means that tile (c,r) is present and that $M_{c,r}$ is the sequence number or starting byte address.

The Tile Index Map is present only when tiles have been omitted from the image file or optionally the data is compressed.

*5[R/A,M]	**Tile Index Value**	INTEGER Order or Address Value of Each sub block (a zero or null value corresponds to an omitted subblock. Occurs once for each block within the frame.).

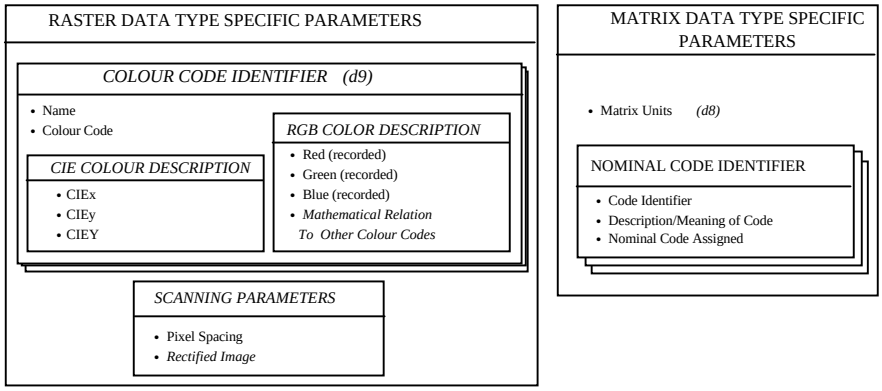


Figure 10-11 Data-Type-Specific Parameters

3[A/R,M]	DATA-TYPE-SPECIFIC PARAMETERS	Provides the supporting information pertaining to colour or attribute coding within the Layer [Coverage] which is helpful for the user and machine reading of actual data.

This logical set depends on the data type. It is either a MATRIX-SPECIFIC PARAMETERS set (for matrix Layers [Coverages]) or a RASTER-SPECIFIC PARAMETERS set (for raster Layers [Coverages]). Each version of the set is defined below.

MATRIX-SPECIFIC PARAMETERS		
4[A,D]	**Matrix Units**	BASIC TEXT(L) Unit of measure used for values of matrix simple data elements. (see Part 3 Clause 7 for appropriate codes to be used). Must be present when Matrix values are actual values.
*4[A,M]	NOMINAL CODE IDENTIFIER	Used to define the meaning of nominal code or value when used for matrix data. Occurs once for each value of each attribute in the matrix.
5[A,M]	**Attribute Code Identifier**	The identifier of the attribute code. It should be used as the Band ID.
5[A,M]	**Description/Meaning of Attribute value**	Free text description of the attribute value (e.g., terrain elevation value, gravity information).
5[A,M]	**Nominal code assigned to an Attribute value**	Integer value code corresponding to the text description.

RASTER-SPECIFIC PARAMETERS		
*4[R,D]	COLOUR CODE IDENTIFIER	Gives Red, Green, Blue values, each averaged over pixels scanned from uniform intensity colour reference samples intended for colour coded processing. Required when colour coded data are transmitted. Occurs as necessary for each colour.
5[R,M]	**Name**	BASIC TEXT Name and / or description for first colour code. (Graphic colour)
5[R,M]	**Colour Code**	INTEGER Colour code assigned in the dataset.

5[R,O]	CIE colour description	
6[R,M]	**CIEx**	INTEGER CIE value for "x". (See Clause 11.2.4, Part 2 A.3.5 and Part 3 Clause 8)
6[R,M]	**CIEy**	INTEGER CIE value for "y". (See Clause 11.2.4, Part 2 A.3.5 and Part 3 Clause 8)
6[R,M]	**CIEY**	INTEGER CIE reflectivity value "Y". (See Clause 11.2.4, Part 2 A.3.5 and Part 3 Clause 8)
5[R,M]	RGB colour description	
6[R,M]	**Red (recorded)**	INTEGER Actual Red intensity value recorded for this colour code where a single source supplies the image, or a nominal Red intensity value for this colour code where more than one source supplies the image.
6[R,M]	**Green (recorded)**	INTEGER Actual Green intensity value recorded for this colour code where a single source supplies the image, or a nominal Green intensity value for this colour code where more than one source supplies the image.
6[R,M]	**Blue (recorded)**	INTEGER Actual Blue intensity value recorded for this colour code where a single source supplies the image, or a nominal Blue intensity value for this colour code where more than one source supplies the image.
5[R,O]	**Mathematical relation to other colour codes**	BASIC TEXT Mathematical relation to other colour codes (free text)
3[R,O]	SCANNING PARAMETERS	Provides information about the scanning process.
4[R,M]	**Pixel Spacing**	INTEGER Sample pixel spacing in microns at capture stage.
4[R,O]	**Rectified Image**	INTEGER (L) Image rectified after scanning. (Yes or No)

11 GEO DATA SUBSET

The Geo Data Subset (GDS) contains the actual collection of digital information representing physical and cultural characteristics of the Earth's surface. The GDS is composed of one or more layers. The GDS can support several data structures (see clause 5), however, data structures may not be mixed within a layer. Also, within a single GDS only one geographic reference system and projection is allowed.

Digital information may be represented by one of the following data structure types:

- Spaghetti vector data (Level 0 Topology);
- Chain-node vector data (Level 1 Topology);
- Planar graph vector data (Level 2 Topology);
- Full topological vector data (Level 3 Topology);
- Raster (Image) data (radiometric information pertaining to pixels); and
- Matrix data (non-radiometric information pertaining to points at regularly identified intervals).

Figure 11-1 illustrates the content of a Geo Data Layer within the GDS.

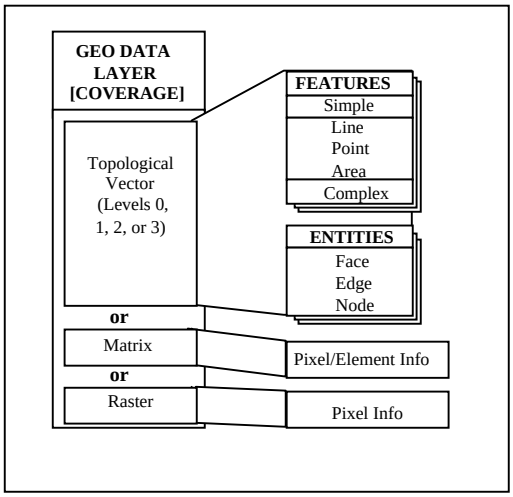


Figure 11-1 Geo Data Layer

The detailed information required for each layer of the GDS is specified below.

11.1 Vector Data

The logical sets of simple data elements necessary to capture the topological, spatial, descriptive feature / attribute and data quality information are contained in a Geo Data Layer. The Geo Data Layer consists of one or more files depending on the encapsulation.

The vector data may be implemented by either a feature-oriented data structure or a relational data structure. The feature-oriented approach treats the various Entities and Features as objects, with attributes. The relationships existing between them are accomplished by means of pointers. The relational approach stores the Entities, Features and attributes in tabular form and they are related by means of key columns.

This section provides a neutral description of the content of vector data. It does not describe the structure used to encapsulate the data that is described in the various encapsulations Annex A, B or C. However, the description below most closely resembles the Annex A record structured object based approach. This section is intended to provide compatibility between the content elements encapsulated in the various annexes. An actual data set would be in accordance with the structures described in Annex A, B or C.

11.1.1 Features / Entities [Primitives] Identification

A vector Geo Data Layer may consist of 11 different logical sets of simple data elements corresponding to Features, Entities [Primitives] or to their definitions.

Each Feature or Topological Entity [Primitive] is uniquely identified through one of the following logical set:

1[C,O]	Data Item A	
2[C,M]	Data Item B	
3[C,O]	Data Item C	
4[C,M]	Data Item D	INTEGER
	FEATURE IDENTIFICATION	
[V, M]	**Feature Type**	Type of the feature: LINE FEATURE (FL|*.LFT_ID), POINT FEATURE(FP|*.PFT_ID), AREA FEATURE (FA|*.AFT_ID), COMPLEX FEATURE(FC|*.CFT_ID)
[V, M]	**Unique ID**	INTEGER Unique identifier of a Feature.

[V, O]	**Security**	"T" | "S" | "C" | "R" | "U" Security level of the feature

TOPOLOGICAL ENTITY[PRIMITIVE] IDENTIFICATION		
[V, M]	**Entity [Primitive] Type**	Type of the Entity [Primitive]: EDGE (ED | EDG_ID), NODE (NO |END_ID | CND_ID), FACE (FE|FAC_ID), TEXT (TP|TXT_ID &*.TFT_ID)
[V, M]	**Unique ID**	INTEGER Unique identifier of a Entity [Primitive]
[V, O]	**Security**	"T" | "S" | "C" | "R" | "U" Security level of the feature pointed to.

11.1.2 Line Feature

The Line Feature logical set is used to relate contiguous topological edges into a line geographic object, and describe that object. At least one Simple Feature must exist for each Complex Feature.

LINE FEATURE
- COUNTERS
- COMPONENT EDGE(S)
- GENERAL DESCRIPTION
- ATTRIBUTE VALUE(S)
- RELATION(S) TO FEATURE(S)

2[V,D]	LINE FEATURE	FL | *.LFT_ID There must be at least one simple feature in the Geodata layer. There must be at least one simple feature for each complex feature.

3[V,O]	COUNTERS	Identifies the following group of entities that define the number of attributes and relations present for the feature.

4[V,M] **Number of Attributes**
4[V,M] **Number of Relations**
4[V,M] **Total Number of Component Edges**

*3[V,M]	COMPONENT EDGE(S)	Identifies the following group of entities that describe "Composed Of" relationships between the Line Feature and topological Edges. Occurs once for each Component Edge.

A line feature is an ordered set of line segments starting from one point and ending at another point. Consequently, to keep this notion of continuity, Edge pointers will appear in such a way that they will reflect the ordered sequence of the segments, or in other words, the orientation of the Line Feature. This orientation will not necessarily be the same as the orientation of each component Edge. To reflect this information Edge identification will be combined with an orientation flag.

4[V,M]	Edge Identification	(see 11.1.1)
4[V,M]	**Orientation flag**	"+" or "-" to specify the direction in which the Edge should be followed.

3[V,M]	GENERAL DESCRIPTION	Identifies the following group of entities that define the FACC code, Minimum Bounding Rectangle and Geographic Reference Point of the Line Feature

Information relating to the coordinate coding (units-format) is given for each Dataset [Library] in the Geo Reference Description and for each Layer [Coverage] in the Layer [Coverage] Metadata.

4 [V,M]	**FACC Identifier Code**	A 5-character FACC code, the first two of which are alphabetic characters and the last three of which are integers.

4 [V,O]	MINIMUM BOUNDING RECTANGLE	
5 [V,M]	**Minimum Easting/Longitude**	X Coordinate of the lower left corner of the MBR
5 [V,M]	**Minimum Northing/Latitude**	Y Coordinate of the lower left corner of the MBR
5[V,D]	**Minimum Elevation**	Z Coordinate of the lowest elevation within the MB. The presence or absence of this value must correspond to the presence or absence of elevation coordinates of the Edges
5[V,M]	**Maximum Easting/Longitude**	X Coordinate of the upper right corner of the MBR
5[V,M]	**Maximum Northing/Latitude**	Y Coordinate of the upper right corner of the MBR

5[V,D]	**Maximum Elevation**	Z Coordinate of the highest elevation within the MB. The presence or absence of this value must correspond to the presence or absence of elevation coordinates of the Edges
4[V,O]	GEOGRAPHIC REFERENCE POINT (GRP) SECTION	
5[V,M]	**Easting/Longitude**	X Coordinate of the GRP
5[V,M]	**Northing/Latitude**	Y Coordinate of the GRP
*3[V,O]	ATTRIBUTE VALUE(S)	Identifies the following group of entities that define characteristics of the feature. Occurs once for each attribute describing the feature.
4[V,M]	**Attribute Code**	The three alphabetic character of FACC Attribute Code associated with the FACC Feature Code.
4[V,M]	**Value Format**	The format according to which the following Attribute Value will be read: "A" | "I" | "R" | "L" | "S" (See Part 4 clause 5)
4[V,M]	**Attribute Value**	The value of the FACC attribute. This may be an enumerated value in I format or an "Actual Value" in A, I , L, S or R format. See Value Format, above.
*3[V,O]	RELATION(S) TO FEATURE(S)	(e.g., “Stacked On”). Occurs once for each relation type
4 [V,M]	**Relation Type**	The currently defined types are "CON" | "DIS | "ALT" | "STK" | "STU" corresponding to Conjunction, Disjunction, Alternative representation, Stacked On and Stacked-under, respectively. Stacked-on / under relationships are possible between Simple Features only.
*4[V,M]	RELATED FEATURE(S) IDENTIFICATION	Identifies the Features related to the Line Feature. Occurs once for each related feature. (See Clause 11.1.1)

11.1.3 Point Feature

The Point Feature logical set is used to relate a single topological node to a point geographic object, and it also describes that object. It contains the logical subsets described below.

POINT FEATURE
- COUNTERS
- COMPONENT NODE(S)
- GENERAL DESCRIPTION
- ATTRIBUTE VALUE(S)
- RELATION(S) TO FEATURE(S)

2[V,D]	POINT FEATURE	FP | *.PFT_ID There must be at least one simple feature in the Geodata layer. There must be at least one simple feature for each complex feature.
3[V,O]	COUNTERS	see Line Feature 11.1.2
*3[V,M]	COMPONENT NODE(S)	Identifies the following group of entities that describe "Composed Of" relationships between the Point Feature and topological Node(s). Occurs once for each Component Node.
4[V,M]	Node Identification	(See Clause 11.1.1)
3[V,M]	GENERAL DESCRIPTION	See Line Feature (Clause 11.1.2)
*3[V,O]	ATTRIBUTE VALUE(S)	See Line Feature (Clause 11.1.2)
*3[V,O]	RELATION(S) TO FEATURE(S)	See Line Feature (Clause 11.1.2)

11.1.4 Area Feature

11.1.4.1 Topological Level 3

Area Features relate contiguous topological Faces into an area geographic object, and describe that object.

AREA FEATURE
- COUNTERS
- COMPONENT FACE(S)
- GENERAL DESCRIPTION
- ATTRIBUTE VALUE(S)
- RELATION(S) TO FEATURE(S)

2[V,D]	AREA FEATURE	FA | *.AFT_ID There must be at least one simple feature in the Geodata layer. There must be at least one simple feature for each complex feature.
3[V,O]	COUNTERS	see Line Feature (Clause 11.1.2)
*3[V,M]	COMPONENT FACE(S)	Identifies the following group of entities that describe "Composed Of" relationships between the Area Feature and topological Face(s). Occurs once for each Component Face.
4[V,M]	Face Identification	(See Clause 11.1.1)
3[V,M]	GENERAL DESCRIPTION	See Line Feature (Clause 11.1.2)
*3[V,O]	ATTRIBUTE VALUE(S)	See Line Feature (Clause 11.1.2)
*3[V,O]	RELATION(S) TO FEATURE(S)	See Line Feature (Clause 11.1.2)

11.1.4.2 Topological Level 2, 1 and 0

Area Features relate topological Edges into boundaries of an area geographic object, and describe that object.

AREA FEATURE
- COUNTERS
- COMPONENT EDGE(S)
- GENERAL DESCRIPTION
- ATTRIBUTE VALUE(S)
- RELATION(S) TO FEATURE(S)

2[V,D]	AREA FEATURE	FA | *.AFT_ID There must be at least one simple feature in the Geodata layer. There must be at least one simple feature for each complex feature.

3[V,O]	COUNTERS	see Line Feature (Clause 11.1.2)

*3[V,M]	COMPONENT EDGE(S)	Identifies the following group of entities that describe "Composed Of" relationships between the Area Feature and topological Edges composing its boundary. Occurs once for each Component Edge.

The boundary of an area feature is an ordered set of line segments starting from one point and ending at another point. The boundary may be composed of one or more contiguous rings. Consequently, to keep this notion of ring, Edges will appear in such a way that they will reflect the ordered sequence of the segments. The orientation of the ring will not necessarily be the same as the orientation of each component Edge. To reflect this information, Edge identification will be combined with an orientation flag.

4[V,M]	Edge Identification	(see Clause 11.1.1)
4[V,M]	**Orientation flag**	"+" or "-" or "I" or "J" to specify the direction in which the Edge should be followed.

"+" **Forward**
Used with an edge that has the same orientation as needed for the outer ring of an area feature.

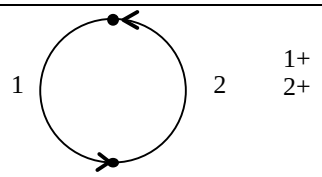


Figure 11-2 Code for Forward

"-" **Reverse**
Used for an edge with the opposite orientation to the clockwise cycle around an outer boundary of an area feature.

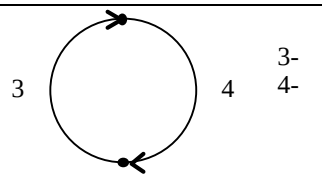


Figure 11-3 Code for Reverse

"I" **Inside Forward**:
Used for the beginning segment of a hole or island within an area feature when the edge has the same orientation as cycle direction (counterclockwise).

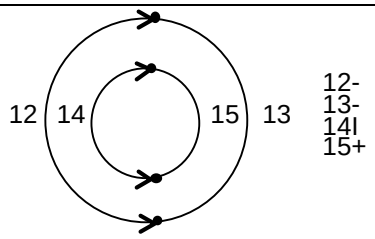


Figure 11-4 Code for Inside Forward

"J" **Inside Reverse**
Used for the beginning segment of a hole or island within an area feature when the edge has the opposite orientation to the cycle direction.

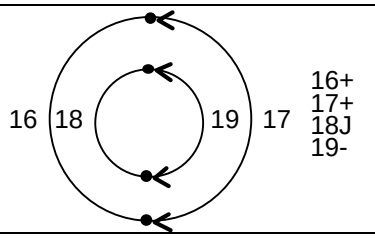


Figure 11-5 Code for Inside Reverse

3[V,M]	GENERAL DESCRIPTION	See Line Feature (Clause 11.1.2)

*3[V,O]	ATTRIBUTE VALUE(S)	See Line Feature (Clause 11.1.2)

*3[V,O]	RELATION(S) TO FEATURE(S)	See Line Feature (Clause 11.1.2)

11.1.5 Complex Feature

The Complex Feature is used to relate any combination of Simple features and other Complex features so long as the definition is not recursive.

COMPLEX FEATURE
- COUNTERS
- COMPONENT FEATURE(S)
- GENERAL DESCRIPTION
- ATTRIBUTE VALUE(S)
- RELATION(S) TO FEATURE(S)

2[V,O]	COMPLEX FEATURE	FC | *.CFT_ID
3[V,O]	COUNTERS	See Line Feature (Clause 11.1.2)
*3[V,M]	COMPONENT FEATURE(S)	Identifies the following group of entities that describe "Composed Of" relationships between the Complex Feature and other Simple and/or Complex Feature(s).
4[V,M]	Feature Identification	(See Clause 11.1.1)
3[V,M]	GENERAL DESCRIPTION	See Line Feature (Clause 11.1.2)
*3[V,O]	ATTRIBUTE VALUE(S)	See Line Feature (Clause 11.1.2)
*3[V,O]	RELATION(S) TO FEATURE(S)	See Line Feature (Clause 11.1.2)

11.1.6 Edge

The Edge logical set is used to describe the spatial, topological and attributional characteristics of topological Edges (as defined in 5.1 (topological relationships) and Part 4 (feature attributes). It contains the following logical subsets:

EDGE
- COUNTERS
- TOPOLOGICAL RELATIONSHIPS
- COMPOSED OF FEATURE(S)
- MINIMUM BOUNDING RECTANGLE
- ATTRIBUTE VALUE(S)
- COORDINATE SET(S)

2[V,D]	EDGE	ED | EDG_ID Vector Layers [Coverage] containing only nodes and no edges or faces may exist. At least one Edge must exist for every Line Feature.

3[V,O]	COUNTERS	Identifies the following group of entities that define the number of attributes, coordinate sets, and composed of Feature(s) for the Edge.

4[V,M]	**Number of Attribute values**	
4[V,M]	**Number of Coordinate sets**	
4[V,D]	**Number of Features "Composed Of" this Edge**	May be absent if null.

3[V3-2,M] [V1,O]	TOPOLOGICAL RELATIONSHIPS	Identifies the following group of entities that describe the relationships between the Edge and the other topological entities [primitives] (Faces and Nodes).

For an Edge, six relations may be established. “Left”, “Right”, “Start” and “End” are based on the digitizing direction of the Edge. These relations are mandatory or optional depending on the topological level to which the vector layer pertains.

4[V3,M]	FACE TOPOLOGY

5[V3,M]	Left Face Identification	Identification of the Face to the left of the Edge (see Clause 11.1.1)

5[V3,M]	Right Face Identification	Identification of the Face to the right of the Edge (see Clause 11.1.1)

4[V3-1,M]	EDGE-NODE TOPOLOGY

5[V3-1,M]	Start Node Identification	Identification of the Connected Node at the start of the Edge (see Clause 11.1.1)

5[V3-1,M]	End Node Identification	Identification of the Connected Node at the end of the Edge (see Clause 11.1.1)

4[V3-1,O]	WINGED-EDGE TOPOLOGY	
5[V3-1,M]	Right Edge Identification	Identification of the Right Edge
5[V3-1,M]	Left Edge Identification	Identification of the Left Edge
*3[V,O]	COMPOSED OF FEATURE(S)	Identifies the following group of entities that describe relationships between the Edge and the features to which the Edge belongs. Occurs once for each feature composed of the Edge.
4[V,M]	Feature Identification	(see Clause 11.1.1)
3[V,O]	MINIMUM BOUNDING RECTANGLE	Identifies the following group of entities that contains the two coordinate sets defining the extent of the MBR of the Edge.

Information relating to the coordinate coding (units-format) is given for each Dataset [Library] in the Geo Reference Description and for each Layer [Coverage] in the Layer [Coverage] Metadata.

4[V,M]	Minimum	Coordinates of Lower Left corner of the Minimum Bounding Rectangle (MBR)
5[V,M]	**Easting/Longitude**	X Coordinate of the MBR
5[V,M]	**Northing/Latitude**	Y Coordinate of the MBR
5[V,D]	**Elevation**	Z Coordinate of the MBR. The presence or absence of this value must correspond to the presence or absence of the elevation of the Upper Right corner of the MBR
4[V,M]	Maximum	Coordinates of Upper Right corner of the Minimum Bounding Rectangle (MBR)
5[V,M]	**Easting/Longitude**	X Coordinate of the MBR
5[V,M]	**Northing/Latitude**	Y Coordinate of the MBR
5[V,D3]	**Elevation**	Z Coordinate of the MBR. The presence or absence of this value must correspond to the presence or absence of the elevation of the Lower Left corner of the MBR.

*3[V,O]	ATTRIBUTE VALUE(S)	Identifies the following group of entities that define quality of the Edge

This logical set is used to describe the quality of an edge such as SOURCE, POSITIONAL ACCURACY, UP-TO-DATENESS and SECURITY (see Part 2 Clause 7). No other attributes may be associated with the Edge topological entity [primitive].

4[V,M]	**Attribute Code**	The three alphabetic character of FACC Attribute Code associated with the FACC Feature Code.
4[V,M]	**Value Format**	The format according to which the following Attribute Value will be read. "A" | "I" | "R"
4[V,M]	**Attribute Value**	The value of the FACC attribute. This may be an enumerated value in I format or an "Actual Value" in A, I or R format. See Value Format, above.

*3[V,M]	COORDINATE SET(S)	Identifies the following group of entities that describe the geometry of the Edge. Occurs once for each point necessary to describe the edge.

Information relating to the coordinate coding (units-format) is given for each Dataset [Library] in the Geo Reference Description and for each Layer [Coverage] in the Layer [Coverage] Metadata.

4[V,M]	**Easting/Longitude**	X Coordinate of a digitized point on the Edge
4[V,M]	**Northing/Latitude**	Y Coordinate of a digitized point on the Edge
4[V,D]	**Elevation**	Z Coordinate of a digitized point on the Edge. This value must be either consistently absent or consistently present.

11.1.7 Node

The Node logical set is used to describe the spatial, topological and attributional characteristics of topological Nodes (as defined in Clause 5.1 (topological relationships) and Part 4 (feature attributes)). It contains the following logical subsets.

NODE
- COUNTERS
- TOPOLOGICAL RELATIONSHIPS
- COMPOSED OF FEATURE(S)
- ATTRIBUTE VALUE(S)
- COORDINATE SET(S)

2[V3-1,M] [V0,M]	NODE	RTY = NO | END_ID | CND_ID Vector Layers [Coverage] containing no nodes may not exist except at level 0. At least one Node must exist for every Point Feature.

3[V,O]	COUNTERS	Identifies the following group of entities that define the number of attributes, coordinate sets, and composed of Feature(s) for the Node.

4[V,M]	**Number of Attribute values**	
4[V,M]	**Number of Coordinate sets**	The value for the "number of expected coordinate sets" must be "1".
4[V,D]	**Number of Features "Composed Of" this Edge**	May be absent if null.

3[V3,M]	TOPOLOGICAL RELATIONSHIPS	Identifies the following group of entities that describe the relationships between the isolated Node and its containing Face. The following logical set will contain null values for a connected node.

4[V3,M]	Containing Face Identification	Identification of the Face or Null (see Clause 11.1.1)

*3[V,O]	COMPOSED OF FEATURE(S)	Identifies the following group of entities that describe relationships between the Node and the Point features to which the Node belongs. Occurs once for each feature composed of the Node.
4[V,M]	Feature Identification	(see Clause 11.1.1)
*3[V,O]	ATTRIBUTE VALUE(S)	Identifies the following group of entities that define quality of the Node (see Edge, Clause 11.1.6)
3[V,M]	COORDINATE SET	Identifies the following group of entities that describe the coordinate set of the Node.

Information relating to the coordinate coding (units-format) is given for each Dataset [Library] in the Geo Reference Description and for each Layer [Coverage] in the Layer [Coverage] Metadata.

4[V,M]	**Easting/Longitude**	X Coordinate of the Node
4[V,M]	**Northing/Latitude**	Y Coordinate of the Node
4[V,O]	**Elevation**	Z Coordinate of the Node.

11.1.8 Face

The Face logical set is used to describe the spatial, topological and attributional characteristics of topological Faces (as defined in 5.1 (topological relationships) and Part 4 (feature attributes)). It contains the following logical subsets.

FACE
- COUNTERS
- COMPOSED OF FEATURE(S)
- MINIMUM BOUNDING RECTANGLE
- ATTRIBUTE VALUE(S)

2[V3,M]	FACE	FE | FAC_ID

3[V3,O]	COUNTERS	Identifies the following group of entities that define the number of explicit attributes, coordinate sets, and composed of Feature(s) for the Face.

4[V3,M]	**Number of Attibute values**	
4[V3,M]	**Number of Coordinate sets**	Null. The number of coordinate sets is null but is carried for the sake of consistency with other counter logical sets at the topological level.
4[V3,D1]	**Number of Features "Composed Of" this Face**	May be absent if null.

*3[V,O]	COMPOSITION RELATIONSHIP(S)	Identifies the following group of entities that describe relationships between the Face and the Area features to which the Face belongs.

*3[V,O]	COMPOSED OF FEATURE(S)	Identifies the following group of entities that describe relationships between the Face and the Area features to which the Face belongs. Occurs once for each feature composed of the Face.

4[V,M]	Feature Identification	(See Clause 11.1.1)

3[V,O]	MINIMUM BOUNDING RECTANGLE	Identifies the following group of entities that contains the two coordinate sets defining the extent of the MBR of the Face. (see Edge, Clause 11.1.6)

*3[V,O]	ATTRIBUTE VALUE(S)	Identifies the following group of entities that define quality of the Face (see Edge, Clause 11.1.6)

11.1.9 Text Placement

The Text Logical set is used to describe the characteristics of cartographic text for the purposes of annotation. It contains the following logical subsets.

TEXT PLACEMENT
- COUNTERS
- POINTED TO FEATURE(S)
- ATTRIBUTE VALUE(S)
- TEXT
- COORDINATE SET(S)

2[V,O]	TEXT PLACEMENT	TP | TXT_ID & *.TFT_ID

3[V,O]	COUNTERS	Identifies the following group of entities that define the number of attributes, coordinate sets, and Feature(s) Pointed to by this text.

4[V,M] **Number of Attributes values**
4[V,M] **Number of Coordinate Sets**
4[V,M] **Number of Features Pointed to by this text**

3[V,O]	POINTED TO FEATURE(S)	Identifies the following group of entities that describe the relationships between the Text Placement data and the features to which the Text Placement applies.

4[V,M]	Feature Identification	(see Clause 11.1.1)

*3[V,O]	ATTRIBUTE VALUE(S)	Identifies the following group of entities that define quality of the Text (see Edge, 11.1.6)

Note that the attributes relevant to Text Placement are concerned solely with the presentation of text. While such attributes will vary from application to application, the first presentation attribute is defined to be the text character cell size.

4[V,M]	**Attribute Code**	The three alphabetic character FACC Attribute Code associated with the FACC Feature Code.
4[V,M]	**Value Format**	The format according to which the following Attribute Value will be read. "A" | "I" | "R"
4[V,M]	**Attribute Value**	The value of the FACC attribute. This may be an enumerated value in I format or an "Actual Value" in A, I or R format. See Value Format, above.

3[V,M]	TEXT	Identifies the following entity that describe the actual text as a string of characters

4[V,M]	**Text**	Text associated with the identified feature

*3[V,M]	COORDINATE SET(S)	Identifies the following group of entities that describe the geometric base for the Text placement. Occurs once for each point.

Information relating to the coordinate coding (units-format) is given for each Dataset [Library] in the Geo Reference Description and for each Layer [Coverage] in the Layer [Coverage] Metadata.

4[V,M]	**Easting/Longitude**	X Coordinate of a digitized point.
4[V,M]	**Northing/Latitude**	Y Coordinate of a digitized point.

11.1.10 Data Dictionary

The purpose of the data dictionary is to define new features or new attributes that may be used in the same manner as those predefined in FACC. Therefore, the definition must take the same form as FACC.

A FACC definition of a **feature** consists of:

a code consisting of two characters followed by 3 numerics
a short name
a descriptive definition.

A FACC definition of an **attribute** consists of:

a code consisting of 3-character acronym (e.g. BFC, AAH)
a short name (e.g., Building Function Category, Absolute Horizontal Accuracy)

Either for each entry of an enumerated list of values the following must be defined:
an integer value number (e.g., 93)
an attribute value definition (e.g., "Dependents Housing/Bivouac Area" for BFC 93)

Or for an attribute which takes on an actual value the following must be defined:
an attribute value format (A | I | R, e.g., R)
an attribute value definition (e.g. "Actual Value (Metres, Real Number)" for Absolute Horizontal Accuracy)
attribute value measurement unit (see Part 3 Clause 10) (e.g. M for metres)

11.1.10.1 Feature / Attribute Entry

The Feature / Attribute Entry is used to define additional feature or attribute codes as part of the data dictionary facility (see clause 6.2).

2[V,D]	FEATURE/ATTRIBUTE ENTRY	Feature (or attribute) entry will be present if any Feature (or attribute) transmitted in the Vector Geodata file is not described in FACC (DIGEST Part 4)

This logical set is used to define the attribute or feature in terms of both the code or label and its definition. In addition, it can be used to describe both the originator of the feature or attribute and the source of its definition. The lexical level is given and is to be applied to all free text simple data element in this logical set.

3[V,M]	**Feature or Attribute**	"1" | "2" This is a Feature (1) or Attribute (2)
3[V,M]	**Designation**	The 5-character Feature code corresponding to FACC, i.e. two alphabetic characters followed by three integers, or the 3-character Attribute code corresponding to FACC, i.e. normally the English acronym for the attribute.
3[V,O]	**Source for the Information**	Free Text
3[V,O]	**Description of the Originator**	Free Text
3[V,O]	**Short Name Free Text**	Free Text
4[V,M]	**Definition**	Free Text

11.1.10.2 Feature / Attribute Association

The Feature / Attribute Association Logical set is used to describe the association between a particular feature and a set of attributes as part of the data dictionary facility (see clause 6.2). FACC allows any attributes in the catalogue to be associated with a feature as long as there is a reasonable and logical connection. Nevertheless, it may be useful to describe a set of attributes that would normally be associated with a feature. The existence of the list of associated attributes does not restrict other attributes from being implemented.

2[V,O]	FEATURE/ATTRIBUTE ASSOCIATION	
3[V,M]	**Feature Label**	The 5-character Feature code corresponding to FACC, i.e., two alphabetic characters followed by three integers.
3[V,M]	**Attribute Label**	The 3-character Attribute code corresponding to FACC, i.e. normally the English acronym for the attribute.

11.1.10.3 ATTRIBUTE / VALUE ASSOCIATION

The Attribute / Value Association is used to define the set of allowable values for a given attribute as part of the data dictionary facility (see clause 6.2).

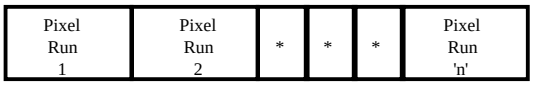
2[V,D1]	ATTRIBUTE/VALUE ASSOCIATION	
3[V,M]	ATTRIBUTE FORMAT DESCRIPTION	Identifies the following group of entities that define the format for a given attribute
4[V,M]	**Attribute Label**	The three character Attribute code corresponding to FACC, i.e., normally the English acronym for the attribute.
4[V,M]	**Enumerated or Actual Value**	"EN" | "AV" for Enumerated or Actual Value
4[V,D]	**Attribute value format**	"A" | "I" | "R" | "L" Format type: alphanumeric, integer, real, or Lexical. For Actual Value attributes only for Actual Values
*3[V,D]	ATTRIBUTE VALUE(S) DESCRIPTION	Identifies the following group of entities that define the allowable values for the given attribute. Attribute/value association record will be present for each attribute transmitted in the Vector Geodata file and not present in FACC.

4[V,M]	**Attribute Values**	The value of an enumerated attribute.
4[V,M]	**Attribute value definition**	Free Text, e.g. "Armoury " (for BFC 093)

11.2 Raster or Matrix Data Format

11.2.1 Pixel or Element Encoding Mechanism

The "scan line" consists of the following logical data elements:



For Matrix data, the "profile" consists of a repetition of element run. The following data items are repeated for each pixel or element run until all the pixels in a "scan line" or "profile" are accounted for.

- Optional Pixel or Element Count - The number of adjacent pixels or elements with the same value as the following "Pixel or Element Value" data item. Use for Run-Length Encoding Only.

- Pixel or Element Value - For RGB type data this is the intensity of the radiation. For colour coded data this is a numeric code that represents a colour or quality, defined in a lookup table. For Matrix data this is the value of the Attribute.

The length of the binary subfields are defined (in bits) in the Layer [Coverage] Metadata by the following simple data elements:

- Value Length: Number of bits per pixel or element value (before compression if compressed).

- Value Type: Specifies the pixel or element value type as integer, 2's complement signed integer, real values, complex or single bit (bi-level). Value Type is defaulted to integer.

- Count Length: Number of bits per pixel or element count.

11.2.2 Compression Mechanisms

The compression mechanisms provided by DIGEST are dependent upon the encapsulation. The Compression mechanism used for a specific Layer [Coverage] is Layer [Coverage] Metadata by the following simple data elements:

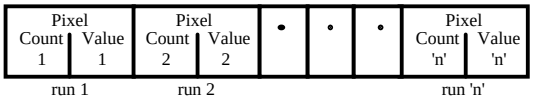
- Compression Code: A code which uniquely identifies the compression mechanism used: Bi-level (CI,M1), RLE (RLE), JPEG (JPEG, C3, M3, C5, M5), VQ (C4, M4). The following codes are reserved for future compression algorithms : C6, M6, C7, M7, C8, M8. The description of the image compression algorithms other than Run Length Encoding are found in ITU-T T.4 AMD2, MIL-STD-188-198A profile of ISO/IEC 10918-1, ISO/IEC 10918-3, and ISO/IEC 12087-5 (VQ compression). Also found in these references are the conditions the data must meet before a given compression method can be applied meaningfully.

- Compression ratio: The average value of the compression ratio.

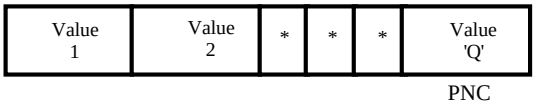
11.2.3 Run Length Encoding Mechanism

The Pixel or Element Count defines the number of pixels or Elements with the value of the following Pixel or Element Value. The sum of all the Pixel or Element Counts for a Scan Line or Profile will be equal to the Number of Pixel or Element per Subblock West to East (PNC).

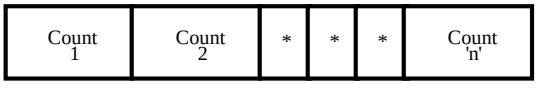
$$\text{i.e. PNC} = \sum_{i=1}^{n} (\text{pixel count})_i$$



If Count Length is set to 0 (zero), Count length may then be omitted and the value of the count is assumed to be one in all cases and the scan line or profile structure reduces to an uncompressed form as follows:



In the case of colour coded images separated into bands, each containing only two colours (e.g,. black and white, or brown and transparent), then Value length can be set to 0 (zero) and the scan line reduces to a string of count elements as follows:



The convention used is that the first count in this scan line refers to the colour defined for the “off” state, which is the Upper Wavelength Limit in Layer [Coverage] Metadata. This count element may therefore be zero. Subsequent count elements alternate in the colour they apply to. As before, the sum of all the Pixel Counts for a Scan Line will be equal to the Number of Pixel per Subblock West to East.

11.2.4 Mechanism For Varying Scan Direction and Pixel or Element Ordering

The scan direction and ordering of the scan lines within the total image may be varied from image to image, if required, by the use of Dataset Parameters defined in the Layer [Dataset] Metadata. These parameters and their permissible values are:

Parameter	**Description and range of values**
Column sequence	0 = left to right 1 = right to left
Row sequence	0 = bottom to top 1 = top to bottom
Pixel or Element Order	0 = Column in row in band in subblock (Band interleaved by block) 1 = Row in column in band in subblock 2 = Column in row in subblock in band (Band Sequential) 3 = Row in column in subblock in band 4 = Column in band in row in subblock (Band interleaved by pixel) 5 = Row in band in column in subblock

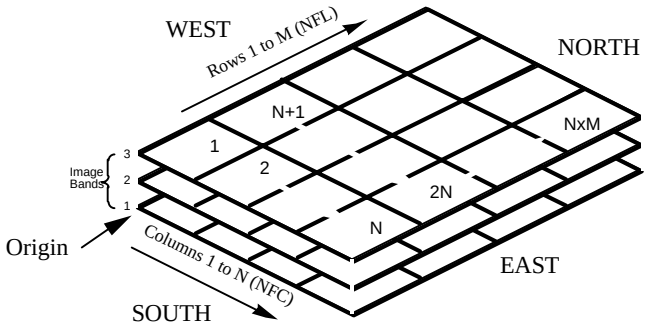


Figure 11-6 Raster Scan Lines (a)

To interpret the meaning of COD, ROD and POR, the convention adopted is as defined in Clause 5.3. The convention used is analogous to the Cartesian coordinate system in that on a normally-oriented image the columns are numbered from left to right (x-axis), the rows bottom to top (y-axis), and the layers from the lower to higher (z-axis), as defined by the ordering in Band Identifications in the General Information File. This is assumed for these examples to be red (first), green (second) and blue (third).

A normally-oriented image of a map would be as shown in Figure 11-11a with the origin of the numbering system at the SW corner of the lower (red) band, and the scan direction along the rows. The value of the fields COD, ROD and POR would be zero.

The subblocks may be of any agreed size of rectangle (defined by PNC and PNL), and sub-divide the image into sub-images for convenience of access. They are ordered in precisely the same order as the pixels within them, as shown in Figure 11-11a.

The scan lines for this pixel ordering, for subblocks where PNL=200 pixels and PNC=100 pixels, with the column and row numbers referred to in absolute terms, would be as follows:

row 1, col 1.....	to.....	col 100	)	)	
row 2, col 1.....	to.....	col 100	)	)	
row 3, col 1.....	to.....	col 100	)	)	
:			) red band	)	
				)	
:			)	)	
:			)	)	
row 200,col 1.....	to.....	col 100	)	)	
				)	
row 1, col 1.....	to.....	col 100	)	)	
:			) green band	)	Subblock 1
:			)	)	
row 200,col 1.....	to.....	col 100	)	)	
				)	
row 1, col 1.....	to.....	col 100	)	)	
:			)	)	
:			) blue band	)	
:			)	)	
row 200, col 1.....	to.....	col 100	)	)	
row 1, col 101.....	to.....	col 200	)	)	
			)	)	
:			) red band	)	
:			)	)	
row 200,col 101.....	to.....	col 200	)	)	
				)	
row 1, col 101.....	to.....	col 200	)	)	
:			)	)	
:			)green band	)	Subblock 2
			)	)	

row 200,col 101.....	to.....	col 200	)	)
				)
row 1,col 101.....	to.....	col 200	)	)
:			)	)
:			) blue band	)
:			)	)
row 200,col 101.....	to.....	col 200	)	)

etc.

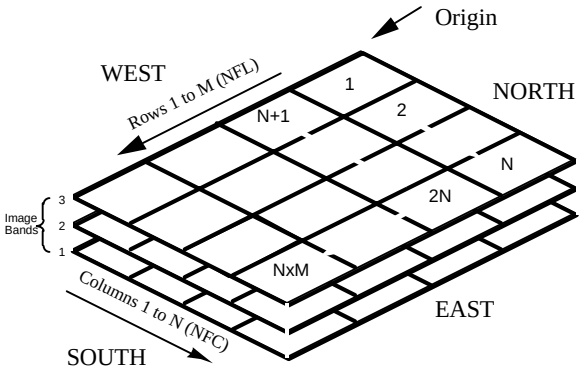


Figure 11-7 Raster Scan Lines (b)

If ROD is set to 1 then the rows are ordered in reverse from top to bottom and the subblock ordering follows suit as shown in Figure 11-11b. The origin is now at the NW corner of the lower (red) band. The scan lines will follow the same numbering pattern as in the example in the previous paragraph.

If ROD and COD are both 1, then the origin is at the NE corner. If ROD is zero and COD is 1, the origin is at the SE corner. In all the above cases the scan lines will follow the pattern defined above. ROD and COD are used merely to indicate the location of the origin.

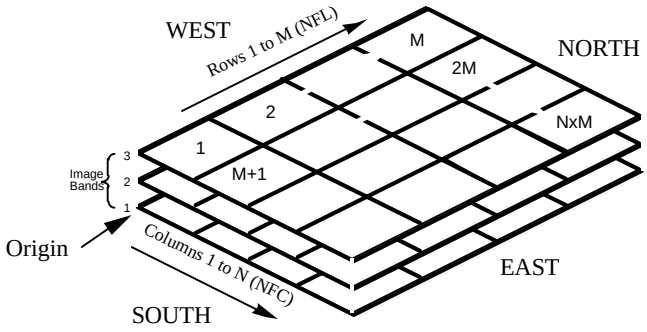


Figure 11-8 Raster Scan Lines (c)

If POR is set to 1 this indicates a direction of scan along the columns. For COD and ROD set to zero this is as shown in Figure 11-11c.

In this case, the scan lines will follow the pattern defined as follows:

row 1, col 1.....	to.....	col 200	)	)	
row 2, col 1.....	to.....	col 200	)	)	
row 3, col 1.....	to.....	col 200	)	)	
:			) red band	)	
				)	
:			)	)	
:			)	)	
row 100,col 1.....	to.....	col 200	)	)	
				)	
row 1, col 1.....	to.....	col 200	)	)	
:			) green band	)	Subblock 1
:			)	)	
row 100,col 1.....	to.....	col 200	)	)	
				)	
row 1, col 1.....	to.....	col 200	)	)	
:			)	)	
:			) blue band	)	
:			)	)	
row 100, col 1.....	to.....	col 200	)	)	
row 1, col 101.....	to.....	col 200	)	)	
			)	)	
:			) red band	)	
:			)	)	
row 100,col 201.....	to.....	col 400	)	)	
				)	
row 1, col 201.....	to.....	col 400	)	)	
:			)	)	
:			)green band	)	Subblock 2

			)	)	
row 100,col 201.....	to.....	col 400	)	)	
				)	
row 1,col 201.....	to.....	col 400	)	)	
:			)	)	
:			) blue band	)	
:			)	)	
row 100,col 201.....	to.....	col 400	)	)	

etc.

If POR is set to 4 while COD and ROD are zero then the row and column numbering remains as for Figure 11-11a but the scan lines are ordered as follows:

row 1, col 1	to	col 100	(red band)	)	
row 1, col 1	to	col 100	(green band)	)	
row 1, col 1	to	col 100	(blue band)	)	
	:			)	Subblock 1
row 200, col 1	to	col 100	(red band)	)	
row 200, col 1	to	col 100	(green band)	)	
row 200, col 1	to	col 100	(blue band)	)	
row 1 , col 101	to	col 200	(red band)	)	
row 1 , col 101	to	col 200	(green band)	)	
row 1 , col 101	to	col 200	(blue band)	)	
	:			)	Subblock 2
row 200, col 101	to	col 200	(red band)	)	
row 200, col 101	to	col 200	(green band)	)	
row 200, col 101	to	col 200	(blue band)	)	

etc.

The combinations are numerous but the above examples and explanations should indicate the manner in which the COD, ROD and POR subfields are to be used. When there is only one band in the image the level of complexity is considerably reduced.

11.2.5 Colour Representation

Colour representation is in the form of colour-code. Each colour-code is stored in a colour look-up table together with its CIE (x, y, Y) reference and nominal RGB intensity values. Where a colour-code represents a transition colour which is a known additive of two or more other coded colours then a mathematical expression defining the mixture will be given in subfield FRM. Where given, the expression will be of the following form :

```
P1*(CC1) + P2*(CC2) +. . . Pn*(CCn);

where P is the proportion,

CC is the colour-code (i.e. label CCD),
```

and $\sum_{i=1}^{n} P_i = 1$

Example:

If the colour that is coded 5 (CC5) is an additive mixture of 0.25 of CC3 and 0.75 of CC6 then the expression for CC5 will be:

0.25*(3) + 0.75*(6)

or 0.75*(6) + 0.25*(3)

The use of the expression is to allow easy modification of the colours for display purposes. For example, if it is necessary to alter the displayed colour for colours 3 and for 6 then the changes to the related colour 5 can be directly computed as follows:

Where R3, G3, B3 and R6, G6, B6 are the desired signal strengths / luminosities of the colours 3 and 6 respectively, then :

R5 = 0.25*R3 + 0.75 *R6
G5 = 0.25*G3 + 0.75*G6
B5 = 0.25*B3 + 0.75*B6

Note: The CIE stimuli (X,Y,Z) may be substituted for R,G,B in the above expression giving:

X5 = 0.25*X3 + 0.75*X6
Y5 = 0.25*Y3 + 0.75*Y6
Z5 = 0.25*Z3 + 0.75*Z6

Where given the CIE reference (x,y,Y) then :

$$X = \frac{x*Y}{y}$$

$$Y = Y$$

$$Z = \frac{Y}{y} * (1- x - y)$$

Section Three ENCAPSULATION / ENCODING and MEDIA STANDARDS

The aim of these standards is to reduce the difficulty of exchanging information between different users and different computing systems. Use of the standards in the following paragraphs will facilitate the exchange of digital data, by defining:

- syntax / data encoding;
- character representation; and
- media standards, including file naming / labelling conventions.

12 ENCAPSULATION / ENCODING

12.1 General Rules

12.1.1 Syntax / Encoding Rules

Encapsulations are defined in this document making use of three ISO syntax / encoding standards, as well as one table-oriented format specified within this document. These encapsulations are:

- ISO 8211 - Specification for a data descriptive file for information interchange (Annex A);
- ISO 8824 - Open Systems Interconnection - Specification of Abstract Syntax Notation One (ASN.1) (Annex B);
- Vector Relational Format (VRF) - (Annex C) (for Vector data only);
- JTC1/SC24 ISO IS 12087-5 Basic Imagery Interchange Format (BIIF) in the form of IIF (Annex D) (for Raster, Image, and Matrix data only)

12.1.2 Character Representation

Two types of character encoding are defined in this standard. Basic Text is used for all text sub fields which are alphanumeric identifiers, labels etc., or must be in ASCII only. It makes use of the ISO 646 international reference version standard which corresponds to ASCII. A General Text format is used for all text fields that may contain descriptions or names expressed in any language. Three lexical levels of alphabetic repertoire of General text characters are defined (Lexical Level 0 corresponds to Basic Text). (A complete description is given in Part 3 Clause 5.)

0 - Primary ASCII text (ISO 646)
1 - Extended ASCII (including accents for Western European Latin alphabet based languages ISO 8859 Part 1 (Latin Alphabet 1))
2 - Universal Character Set (Base Multilingual plane of ISO 10646) (note: 2 bytes per character)

Note: The use of ISO 6937 has been abandoned since it is obsolete.

12.1.3 Special Symbol

Line Separator Symbol - a back slash (\) is used for the line separator symbol in the originator and addressee elements in DIGEST Information Package Metadata Subset. The function of the line separator symbol is to allow a particular portrayal of a text, without changing its logical structure. The line separator symbol is not a delimiter symbol and must be interpreted as a "carriage return". An example of the use of this symbol is depicted below:

```
D MIL SVY \ ELMWOOD AVENUE \ FELTHAM;
```

12.1.4 ASCII Table of Contents

DIGEST information packages may contain a mixture of data types and encapsulation methods. To aid understanding of such DIGEST information packages, an ASCII Table of Contents file is included. This file requires no special software and presents a quick overview of the DIGEST information package contents. The file also makes clear what the encapsulation method is for the DIGEST Information Package Metadata Subset where additional details can be found about the DIGEST information package (see Section Two, Clause 9 and Annex E).

12.2 Implementation Rules

12.2.1 ISO 8211 Encapsulation (Annex A)

The building blocks of an ISO 8211 encapsulated DIGEST information package are the following:

- File(s), identified by a File name, and compliant to a defined File structure composed of
- Records(s), identified by a Record type and Id number, and compliant to a defined Record structure composed of
- Field(s), identified by a TAG, and compliant to a defined Field structure composed of
- Subfield(s), identified by a label and given a specific data type and length. Each Subfield value corresponds to a specific DIGEST data element value. Subfield data types must be compatible with generic DIGEST data element types.

The following repetition mechanism may exist within an ISO 8211 encapsulated DIGEST information package:

- Repeating Files: several files compliant to the same file structure identified by different file names may exist within a DIGEST information package;
- Repeating Records: several records of the same record type, and compliant to the same record structure are repeated within a file; those records are sequential within the file and their Ids are sequential beginning with 1;

- Repeating Fields: several fields identified by the same TAG, and compliant to the same field structure are repeated within a record; those fields are sequential within the record;
- Arrays of Subfields: a specific field structure where the set of composing subfields is repeated within the field.

Clauses 12.2.1.1 to 12.2.1.7 document the correspondence between DIGEST data elements and ISO 8211 encapsulation for the Metadata subsets. Subfields are designated by the following pattern: <Record type>.<Field TAG>.<Subfield Label>

12.2.1.1 DIGEST Information Package Metadata in ISO 8211

The DIGEST Information Package Metadata Subset is transmitted within the Transmittal Header File (THF), including two Records the Transmittal Description Record (THF), and the Security and Update Record (LCF).

DATABASE CONTEXT is omitted and the DIGEST INFORMATION PACKAGE IDENTIFICATION, the EXCHANGE CONTEXT and the number of Datasets / Libraries are transmitted within the Transmittal Header Field (THF.VDR).

2 [C,O]	DATABASE CONTEXT	(OMITTED)
2[C,M]	DIGEST INFORMATION PACKAGE IDENTIFICATION	
3[C,M]	**identifier**	THF.VDR.URF
3[C,M]	**edition number**	THF.VDR.EDN
3[C,M]	**exchange date**	THF.VDR.CDV07
2[C,O]	EXCHANGE CONTEXT	
3[C,M]	**originator**	THF.VDR.VOO
3[C,O]	**addressee**	THF.VDR.ADR
2[C,M]	**number of Datasets/Libraries**	THF.VDR.NOF

CONTENT: DATASET [LIBRARY] DESCRIPTION is transmitted within one or possibly two repeating Fields: the Dataset Description Field (THF.FDR) and the Up-to-dateness fields (LCF.QUV) which in that case occurs exactly the same number of times as the Dataset Description Field.

*2[C,M]	CONTENT: DATASET [LIBRARY] DESCRIPTION	
3[C,M]	IDENTIFICATION	
4[C,M]	**designation**	THF.FDR.NAM
4[C,O]	**description**	(OMITTED)
4[C,O]	**dataset type**	THF.FDR.PRT
4[C,O]	**structure**	THF.FDR.STR
4[C,D]	**encapsulation**	THF.FDR.ENC

3[C,M]	WGS84 MBR	
4 [C,M]	**Longitude of SW Corner**	THF.FDR.SWO
4 [C,M]	**Latitude of SW Corner**	THF.FDR.SWA
4 [C,M]	**Longitude of NE Corner**	THF.FDR.NEO
4 [C,M]	**Latitude of NE Corner**	THF.FDR.NEA
3[C,D]	SPECIFICATION	
4[C,M]	DIGEST SPECIFICATION	
5[C,M]	**edition id**	LCF.QUV.SRC1
5[C,M]	**amendment**	LCF.QUV.SPA1
5[C,M]	**edition date**	LCF.QUV.CDV12
4[C,O]	PRODUCT SPECIFICATION	
5[C,M]	**edition id**	LCF.QUV.SRC2
5[C,M]	**amendment**	LCF.QUV.SPA2
5[C,M]	**edition date**	LCF.QUV.CDV22

SPECIFICATION is transmitted within the Up-to-dateness field (LCF.QUV) which in that case does not repeat.

2[C,D]	SPECIFICATION	
3[C,M]	DIGEST SPECIFICATION	
4[C,M]	**edition id**	LCF.QUV.SRC1
4[C,M]	**amendment**	LCF.QUV.SPA1
4[C,M]	**edition date**	LCF.QUV.CDV12
3[C,O]	PRODUCT SPECIFICATION	
4[C,M]	**edition id**	LCF.QUV.SRC2
4[C,M]	**amendment**	LCF.QUV.SPA2
4[C,M]	**edition date**	LCF.QUV.CDV22

SECURITY AND RELEASE is transmitted within the Security and Release field (LCF.QSR).

2[C,M]	SECURITY AND RELEASE	
3[C,M]	**Security Classification**	LCF.QSR.QSS
3[C,M]	**Downgrading**	LCF.QSR.QOD
3[C,O]	**Downgrading date**	LCF.QSR.CDV10
3[C,M]	**Releasability**	LCF.QSR.QLE

12.2.1.2 Dataset [Library] Metadata: General Information in ISO 8211

The General Information is transmitted as part of the General Information File (GEN) which includes two Records: the General Information Record (GIN), also used for the transmission of the Layer [Coverage] Metadata and repeating once for each Layer [Coverage] Metadata, and the Dataset Description Record (DSS).

DATABASE IDENTIFICATION is transmitted within the Dataset Id Field (GIN.DSI) which for backward compatibility is repeated with exactly the same content within each occurrence of the General Information Record.

2[C,M]	DATASET IDENTIFICATION	
3[C,M]	**designation**	GIN.DSI.NAM
3[C,O]	**description**	(OMITTED)
3[C,O]	**dataset type**	GIN.DSI.PRT
3[C,O]	**structure**	(OMITTED)
3[C,O]	**encapsulation**	(OMITTED)

CONTENT: LAYER [COVERAGE] is transmitted as part of the Dataset Parameters Field (GIN.SPR) and of the General Information Field (GIN.GEN) within the repeating General Information Record (GIN) also used for the transmission of the Layer [Coverage] Metadata

*2[C,M]	CONTENT: LAYER [COVERAGE]	
3[C,M]	IDENTIFICATION	
4[C,M]	**designation**	GIN.SPR.BAD = file name
4[C,O]	**description**	(OMITTED)
4[C,M]	**structure**	GIN.GEN.STR
4[C,D]	**encapsulation**	GIN.GEN.ENC
3[C,O]	WGS84 MBR	
4[C,M]	**Longitude of SW Corner**	GIN.GEN.SWO
4[C,M]	**Latitude of SW Corner**	GIN.GEN.SWA
4[C,M]	**Longitude of NE Corner**	GIN.GEN.NEO
4[C,M]	**Latitude of NE Corner**	GIN.GEN.NEA

NUMBER OF COMPONENTS is transmitted within the Dataset Description Field (DSS.DRF).

2[C,O]	NUMBER OF COMPONENTS	
3[C,M]	**Number of Horizontal Accuracy Sub-regions**	DSS.DRF.NSH
3[C,M]	**Number of Vertical Accuracy Sub-regions**	DSS.DRF.NSV
3[C,M]	**Number of Positional Accuracy Sub-regions**	DSS.DRF.NSP
3[C,M]	**Number of Layers**	DSS.DRF.NOZ
3[C,M]	**Number of Source Descriptions**	DSS.DRF.NOS

12.2.1.3 Dataset [Library] Metadata: Geo Reference Description in ISO 8211

The Geo Reference Description is transmitted within the Geo Reference File (GER) which includes at least one Record the Geo Reference Record (GEO) and possibly repeating Grid Description Records.

Coordinate System Type, Coordinate units and GEODETIC PARAMETERS are transmitted within the Geo Parameters Field (GEO.GEP).

2[C,M]	**Coordinate System Type**	GEO.GEP.TYP
2[C,M]	**Coordinate Units**	GEO.GEP.UNI
2[C,M]	GEODETIC PARAMETERS	
3[C,M]	HORIZONTAL DATUM	
4[C,M]	**Geodetic Datum Name**	GEO.GEP.DAG
4[C,M]	**Geodetic Datum Code**	GEO.GEP.DCD
3[C,M]	GEODETIC ELLIPSOID	
4[C,M]	**Ellipsoid Name**	GEO.GEP.ELL
4[C,M]	**Ellipsoid Code**	GEO.GEP.ELC
3[V/A,D]	VERTICAL DATUM	
4[V/A,M]	**Vertical Datum Reference**	GEO.GEP.DVR
4[V/A,M]	**Code of Vertical Reference**	GEO.GEP.VDCdvr
3[V/A,D]	SOUNDING DATUM	
4[V/A,M]	**Sounding Datum Name**	GEO.GEP.SDA
4[V/A,M]	**Sounding Datum Code**	GEO.GEP.VDCsda

PROJECTION is transmitted within the Projection Field (GEO.PRR).

2[C,D]	PROJECTION	
3[C,M]	**Projection Name**	GEO.PRR.PRN
3[C,M]	**Projection Code**	GEO.PRR.PCO
3[C,M]	PROJECTION PARAMETER(S)	
4[C,M]	**Parameter**	GEO.PRR.PAA (PAB, PAC, PAE, ...PAZ)
3[C,D]	PROJECTION FALSE ORIGIN	
4[C,M]	**X false origin**	GEO.PRR.XOR
4[C,M]	**Y false origin**	GEO.PRR.YOR

GRID SYSTEM is transmitted within the Geo Parameters Field (GEO.GEP).

2[C,D]	GRID SYSTEM	
3[C,M]	**Grid code**	GEO.GEP.GRD
3[C,O]	**Grid description**	GEO.GEP.GRN
3[C,D]	**Grid Zone Number**	GEO.GEP.ZNA

Z Values False Origin is transmitted within the Projection Field (GEO.PRR).

2[C,D]	**Z Values False Origin**	GEO.PRR.ZOR

REGISTRATION POINT(S) are transmitted within the Registration Point Field (GEO.RPR) which contains an array of subfields with one column per registration point.

*2[C,O]	REGISTRATION POINT(S)	
3[C,M]	**Registration Point ID**	GEO.RPR.PID
3[C,M]	**Longitude/Easting**	GEO.RPR.LON
3[C,M]	**Latitude/Northing**	GEO.RPR.LAT
3[C,D]	**Elevation**	GEO.RPR.ZVL
3[C,M]	**Local X coordinate**	GEO.RPR.DIX
3[C,M]	**Local Y coordinate**	GEO.RPR.DIY
3[C,D]	**Local Z coordinate**	GEO.RPR.DIZ
3[C,D]	**Located Layer ID**	GEO.RPR.BAD

DIAGNOSTIC POINT(S) are transmitted within the Diagnostic Point Field (GEO.DPR) which contains an array of subfields with one column per diagnostic point.

*2[C,O]	DIAGNOSTIC POINT(S)	
3[C,M]	**Diagnostic Point ID**	GEO.DPR.PID
3[C,M]	**Longitude/Easting**	GEO.DPR.LON
3[C,M]	**Latitude/Northing**	GEO.DPR.LAT
3[C,D]	**Elevation**	GEO.DPR.ZVL
3[C,M]	**Local X coordinate**	GEO.DPR.DIX
3[C,M]	**Local Y coordinate**	GEO.DPR.DIY
3[C,D]	**Local Z coordinate**	GEO.DPR.DIZ
3[C,D]	**Controlled Layer ID**	GEO.DPR.BAD

The LOCATION GRID(S) are transmitted within the repeating Grid Description Record (GRD).

*2[R/A,O]	LOCATION GRID(S)	
3[R/A,M]	**Location Grid ID**	GRD.SPR.BAD
3[R/A,M]	**Located Layer ID**	GRD.GRI.BAD
3[R/A,O]	**Location Grid Elevation**	GRD.GRI.ZVL
3[R/A,M]	Location Grid Parameters	
4 [R/A,M]	**Data density in columns**	GRD.GEN.LOD
4 [R/A,M]	**Data density in rows**	GRD.GEN.LAD
4 [R/A,M]	**Origin in columns**	GRD.GEN.PSO
4 [R/A,M]	**Origin in rows**	GRD.GEN.LSO
4 [R/A,M]	**Number of columns**	Computed from GRD.SPR.NUS, GRD.SPR.NLS
4 [R/A,M]	**Number of rows**	Computed from GRD.SPR.NUL, GRD.SPR.NLL
3[R/A,M]	BANDS DESCRIPTION	(See Layer Metadata: Switch GEN.BDF into GRD.BDF with no signal description)
3[R/A,M]	PIXELS/ELEMENTS ENCODING	(See Layer Metadata: Switch GEN.SPR into GRD.SPR with no compression, a single block and no tile index map)

12.2.1.4 Dataset [Library] Metadata: Source Graphic Description in ISO 8211

The Source Graphic Description is transmitted within the Source File (SOU) which, in that case, includes at least one Record the Source Record (SOU) and possibly repeating Legend Records, a Metric Support Record (MSD) or a Supplementary Text Record (SPT). There is one Source File per source graphic within a DIGEST information package.

Derived Layer and NUMBER OF COMPONENTS are transmitted within the Source Summary Field (SOU.SGF) composed of an array of subfields with one column per derived layer; when there are several derived layers, the number of components occurs redundantly with exactly the same values once for each derived layer. EXTENT OF DERIVED DATA is transmitted within the Repeating field Bounding Polygon (SOU.RCI) composed of an array of subfields with one column per point.

2[C,D]	FIELD OF APPLICATION	
*3[C,D]	**Derived Layer**	SOU.SGF.BAD
*3[C,D]	EXTENT OF DERIVED DATA: BOUNDING POLYGON	
*4[R,M]	Point	
5[C,M]	**Longitude/Easting**	SOU.RCI.LON
5[C,M]	**Latitude/Northing**	SOU.RCI.LAT
2[C,O]	NUMBER OF COMPONENTS	
3[R,O]	**Number of Magnetic Information**	SOU.SGF.NMI
3[C,O]	**Number of Supplementary Text**	SOU.SGF.NST
3[R,O]	**Number of Legend Images**	SOU.SGF.NLI
3[R,O]	**Number of Insets**	SOU.SGF.NIN

GENERAL DESCRIPTION is transmitted within the Source Field (SOU.SOR), which includes also the transmission of part of the COORDINATE SYSTEM, the Security and release Field (SOU.QSR) and the Copyright Field (SOU.CPY).

2[C,M]	GENERAL DESCRIPTION	
3[C,M]	GRAPHIC IDENTIFICATION	
4[C,S]	**Series**	SOU.SOR.PRT
4[C,M]	**Source Identification**	SOU.SOR.URF
4[C,M]	**Edition**	SOU.SOR.EDN
4[C,S]	**Name**	SOU.SOR.NAM
4[C,M]	**Significant Date**	SOU.SOR.CDP SOU.SOR.CDV
4[C,S]	**Perishable Date**	SOU.SOR.CDV27
4[C,O]	**Source Reference Number**	SOU.SOR.SRN
3[C,M]	GRAPHIC DESCRIPTION	
4[C,S]	**Reciprocal Scale**	SOU.SOR.SCA
4[C,O]	Coverage	
5[C,M]	**Coverage**	SOU.SOR.SQU
5[C,M]	**Unit of Measure for Coverage**	SOU.SOR.UNIsqu
4[C,O]	Contour Interval	
5[C,M]	**Contour Interval**	SOU.SOR.PCI
5[C,M]	**Unit**	SOU.SOR.UNIpci
4[C,O]	**Water Coverage**	SOU.SOR.WPC
4[C,O]	**Navigational System Type**	SOU.SOR.NST
4[R,O]	Highest Elevation	
5[R,M]	**Highest Elevation**	SOU.SOR.HKE
5[R,M]	**Unit**	SOU.SOR.UNIhke
5[R,S]	Highest Elevation Point	

6[R,M]	**Longitude/Easting**	SOU.SOR.LON
6[R,M]	**Latitude/Northing**	SOU.SOR.LAT
3[C,M]	SECURITY AND RELEASE	
4[C,M]	**Security Classification**	SOU.QSR.QSS
4[C,M]	**Downgrading**	SOU.QSR.QOD
4[C,O]	**Downgrading date**	SOU.QSR.CDV10
4[C,M]	**Releasability**	SOU.QSR.QLE
3[C,S]	COPYRIGHT	
4[C,M]	**Statement**	SOU.CPY.CPZ

MAGNETIC INFORMATION is transmitted within the Magnetic Rate Field (SOU.MAG) composed of an array of Subfield with one column per occurrence of MAGNETIC INFORMATION

2[C,O]	MARGINALIA	
*3[R,O]	**MAGNETIC INFORMATION**	
4[R,M]	**Date (magnetic)**	SOU.MAG.CDP
		SOU.MAG.CDV
4[R,M]	Annual rate of change	
5[R,M]	**Rate of Change**	SOU.MAG.RAT
5[R,M]	**Unit**	SOU.MAG.UNIrat
4[R,M]	Grid Magnetic angle	
5[R,M]	**G-M Angle**	SOU.MAG.GMA
5[R,M]	**Unit**	SOU.MAG.UNIgma
4[R,S]	Magnetic rate reference Point	
5[R,M]	**Longitude/Easting**	SOU.MAG.LON
5[R,M]	**Latitude/Northing**	SOU.MAG.LAT
4[R,O]	Grid convergence	
5[R,M]	**Convergence Angle**	SOU.MAG.GCA
5[R,M]	**Unit**	SOU.MAG.UNIgca

SUPPLEMENTARY TEXT is transmitted within the SUPPLEMENTARY TEXT Field (SPT.SUP) composed of an array of Subfield with one column per occurrence of SUPPLEMENTARY TEXT.

*3[C,O]	**SUPPLEMENTARY TEXT**	
4[C,M]	**Text Field Type**	SPT.SUP.TRV
4[C,O]	**Text Field Reference ID**	SPT.SUP.TRI
4[C,M]	**Free text**	SPT.SUP.TXT

LEGEND DESCRIPTION is transmitted within the repeating Legend Record.

*3[R,O]	LEGEND DESCRIPTION	
4[R,M]	LEGEND DATA	
5[R,O]	**Name**	LEG.LGI.NAM
5[R,M]	**Data Structure**	LEG.LGI.STR
5[R,M]	**Legend ID**	LEG.SPR.BAD
4[R,D]	BANDS DESCRIPTION	(OMITTED)
4[R,M]	PIXELS/ELEMENTS ENCODING	(See Layer Metadata: Switch GEN.SPR into LEG.SPR, and GEN.TIM into LEG.TIM)

COORDINATE SYSTEM is transmitted within the Source Field (SOU.SOR), which includes also the transmission of part of the GENERAL DESCRIPTION, within the Projection Field (SOU.PRR), and possibly within the Metric Support Record (MSD).

[2[R,S] V/A,O]	COORDINATE SYSTEM	
3[C,M]	GEODETIC PARAMETERS	
4[C,M]	HORIZONTAL DATUM	
5[C,M]	**Geodetic Datum Name**	SOU.SOR.DAG
5[C,M]	**Geodetic Datum Code**	SOU.SOR.DCD
4[C,M]	GEODETIC ELLIPSOID	
5[C,M]	**Ellipsoid Name**	SOU.SOR.ELL
5[C,M]	**Ellipsoid Code**	SOU.SOR.ELC
4[C,D]	VERTICAL DATUM	
5[C,M]	**Vertical Datum Reference**	SOU.SOR.DVR
5[C,M]	**Code of Vertical Datum Ref.**	SOU.SOR.VDCdvr
4[C,D]	SOUNDING DATUM	
5[C,M]	**Sounding Datum Name**	SOU.SOR.SDA
5[C,M]	**Sounding Datum Code**	SOU.SOR.VDCsda
3[C,M]	PROJECTION	
4[C,M]	**Projection Name**	SOU.PRR.PRN
4[C,M]	**Projection Code**	SOU.PRR.PCO
4[C,M]	PROJECTION PARAMETER(S)	
*5[C,M]	**Parameter**	SOU.PRR.PAA (PAB, PAC, PAE, ...PAZ)

4[C,D]	PROJECTION FALSE ORIGIN	
5[C,M]	**X false origin**	SOU.PRR.XOR
5[C,M]	**Y false origin**	SOU.PRR.YOR
3[C,D]	GRID SYSTEM	
4[C,M]	**Grid code**	SOU.SOR.GRD
4[C,O]	**Grid description**	SOU.SOR.GRN
4[C,D]	**Grid Zone Number**	SOU.SOR.ZNA

ARC SYSTEM METRIC SUPPORT PARAMETERS are transmitted within the Normalization Constants Field (MSD.NCD), the Source Datum Coefficients Data Field (MSD.SDC), and the Map Projection Coefficients Data Field (MSD.MPC).

3[R/A,O]	METRIC SUPPORT PARAMETERS	
4[R/A,O]	ARC SYSTEM METRIC SUPPORT PARAMETERS	
5[R/A,M]	NORMALIZATION CONSTANTS	
6[R/A,M]	**Latitude Scale Factor**	MSD.NCD.TSF
6[R/A,M]	**Longitude Scale Factor**	MSD.NCD.GSF
6[R/A,M]	**Latitude Translation Term**	MSD.NCD.TTT
6[R/A,M]	**Longitude Translation Term**	MSD.NCD.GTT
6[R/A,M]	**Northing Scale Factor**	MSD.NCD.NSF
6[R/A,M]	**Easting Scale Factor**	MSD.NCD.ESF
6[R/A,M]	**Northing Translation Term**	MSD.NCD.NTT
6[R/A,M]	**Easting Translation Term**	MSD.NCD.ETT
5[R/A,M]	SOURCE DATUM COEFFICIENTS	
6[R/A,M]	**Latitude Coefficient 1**	MSD.SDC.AX1
6[R/A,M]	**Latitude Coefficient 2**	MSD.SDC.AX2
6[R/A,M]	**Latitude Coefficient 3**	MSD.SDC.AX3
:	**:**	
6[R/A,M]	**Latitude Coefficient 7**	MSD.SDC.AX7
6[R/A,M]	**Longitude Coefficient 1**	MSD.SDC.BX1
6[R/A,M]	**Longitude Coefficient 2**	MSD.SDC.BX2
6[R/A,M]	**Longitude Coefficient 3**	MSD.SDC.BX3
:	**:**	
6[R/A,M]	**Longitude Coefficient 7**	MSD.SDC.BX7
5[R/A,M]	MAP PROJECTION COEFFICIENTS	
6[R/A,M]	**Northing Coefficient 1**	MSD.MPC.CX1
6[R/A,M]	**Northing Coefficient 2**	MSD.MPC.CX2
6[R/A,M]	**Northing Coefficient 3**	MSD.MPC.CX3
:	**:**	
6[R/A,M]	**Northing Coefficient 10**	MSD.MPC.CXA
6[R/A,M]	**Easting Coefficient 1**	MSD.MPC.DX1
6[R/A,M]	**Easting Coefficient 2**	MSD.MPC.DX2
6[R/A,M]	**Easting Coefficient 3**	MSD.MPC.DX3
:	**:**	
6[R/A,M]	**Easting Coefficient 10**	MSD.MPC.DXA

UTM/UPS SYSTEM METRIC SUPPORT PARAMETERS are transmitted within the Datum Change Constants Field (MSD.DCC), the Source Datum Coefficients Counter Field (MSD.SCC), the Source Datum Longitude Coefficients Field (MSD.SLG), the Source Datum Latitude Coefficients Field (MSD.SLT), and the Grid Rotation Coefficients Field (MSD.GRC).

4[R/A,O]	UTM/UPS SYSTEM METRIC SUPPORT PARAMETERS	
5[R/A,M]	DATUM CHANGE CONSTANTS	
6[R/A,M]	**Latitude normalizing offset**	MSD.DCC.TOF
6[R/A,M]	**Longitude normalizing offset**	MSD.DCC.GOF
6[R/A,M]	**Normalizing factor**	MSD.DCC.NZT
6[R/A,M]	**Eastern limit of validity**	MSD.DCC.ELV
6[R/A,M]	**Western limit of validity**	MSD.DCC.WLV
6[R/A,M]	**Northern limit of validity**	MSD.DCC.NLV
6[R/A,M]	**Southern limit of validity**	MSD.DCC.SLV
5[R/A,M]	SOURCE DATUM COEFFICIENT COUNTERS	
6[R/A,M]	**Number of longitude coefficients**	MSD.SCC.BCT
6[R/A,M]	**Number of latitude coefficients**	MSD.SCC.ACT
*5[R/A,M]	SOURCE DATUM LONGITUDE COEFFICIENTS	
6[R/A,M]	**i long index**	MSD.SLG.CBI
6[R/A,M]	**j long index**	MSD.SLG.CBJ
6[R/A,M]	**Coefficient of MRE $b_{i,j}$**	MSD.SLG.LGC
*5[R/A,M]	SOURCE DATUM LATITUDE COEFFICIENTS	
6[R/A,M]	**i lat index**	MSD.SLT.CAI
6[R/A,M]	**j lat index**	MSD.SLT.CAJ
6[R/A,M]	**Coefficient of MRE $a_{i,j}$**	MSD.SLT.LTC
5[R/A,O]	GRID_ROTATION_COEFFICIENTS	
6[R/A,M]	**Normalized Eastings shift**	MSD.GRC.NES
6[R/A,M]	**Normalized Northings shift**	MSD.GRC.NNS
6[R/A,M]	**Angle of orientation**	MSD.GRC.AOR

INSET(S): INSET DESCRIPTION are transmitted within Inset Field (SOU.INS) composed of an Array of Subfields with one column per Inset description.

*2[R,D]	INSET(S): INSET DESCRIPTION	
3[R,M]	**Inset Identification**	SOU.INS.INT
3[R,M]	**Reciprocal Scale**	SOU.INS.SCA
3[R,M]	**Name**	SOU.INS.NAM
3[R,M]	Absolute Coordinates	
4[R,M]	**longitude of lower left corner**	SOU.INS.NTL
4[R,M]	**latitude of lower left corner**	SOU.INS.TTL
4[R,M]	**longitude of upper left corner**	SOU.INS.NVL
4[R,M]	**latitude of upper left corner**	SOU.INS.TVL
4[R,M]	**longitude of upper right corner**	SOU.INS.NTR
4[R,M]	**latitude of upper right corner**	SOU.INS.TTR
4[R,M]	**longitude of lower right corner**	SOU.INS.NVR
4[R,M]	**latitude of lower right corner**	SOU.INS.TVR
3[R,M]	Relative Coordinates	
4[R,M]	**longitude of lower left corner**	SOU.INS.NRL
4[R,M]	**latitude of lower left corner**	SOU.INS.TRL
4[R,M]	**longitude of upper left corner**	SOU.INS.NSL
4[R,M]	**latitude of upper left corner**	SOU.INS.TSL
4[R,M]	**longitude of upper right corner**	SOU.INS.NRR
4[R,M]	**latitude of upper right corner**	SOU.INS.TRR
4[R,M]	**longitude of lower right corner**	SOU.INS.NSR
4[R,M]	**latitude of lower right corner**	SOU.INS.TSR

12.2.1.5 Dataset [Library] Metadata: Sensor Parameters Description in ISO 8211

The Sensor Parameters Description is transmitted within the Source File (SOU) which, in that case, includes a single Record the Auxilliary Parameters Record (AUP). There is one Source File per Sensor Parameters Description within a DIGEST information package.

Derived Layer is transmitted within the Source Summary Field (SOU.SGF) as a repeating Subfield. EXTENT OF DERIVED DATA is transmitted within the Repeating field Bounding Polygon (SOU.RCI) composed of an array of subfields with one column per point.

2[R,D]	FIELD OF APPLICATION	
*3[R,D]	**Derived Layer**	AUP.SGF.BAD
*3[R,D]	EXTENT OF DERIVED DATA: BOUNDING POLYGON	
*4[R,M]	Point	
5[R,M]	**Longitude/Easting**	AUP.RCI.LON
5[R,M]	**Latitude/Northing**	AUP.RCI.LAT

SOURCE IMAGE BAND IDENTIFICATION is transmitted within the Original Scene Band Id Field (AUP.BDF) composed of an array of subfields with one column per band.

*2[R,M]	SOURCE IMAGE BAND IDENTIFICATION	
3[R/A,M]	**Band designation**	AUP.BDF.BID
3[R,M]	Band description	
4[R,M]	**Signal Lower Limit**	AUP.BDF.WS1
4[R,M]	**Signal Upper Limit**	AUP.BDF.WS2

IMAGE RESOLUTION is transmitted within the Resolution and Ground Sample Distance Field (AUP.BDF) composed of an array of subfields with one column per band.

2[R,M]	IMAGE RESOLUTION	
3[R,M]	**Resolution in columns**	AUP.RSD.REX
3[R,M]	**Resolution in rows**	AUP.RSD.REY
3[R,O]	**Ground Sample Distance at Source in columns**	AUP.RSD.GSX
3[R,O]	**Ground Sample Distance at Source in rows**	AUP.RSD.GSY
3[R,O]	**Location of Pixel for Ground Sample Distances**	AUP.RSD.GSL
3[R,M]	**Unit for resolution**	AUP.RSD.UNIres

BASIC AUXILIARY PARAMETERS are transmitted within the Basic Auxiliary Parameters Field (AUP.BAP).

2[R,M]	BASIC AUXILIARY PARAMETERS	
3[R,M]	Image and sensor identification	
4[R,M]	**Vector or Mission Name**	AUP.BAP.VEC
4[R,M]	**Sensor or Instrument Name**	AUP.BAP.SNS
4[R,M]	**Spectral Mode**	AUP.BAP.MOD
4[R,M]	**Processing Level**	AUP.BAP.PRL
4[R,O]	**Source image ID**	AUP.BAP.CDV07
4[R,M]	**Acquisition Date and Time**	AUP.BAP.ATM
3[R,O]	Incidence Angle	
4[R,M]	**Angle value**	AUP.BAP.ANG
4[R,M]	**Angle unit**	AUP.BAP.UNIang
3[R,O]	Altitude	
4[R,M]	**Altitude value**	AUP.BAP.ALT
4[R,M]	**Unit of Altitude**	AUP.BAP.UNIalt
3[R,M]	Image Centre Location	
4[R,M]	**Longitude**	AUP.BAP.LON

4[R,M]	**Latitude**	AUP.BAP.LAT
3[R,O]	Solar angles at Image Centre	
4[R,M]	**Solar Azimuth**	AUP.BAP.SAZ
4[R,M]	**Solar Elevation**	AUP.BAP.SEL
4[R,M]	**Unit of Solar Angles**	AUP.BAP.UNIsae
3[R,O]	Attitude angles at Image Centre	
4[R,M]	**Roll**	AUP.BAP.ROL
4[R,M]	**Pitch**	AUP.BAP.PIT
4[R,M]	**Yaw**	AUP.BAP.YAW
4[R,M]	**Unit of Attitude Angles**	AUP.BAP.UNIrpy
3[R,O]	Pixel Time	
4[R,M]	**Pixel Time**	AUP.BAP.PXT
4[R,M]	**Unit of Pixel Time**	AUP.BAP.UNIpxt
3[R,O]	Attitude speed at Image Centre	
4[R,M]	**Roll Speed**	AUP.BAP.ROS
4[R,M]	**Pitch Speed**	AUP.BAP.PIS
4[R,M]	**Yaw Speed**	AUP.BAP.YAS
4[R,M]	**Unit of Attitude Speed**	AUP.BAP.UNIspe

ADDITIONAL AUXILIARY PARAMETERS are transmitted within the Additional Auxiliary Parameters Field (AUP.BAP) composed of an array of subfields with one column per parameter.

2[R,O]	ADDITIONAL AUXILIARY PARAMETERS	
3[R,O]	**Number of Aux. Parameters**	(OMITTED)
*3[R,M]	PARAMETER ID AND VALUE	
4[R,M]	**Aux. Param. Identification**	AUP.AAP.API
4[R,M]	**Aux. Param. Value Format**	AUP.AAP.APF
4[R,M]	**Unit of Auxiliary Parameter**	AUP.AAP.UNIapx
4[R,D]	**Aux. Param. Integer Value**	AUP.AAP.APN
4[R,D]	**Aux. Param. Real Value**	AUP.AAP.APR
4[R,D]	**Aux. Param. Characters String**	AUP.AAP.APA

12.2.1.6 Dataset [Library] Metadata: Quality Description in ISO 8211

The Quality Description is transmitted within the Quality File (QAL) which includes the Quality Record (QAL) and at least on of the following records: Accuracy Record (QAI), Horizontal Accuracy Record (HOR), or Vertical Accuracy Record (VER).

SECURITY AND RELEASE is transmitted within the Security and Release Field (QAL.QSR).

2[C,M]	SECURITY AND RELEASE	
3[C,M]	**Security Classification**	QAL.QSR.QSS
3[C,M]	**Downgrading**	QAL.QSR.QOD
3[C,O]	**Downgrading date**	QAL.QSR.CDV10
3[C,M]	**Releasability**	QAL.QSR.QLE

UP-TO-DATENESS is transmitted within the Up-to-dateness Field (QAL.QUV).

2[C,M]	UP-TO-DATENESS	
3[C,M]	**Edition Number**	QAL.QUV.EDN
3[C,M]	**Creation Date**	QAL.QUV.CDV07
3[C,D]	**Revision Date**	QAL.QUV.CDV24
3[C,O]	**Recompilation Count**	QAL.QUV.REC
3[C,O]	**Revision Count**	QAL.QUV.REV
3[C,O]	**Earliest Source**	QAL.QUV.CDV20
3[C,O]	**Latest Source**	QAL.QUV.CDV21
3[C,O]	PRODUCT SPECIFICATION	
4[C,M]	**edition id**	QAL.QUV.SRC
4[C,M]	**amendment**	QAL.QUV.SPA
4[C,M]	**edition date**	QAL.QUV.CDV22

VECTOR DATA QUALITY is transmitted within the Completeness and consistency Field (QAL.QCC) and the Attribute Accuracy Field (QAL.QAA).

2[V,O]	VECTOR DATA QUALITY	
3[V,O]	COMPLETENESS AND CONSISTENCY	
4[V,O]	**Feature Completeness**	QAL.QCC.QFC
4[V,O]	**Attribute Completeness**	QAL.QCC.QAC
4[V,O]	**Consistency**	QAL.QCC.QLC
3[V,O]	ATTRIBUTE ACCURACY	
4[V,O]	**Quantitative Attribute**	QAL.QAA.QUT
4[V,O]	**Qualitative Attribute**	QAL.QAA.QUL
4[V,O]	**Collection Criteria**	QAL.QAA.CCR

POSITIONAL ACCURACY SUBREGION(S) are transmitted within the repeating Accuracy Records (QAI), Horizontal Accuracy Records (HOR), or Vertical Accuracy Records (VER). ACCURACY STATEMENT is transmitted within the Accuracy Field (QAI.QAP), the Horizontal Accuracy Field (HOR.ASH) or the Vertical accuracy Field (VER.ASV). The Extent of the Accuracy Subregion is transmitted within the bounding polygon field within each record (QAI.RCI, HOR.RCI,VER.RCI) which contains an array of subfields with one column per point.

*2[C,M]	POSITIONAL ACCURACY SUBREGION(S)	
3[C,M]	ACCURACY STATEMENT	

POSITIONAL ACCURACY STATEMENT

4[C,M]	Absolute Horizontal Accuracy	
5[C,M]	**Accuracy value**	QAI.QAP.AAH
5[C,M]	**Unit of Measure**	QAI.QAP.UNIaah
4[C,M]	Absolute Vertical Accuracy	
5[C,M]	**Accuracy value**	QAI.QAP.AAV
5[C,M]	**Unit of Measure**	QAI.QAP.UNIaav
4[C,M]	Point to Point Horizontal Accuracy	
5[C,M]	**Accuracy value**	QAI.QAP.APH
5[C,M]	**Unit of Measure**	QAI.QAP.UNIaph
4[C,M]	Point to Point Vertical Accuracy	
5[C,M]	**Accuracy value**	QAI.QAP.APV
5[C,M]	**Unit of Measure**	QAI.QAP.UNIapv

HORIZONTAL ACCURACY STATEMENT

4[C,M]	Absolute Horizontal Accuracy	
5[C,M]	**Accuracy value**	HOR.ASH.AAH
5[C,M]	**Unit of Measure**	HOR.ASH.UNIaah
4[C,M]	Point to Point Horizontal Accuracy	
5[C,M]	**Accuracy value**	HOR.ASH.APH
5[C,M]	**Unit of Measure**	HOR.ASH.UNIaph

VERTICAL ACCURACY STATEMENT

4[C,M]	Absolute Vertical Accuracy	
5[C,M]	**Accuracy value**	VER.ASV.AAV
5[C,M]	**Unit of Measure**	VER.ASV.UNIaav
4[C,M]	Point to Point Vertical Accuracy	
5[C,M]	**Accuracy value**	VER.ASV.APV
5[C,M]	**Unit of Measure**	VER.ASV.UNIapv
3[C,M]	EXTENT OF ACCURACY SUBREGION:	
*4[C,M]	Point	
5[C,M]	**Longitude/Easting**	QAI(| HOR | VER).RCI.LON
5[C,M]	**Latitude/Northing**	QAI(| HOR | VER).RCI.LAT

COLOUR PATCH is transmitted within the repeating Colour Patch Type Field (QAL.CPT), the Colour patch ID Field (QAL.CPI) and the Dataset Parameters field (QAL.SPR).

2[R,O]	COLOUR PATCH	
3[R,M]	**Colour Patch Reference**	QAL.CPT.SCR
3[R,D]	**Colour Patch Identification**	QAL.SPR.BAD
*3[R,O]	COLOUR IDENTIFIER	
4[R,M]	**Colour Name**	QAL.CPI.PNM
4[R,M]	**Red**	QAL.CPI.PIR
4[R,M]	**Green**	QAL.CPI.PIG
4[R,M]	**Blue**	QAL.CPI.PIB
3[R,D]	BANDS DESCRIPTION	(OMITTED: RBG only)
3[R,D]	PIXELS/ELEMENTS	(see Layer Metadata switch
	ENCODING	GEN.SPR into QUAL.SPR)

OTHER QUALITY INFO is transmitted within the Other Quality information field (QAL.QOI)

2[C,O]	OTHER QUALITY INFO	
3[C,M]	**Free text**	QAL.QOI.OQI

12.2.1.7 Layer [Coverage] Metadata in ISO 8211

The Layer [Coverage] Metadata constitutes the main part of the repeating General Information Record (GIN) within the General Information File (GEN). The General Information Record (GIN) occurs once for each Layer [Coverage] Metadata.

Layer [Coverage] designation, coincident with the Geo Data file name, is transmitted within the Dataset Parameters Field (GIN.SPR). IDENTIFICATION, reciprocal scale and GEOGRAPHIC EXTENT are transmitted as part of the General Information Field (GIN.GEN).

2[C,M]	GENERAL DESCRIPTION	
3[C,M]	IDENTIFICATION	
4[C,M]	**designation**	GIN.SPR.BAD
4[C,O]	**description**	(OMITTED)
4[C,O]	**structure**	GIN.GEN.STR

3[R,D]	**reciprocal scale**	GIN.GEN.SCA
3[C,O]	GEOGRAPHIC EXTENT	
4[V/A,O]	**Data Cover**	GIN.GEN.COV
4[C,O]	WGS84 MBR	
5 [C,M]	**Longitude of SW Corner**	GIN.GEN.SWO
5 [C,M]	**Latitude of SW Corner**	GIN.GEN.SWA
5 [C,M]	**Longitude of NE Corner**	GIN.GEN.NEO
5 [C,M]	**Latitude of NE Corner**	GIN.GEN.NEA
3[C,O]	**General comment**	GIN.GEN.TXT

LAYER POSITIONAL ACCURACY SUBREGION(S) are transmitted within the repeating Accuracy Records (QAI), Horizontal Accuracy Records (HOR), or Vertical Accuracy Records (VER) of the Quality File. A BAD Subfield is then added to the Accuracy Field (QAI.QAP), the Horizontal Accuracy Field (HOR.ASH) or the Vertical accuracy Field (VER.ASV), in order to indicate to which Layer the information applies. This BAD Subfield must be filled with the Layer designation as in GIN.SPR.BAD.

*3[C,O]	LAYER POSITIONAL ACCURACY SUBREGION (S) (see Quality Description: POSITIONAL ACCURACY SUBREGION (S))

2[V,O] [A/R,M]	DATA TYPE SPECIFIC DESCRIPTION

Within VECTOR SPECIFIC DESCRIPTION, LOCAL COORDINATE SYSTEM, VECTOR COMPONENTS and MBR/GRP Units are transmitted as part of the General Information Field (GIN.GEN).

VECTOR SPECIFIC DESCRIPTION		
3[V,O]	LOCAL COORDINATE SYSTEM	
4[V, M]	**Longitude/Easting of Origin**	GIN.GEN.LSO
4[V, M]	**Latitude/Northing of Origin**	GIN.GEN.PSO
4[V, M]	**Coordinates scale factor**	GIN.GEN.CSF
3[V,O]	VECTOR COMPONENTS	
4[V,O]	**Feature Count**	GIN.GEN.FEC
4[V,O]	**Point Feature Count**	GIN.GEN.POC
4[V,O]	**Line Feature Count**	GIN.GEN.LIC
4[V,O]	**Area Feature Count**	GIN.GEN.ALC
4[V,O]	**Segment/Edge Count**	GIN.GEN.SGC
4[V,O]	**Node Record Count**	GIN.GEN.NEC
4[V,O]	**Face Record Count**	GIN.GEN.FCC
4[V,O]	**Simple Feature Count**	GIN.GEN.SFT
3[V,O]	**MBR/GRP Units**	GIN.GEN.MBU

VECTOR DATA QUALITY is transmitted within the Completeness and consistency Field (QAL.QCC) and the Attribute Accuracy Field (QAL.QAA) of the Quality Record (QAL) of the Quality File. A BAD subfield is then added to those fields in order to indicate to which Layer the information applies. This BAD subfield must be filled with the Layer designation as in GIN.SPR.BAD.

3[V,O] VECTOR DATA QUALITY (see QUALITY DESCRIPTION)

RASTER OR MATRIX SPECIFIC DESCRIPTION

Within RASTER OR MATRIX SPECIFIC DESCRIPTION, LOCAL COORDINATE SYSTEM, is transmitted as part of the General Information Field (GIN.GEN).

3[A/R,D]	LOCAL COORDINATE SYSTEM	
4[A/R, M]	**Longitude/Easting of Origin**	GIN.GEN.LSO
4[A/R, M]	**Latitude/Northing of Origin**	GIN.GEN.PSO
4[A/R,M]	SCALING PARAMETERS	
Geographic Coordinate system		
5[R/A,M]	**longitude density**	GIN.GEN.ARV
5[R/A,M]	**latitude density**	GIN.GEN.BRV
Cartographic Coordinate system		
5[R/A,M]	**Easting interval**	GIN.GEN.LOD
5[R/A,M]	**Northing interval**	GIN.GEN.LAD
5[R/A,M]	**length unit**	GIN.GEN.UNIloa

BAND DESCRIPTION is transmitted within the Band Identification Field (GIN.BDF).

3[R/A,M]	BANDS DESCRIPTION	
4[R/A,O]	Number of bands	(OMITTED)
*4[R/A,M]	BAND IDENTIFICATION	
5[R/A,M]	**Band designation**	GIN.BDF.BID
5[R,D]	Band description	
6[R,M]	**Wavelength Lower Limit**	GIN.BDF.WS1
6[R,M]	**Wavelength Upper Limit**	GIN.BDF.WS2

MBR and SIZE AND ORDER OF BLOCKS AND PIXELS are transmitted within the Dataset Parameters Field (GIN.SPR).

3[R/A,M]	PIXELS/ELEMENTS ENCODING	
4[R/A,O]	MBR	
5[R/A,M]	**row of upper right corner**	GIN.SPR.NUL
5[R/A,M]	**column of upper right corner**	GIN.SPR.NUS
5[R/A,M]	**row of lower left corner**	GIN.SPR.NLL
5[R/A,M]	**column of lower left corner**	GIN.SPR.NLS
5[R/A,O]	MBR size	(OMITTED may be derived from MBR)
4[R/A,M]	SIZE AND ORDER OF BLOCKS AND PIXELS	
5[R/A,M]	**vertical block number**	GIN.SPR.NFL
5[R/A,M]	**horizontal block number**	GIN.SPR.NFC
5[R/A,M]	**vertical pixel number**	GIN.SPR.PNC
5[R/A,M]	**horizontal pixel number**	GIN.SPR.PNL
5[R/A,M]	**Column Sequence**	GIN.SPR.COD
5[R/A,M]	**Row Sequence**	GIN.SPR.ROD
5[R/A,M]	**Pixel or element Order**	GIN.SPR.POR

ENCODING MECHANISM is transmitted as part of the Dataset Parameters Field (GIN.SPR) and within the Compression ID Field (GIN.CID).

4[R/A,M]	ENCODING MECHANISM	
5[R/A,D]	**Compression Code**	GIN.CID.COM
5[R/A,O]	**Compression ratio**	GIN.CID.CPR
5[R/A,M]	**Value Length**	GIN.SPR.PVB
5[R/A,M]	**Value Type** (defaulted to Integer if omitted)	GIN.SPR.PVT
5[R/A,D]	**Count Length**	GIN.SPR.PCB
5[R/A,M]	**Tile Index Map Flag**	GIN.SPR.TIF

COMPRESSION LOOKUP TABLES are transmitted within two repeating Fields; the Compression Lookup Table Description Field (GIN.LTD) contains the COMPRESSION LOOKUP TABLE DESCRIPTION and the Compression Lookup Table Value Field (GIN.LTV) contains COMPRESSION LOOKUP TABLE VALUES. Those two Fields are repeated exactly the same number of times, and their order is significant.

*4[R/A,D]	COMPRESSION LOOKUP TABLES	
5[R/A,M]	COMPRESSION LOOKUP TABLE DESCRIPTION	
6[R/A,M]	**Compression Lookup Table Id**	GIN.LTD.LTI
6[R/A,M]	**No of Compression LUT Rows**	GIN.LTD.NLR
6[R/A,M]	**No of Val. / Compr. LUT Row**	GIN.LTD.NVA
6[R/A,O]	**Compr. LUT Value Bit Length**	GIN.LTD.VLB
5[R/A,M]	COMPRESSION LOOKUP TABLE VALUES	
*6[R/A,M]	**Compression LUT Value**	GIN.LTV.CLV

COMPRESSION PARAMETERS are transmitted within Compresssion Parameters Field (GN.CPM) which is composed of an array of subfields with one column per Compression parameter.

*4[R/A,D]	COMPRESSION PARAMETER(S)	
5[R/A,M]	**Compression Parameter Id**	GIN.CPM.CQI
5[R/A,M]	**Compression Parameter Value**	GIN.CPM.CPV

TILE INDEX MAP is transmitted within Tile Index Map Field (GIN.TIM).

4[R/A,D]	TILE INDEX MAP	
*5[R/A,M]	**Tile Index Value**	GIN.TIM.TSI

3[A/R,M] DATA TYPE SPECIFIC PARAMETERS

MATRIX-SPECIFIC PARAMETERS are transmitted within the General Information Field (GIN.GEN) for the Matrix Units, and within the Nominal code Identifier Field of the Quality Record of the Quality File, for the NOMINAL CODE IDENTIFIER, where the BAD subfield designate the Layer to which the information applies.

MATRIX-SPECIFIC PARAMETERS

4[A,D]	**Matrix Units**	GIN.GEN.UNImat
*4[A,M]	NOMINAL CODE IDENTIFIER	
5[A,M]	**Attribute Code Identifier**	QAL.NOM.NCI
5[A,M]	**Description/Meaning of the Attribute value**	QAL.NOM.NDB
5[A,M]	**Nominal code assigned to the Attribute value**	QAL.NOM.NCD

RASTER-SPECIFIC PARAMETERS are transmitted within the General Information Field (GIN.GEN) for the SCANNING PARAMETERS, and for the COLOUR CODE IDENTIFIER, within the Colour code Identifier Field of the Quality Record of the Quality File where the BAD subfield designate the Layer to which the information applies.

RASTER-SPECIFIC PARAMETERS		
*4[R,D]	COLOUR CODE IDENTIFIER	
5[R,M]	**Name**	QAL.COL.CBD
5[R,M]	**Colour Code**	QAL.COL.CCD
5[R,O]	CIE colour description	
6[R,M]	**CIEx**	QAL.COL.CR1
6[R,M]	**CIEy**	QAL.COL.CR2
6[R,M]	**CIEY**	QAL.COL.CR3
5[R,M]	RGB colour description FRM	
6[R,M]	**Red (recorded)**	QAL.COL.NSR
6[R,M]	**Green (recorded)**	QAL.COL.NSG
6[R,M]	**Blue (recorded)**	QAL.COL.NSB
5[R,O]	**Mathematical relation to other colour codes**	QAL.COL.FRM
3[R,O]	SCANNING PARAMETERS	
4[R,M]	**Pixel Spacing**	GIN.GEN.PSP
4[R,O]	**Rectified Image**	GIN.GEN.IMR

12.2.2 ISO 8824 Encapsulation (Annex B)

The ISO 8824 /5 encapsulation encodes DIGEST data in terms of a data stream. The basic building block of this data stream is a tagged element corresponding to a subfield in the ISO 8211 encapsulation. Tagged elements are identified in the context of the implicit syntactic tree representing the entire DIGEST standard. This syntactic tree represents the standard itself, and it is not communicated. It is assumed that two communicating parties both have implemented this syntactic tree, which is used as a template for parsing and encoding messages.

The ISO 8824/5 encapsulation is in two parts. The ISO 8824 standard defines the Abstract Syntax Notation (ASN.1) which is used to describe the syntactic tree. The Abstract Syntax Notation is similar to Baccus Naur Form, which is the rigorous method used in Computer Science for describing computer language syntaxes. The syntactic tree corresponding to DIGEST is described in ASN.1 in Part 2 Annex B.

The second part of the ISO 8824/5 encapsulation is the encoding rules described in the ISO 8825 standard. The encoding rules are not used to encode the entire syntactic tree, but rather specific elements in terms of the syntactic tree. Each tagged element is identified by a single numeric tag or a set of nested relative numeric tags. Only the tags that are communicated are encoded. This means that optional elements that do not exist do not incur overhead. It also makes the ISO 8825 encoding very efficient for shorter messages, such as map update messages or extracted information from a database, since the overhead of the entire DIGEST standard is not incurred.

The ISO 8824/5 encapsulation places its emphasis on bit-level efficiency in order to minimize the amount of data that needs to be communicated in a message. Coordinates are stored as interleaved normalized binary fractions to reduce the number of bits needed for encoding. ISO 8825 tags are short numeric codes that identify the number of the choice selected from each node of the syntactic tree. For example, if an element in DIGEST is a CHOICE of [1], or [2] or [3], then the tag used to identify the element is simply the 1,2 or 3. This is imbedded in a series of nested tags identifying choices at each node of the syntactic tree. Typically, a tag is no longer than one byte. An element might be preceded by several tags, such as [2], [4], [1] representing the first choice within the fourth choice within the second choice. To keep this hierarchy of tags from itself becoming an overhead, a number of absolute or application wide tags are defined. These are strategically placed within the standard so that the number of nested tags in messages are minimized. Tags are also used to identify the type of bit-level encoding, such as INTEGER, Character etc. When there is no possible confusion in the syntactic tree, tags may be made implicit. For example, if there is a choice of having an element as a REAL number or as an INTEGER, then tag defining the type of encoding may be used to identify the choice. Repetition is indicated by multiple occurrences of the same tag.

In the ASN.1 description of the syntactic tree of DIGEST, labels are used to identify particular fields and subfields as single elements and sets of elements. These labels do not perform a necessary function in ASN.1, since the syntactic tree is completely described by the hierarchy of tags. However, they are included to establish a correspondence with the ISO 8211 encapsulation. Where possible, labels that correspond directly to ISO 8211 TAGs are used. Because ASN.1 is based on a programming language paradigm, it requires that all labels be unique. ISO 8211 reuses its TAGs when it reuses its field definitions. Where there is a conflict of label uniqueness in ASN.1, the description of DIGEST in ASN.1 has used a slight variation of the tag used in the ISO 8211 encapsulation. For example, a letter a or b or other suffix might be appended to distinguish between two occurrences of the label corresponding to one ISO 8211 TAG.

Clauses 12.2.2.1 to 12.2.2.7 document the correspondence between DIGEST data elements and ISO 8224 encapsulation for the Metadata subsets. Subfields are designated as follows. The first and second columns of the following tables describe the record type / level and the description of the field or subfield as given in DIGEST Part 2 Clauses 9, 10 or 11. The third column gives the Record, Field and Subfield labels from Annex B in the following pattern: <Record type>.<Field TAG>.<Subfield Label>. Note that these labels parallel those used in the ISO 8211 encapsulation. The subfield label is an actual ISO 8824 label and therefore is given in lower case. The Record and Field labels are contained in the ISO 8824 code as comments and are therefore, given as upper case in order to show their correspondence to the equivalent ISO 8211 Record and Field TAGs. The terms File, Record and Field are used to maintain correspondence with the ISO 8211 description, even though these constructs are not used in ISO 8824 where they are all just tagged elements in a data stream.

12.2.2.1 DIGEST Information Package Metadata in ISO 8824

The DIGEST Information Package Metadata Subset is within the Transmittal Header File (THF), which includes two Records: the Transmittal Description Record (THF), and the Security and Update Record (LCF).

DATABASE CONTEXT is omitted and the DIGEST INFORMATION PACKAGE IDENTIFICATION, the EXCHANGE CONTEXT and the number of Datasets / Libraries are transmitted within the Transmittal Header Field (THF.VDR).

2 [C,O]	DATABASE CONTEXT	(OMITTED)
2[C,M]	DIGEST INFORMATION PACKAGE IDENTIFICATION	
3[C,M]	**identifier**	THF.VDR.urf
3[C,M]	**edition number**	THF.VDR.edn
3[C,M]	**exchange date**	THF.VDR.cdv07
2[C,O]	EXCHANGE CONTEXT	
3[C,M]	**originator**	THF.VDR.voo
3[C,O]	**addressee**	THF.VDR.adr
2[C,M]	**number of Datasets/Libraries**	THF.VDR.nof

CONTENT: DATASET [LIBRARY] DESCRIPTION is within one or possibly two repeating Fields: the Dataset Description Field (THF.FDR) and the Up-to-dateness fields (LCF.QUV) which in that case occurs exactly the same number of times as the Dataset Description Field.

*2[C,M]	CONTENT: DATASET [LIBRARY] DESCRIPTION	
3[C,M]	IDENTIFICATION	
4[C,M]	**designation**	THF.FDR.nam
4[C,O]	**description**	(OMITTED)
4[C,O]	**dataset type**	THF.FDR.prt
4[C,O]	**structure**	THF.FDR.str
4[C,D]	**encapsulation**	THF.FDR.enc
3[C,M]	WGS84 MBR	
4 [C,M]	**Longitude of SW Corner**	THF.FDR.swo
4 [C,M]	**Latitude of SW Corner**	THF.FDR.swa
4 [C,M]	**Longitude of NE Corner**	THF.FDR.neo
4 [C,M]	**Latitude of NE Corner**	THF.FDR.nea
3[C,D]	SPECIFICATION	
4[C,M]	DIGEST SPECIFICATION	

5[C,M]	**edition id**	LCF.QUV.src1
5[C,M]	**amendment**	LCF.QUV.spa1
5[C,M]	**edition date**	LCF.QUV.cdv12
4[C,O]	PRODUCT SPECIFICATION	
5[C,M]	**edition id**	LCF.QUV.src2
5[C,M]	**amendment**	LCF.QUV.spa2
5[C,M]	**edition date**	LCF.QUV.cdv22

SPECIFICATION is within the Up-to-dateness field (LCF.QUV) which in that case does not repeat.

2[C,D]	SPECIFICATION	
3[C,M]	DIGEST SPECIFICATION	
4[C,M]	**edition id**	LCF.QUV.src1
4[C,M]	**amendment**	LCF.QUV.spa1
4[C,M]	**edition date**	LCF.QUV.cdv12
3[C,O]	PRODUCT SPECIFICATION	
4[C,M]	**edition id**	LCF.QUV.src2
4[C,M]	**amendment**	LCF.QUV.spa2
4[C,M]	**edition date**	LCF.QUV.cdv22

SECURITY AND RELEASE is within the Security and Release field (LCF.QSR).

2[C,M]	SECURITY AND RELEASE	
3[C,M]	**Security Classification**	LCF.QSR.qss
3[C,M]	**Downgrading**	LCF.QSR.qod
3[C,O]	**Downgrading date**	LCF.QSR.cdv10
3[C,M]	**Releasability**	LCF.QSR.qle

12.2.2.2 Dataset [Library] Metadata: General Information in ISO 8824

The General Information is within the General Information File (GEN) which includes two Records: the General Information Record (GIN) also used for the Layer [Coverage] Metadata and occurring once for each Layer [Coverage] Metadata, and the Dataset Description Record (DSS).

DATABASE IDENTIFICATION is within the Dataset Id Field (GIN.DSI) which for backward compatibility is repeated with exactly the same content within each occurrence of the General Information Record.

2[C,M]	DATASET IDENTIFICATION	
3[C,M]	**designation**	GIN.DSI.nam-d
3[C,O]	**description**	(OMITTED)
3[C,O]	**dataset type**	GIN.DSI.prt-d
3[C,O]	**structure**	(OMITTED)
3[C,O]	**encapsulation**	(OMITTED)

CONTENT: LAYER [COVERAGE] is transmitted as part of the Dataset Parameters Field (GIN.SPR) and of the General Information Field (GIN.GEN) within the repeating General Information Record (GIN) also used for the transmission of the Layer [Coverage] Metadata.

*2[C,M]	CONTENT: LAYER [COVERAGE]	
3[C,M]	IDENTIFICATION	
4[C,M]	**designation**	GIN.SPR.bad-d = layer file name
4[C,O]	**description**	(OMITTED)
4[C,M]	**structure**	GIN.GEN-V.str-v / GEN-R str-r / GEN-M str-a
4[C,D]	**encapsulation**	GIN.GEN-V.enc-v / GEN-R enc-r / GEN-M enc-a
3[C,O]	WGS84 MBR	
4[C,M]	**Longitude of SW Corner**	GIN.swo-mb
4[C,M]	**Latitude of SW Corner**	GIN.swa-mb
4[C,M]	**Longitude of NE Corner**	GIN.neo-mb
4[C,M]	**Latitude of NE Corner**	GIN.nea-mb

NUMBER OF COMPONENTS is within the Dataset Description Field (DSS.DRF).

2[C,O]	NUMBER OF COMPONENTS	
3[C,M]	**Number of Horizontal Accuracy Sub-regions**	DSS.DRF.nsh
3[C,M]	**Number of Vertical Accuracy Sub-regions**	DSS.DRF.nsv
3[C,M]	**Number of Positional Accuracy Sub-regions**	DSS.DRF.nsp
3[C,M]	**Number of Layers**	DSS.DRF.noz
3[C,M]	**Number of Source Descriptions**	DSS.DRF.nos

12.2.2.3 Dataset [Library] Metadata: Geo Reference Description in ISO 8824

The Geo Reference Description is within the Geo Reference File (GER) which includes at least one Record: the Geo Reference Record (GEO) and possibly repeating Grid Description Records.

Coordinate System Type, Coordinate units and GEODETIC PARAMETERS are within the Geo Parameters Field (GEO.GEP).

2[C,M]	**Coordinate System Type**	GEO.GEP.typ
2[C,M]	**Coordinate Units**	GEO.GEP.uni
2[C,M]	GEODETIC PARAMETERS	
3[C,M]	HORIZONTAL DATUM	
4[C,M]	**Geodetic Datum Name**	GEO.GEP.dag
4[C,M]	**Geodetic Datum Code**	GEO.GEP.dcd
3[C,M]	GEODETIC ELLIPSOID	
4[C,M]	**Ellipsoid Name**	GEO.GEP.ell
4[C,M]	**Ellipsoid Code**	GEO.GEP.elc
3[V/A,D]	VERTICAL DATUM	
4[V/A,M]	**Vertical Datum Reference**	GEO.GEP.dvr
4[V/A,M]	**Code of Vertical Reference**	GEO.GEP.vdcdvr
3[V/A,D]	SOUNDING DATUM	
4[V/A,M]	**Sounding Datum Name**	GEO.GEP.sda
4[V/A,M]	**Sounding Datum Code**	GEO.GEP.vdcsda

PROJECTION is within the Projection Field (GEO.PRR).

2[C,D]	PROJECTION	
3[C,M]	**Projection Name**	GEO.PRR.PRN
3[C,M]	**Projection Code**	GEO.PRR.PCO
3[C,M]	PROJECTION PARAMETER(S)	
4[C,M]	**Parameter**	GEO.PRR.paa (pab, pac, pae, ...paz)
3[C,D]	PROJECTION FALSE ORIGIN	
4[C,M]	**X false origin**	GEO.PRR.xor
4[C,M]	**Y false origin**	GEO.PRR.yor

GRID SYSTEM is within the Geo Parameters Field (GEO.GEP).

2[C,D]	GRID SYSTEM	
3[C,M]	**Grid code**	GEO.GEP.grd-c
3[C,O]	**Grid description**	GEO.GEP.grn-c
3[C,D]	**Grid Zone Number**	GEO.GEP.zna

Z Values False Origin is within the Projection Field (GEO.PRR).

2[C,D]	**Z Values False Origin**	GEO.PRR.zor

REGISTRATION POINT(S) are within the Registration Point Field (GEO.RPR) which contains an array of subfields with one column per registration point.

*2[C,O]	REGISTRATION POINT(S)	
3[C,M]	**Registration Point ID**	GEO.RPR.pid-rp
3[C,M]	**Longitude/Easting**	GEO.RPR.lon-rp
3[C,M]	**Latitude/Northing**	GEO.RPR.lat-rp
3[C,D]	**Elevation**	GEO.RPR.zvl-rp
3[C,M]	**Local X coordinate**	GEO.RPR.dix-rp
3[C,M]	**Local Y coordinate**	GEO.RPR.diy-rp
3[C,D]	**Local Z coordinate**	GEO.RPR.diz-rp
3[C,D]	**Located Layer ID**	GEO.RPR.bad-rp

DIAGNOSTIC POINT(S) are transmitted within the Diagnostic Point Field (GEO.DPR) which contains an array of subfields with one column per diagnostic point.

*2[C,O]	DIAGNOSTIC POINT(S)	
3[C,M]	**Diagnostic Point ID**	GEO.RPR.pid-dp
3[C,M]	**Longitude/Easting**	GEO.RPR.lon-dp
3[C,M]	**Latitude/Northing**	GEO.RPR.lat-dp
3[C,D]	**Elevation**	GEO.RPR.zvl-dp
3[C,M]	**Local X coordinate**	GEO.RPR.dix-dp
3[C,M]	**Local Y coordinate**	GEO.RPR.diy-dp
3[C,D]	**Local Z coordinate**	GEO.RPR.diz-dp
3[C,D]	**Controlled Layer ID**	GEO.RPR.bad-dp

The LOCATION GRID(S) are transmitted within the repeating Grid Description Record (GRD).

*2[R/A,O]	LOCATION GRID(S)	
3[R/A,M]	**Location Grid ID**	GRD.SPR.bad-l
3[R/A,M]	**Located Layer ID**	GRD.GRI.bad-g
3[R/A,O]	**Location Grid Elevation**	GRD.GRI.zvl
3[R/A,M]	Location Grid Parameters	
4 [R/A,M]	**Data density in columns**	GRD.GEN-G.lod-g
4 [R/A,M]	**Data density in rows**	GRD.GEN-G.lad-g
4 [R/A,M]	**Origin in columns**	GRD.GEN-G.pso
4 [R/A,M]	**Origin in rows**	GRD.GEN-G.lso
4 [R/A,M]	**Number of columns**	Computed from GRD.SPR.nus-g, GRD.SPR.nls-g
4 [R/A,M]	**Number of rows**	Computed from GRD.SPR.nul-g, GRD.SPR.nll-g
3[R/A,M]	BANDS DESCRIPTION	(See Layer Metadata: Switch GEN.bdf-r or bdf-a into GRD.bdf with no signal description)
3[R/A,M]	PIXELS/ELEMENTS ENCODING	(See Layer Metadata: Switch GEN.spr-r or spr-a into GRD.spr with no compression, a single block and no tile index map)

12.2.2.4 Dataset [Library] Metadata: Source Graphic Description in ISO 8824

The Source Graphic Description is within the Source File (SOU) which, in that case, includes at least one Record: the Source Record (SOU) and possibly repeating Legend Records, a Metric Support Record (MSD) or a Supplementary Text Record (SPT). There is one Source File per source graphic within a DIGEST information package.

Derived Layer and NUMBER OF COMPONENTS are transmitted within the Source Summary Field (SOU.SGF) composed of an array of subfields with one column per derived layer; when there are several derived layers, the number of components occurs redundantly with exactly the same values once for each derived layer. EXTENT OF DERIVED DATA is transmitted within the Repeating field Bounding Polygon (SOU.RCI) composed of an array of subfields with one column per point.

2[C,D]	FIELD OF APPLICATION	
*3[C,D]	**Derived Layer**	SOU.SGF.bad-s
*3[C,D]	EXTENT OF DERIVED DATA: BOUNDING POLYGON	
*4[R,M]	Point	
5[C,M]	**Longitude/Easting**	SOU.RCI.lon
5[C,M]	**Latitude/Northing**	SOU.RCI.lat
2[C,O]	NUMBER OF COMPONENTS	
3[R,O]	**Number of Magnetic Information**	SOU.SGF.nmi
3[C,O]	**Number of Supplementary Text**	SOU.SGF.nst
3[R,O]	**Number of Legend Images**	SOU.SGF.nli
3[R,O]	**Number of Insets**	SOU.SGF.nin

GENERAL DESCRIPTION is within the Source Field (SOU.SOR), which includes also the transmission of part of the COORDINATE SYSTEM, the Security and release Field (SOU.QSR) and the Copyright Field (SOU.CPY).

2[C,M]	GENERAL DESCRIPTION	
3[C,M]	GRAPHIC IDENTIFICATION	
4[C,S]	**Series**	SOU.SOR.prt-s
4[C,M]	**Source Identification**	SOU.SOR.urf-s
4[C,M]	**Edition**	SOU.SOR.edn-s
4[C,S]	**Name**	SOU.SOR.nam-s
4[C,M]	**Significant Date**	SOU.SOR.cdp-s SOU.SOR.cdv-s
4[C,S]	**Perishable Date**	SOU.SOR.cdv27-s
4[C,O]	**Source Reference Number**	SOU.SOR.srn-s
3[C,M]	GRAPHIC DESCRIPTION	
4[C,S]	**Reciprocal Scale**	SOU.SOR.sca-s
4[C,O]	Coverage	
5[C,M]	**Coverage**	SOU.SOR.squ
5[C,M]	**Unit of Measure for Coverage**	SOU.SOR.unisqu
4[C,O]	Contour Interval	
5[C,M]	**Contour Interval**	SOU.SOR.pci
5[C,M]	**Unit**	SOU.SOR.unipci
4[C,O]	**Water Coverage**	SOU.SOR.wpc
4[C,O]	**Navigational System Type**	SOU.SOR.nst-s
4[R,O]	Highest Elevation	
5[R,M]	**Highest Elevation**	SOU.SOR.hke
5[R,M]	**Unit**	SOU.SOR.unihke
5[R,S]	Highest Elevation Point	

6[R,M]	**Longitude/Easting**	SOU.SOR.lon-m
6[R,M]	**Latitude/Northing**	SOU.SOR.lat-m
3[C,M]	SECURITY AND RELEASE	
4[C,M]	**Security Classification**	SOU.QSR.qss
4[C,M]	**Downgrading**	SOU.QSR.qod
4[C,O]	**Downgrading date**	SOU.QSR.cdv10
4[C,M]	**Releasability**	SOU.QSR.qle
3[C,S]	COPYRIGHT	
4[C,M]	**Statement**	SOU.CPY.cpz

MAGNETIC INFORMATION is within the Magnetic Rate Field (SOU.MAG) composed of an array of Subfield with one column per occurrence of MAGNETIC INFORMATION

2[C,O]	MARGINALIA	
*3[R,O]	**MAGNETIC INFORMATION**	
4[R,M]	**Date (magnetic)**	SOU.MAG.cdp SOU.MAG.cdv
4[R,M]	Annual rate of change	
5[R,M]	**Rate of Change**	SOU.MAG.rat
5[R,M]	**Unit**	SOU.MAG.unirat
4[R,M]	Grid Magnetic angle	
5[R,M]	**G-M Angle**	SOU.MAG.gma
5[R,M]	**Unit**	SOU.MAG.unigma
4[R,S]	Magnetic rate reference Point	
5[R,M]	**Longitude/Easting**	SOU.MAG.lon-m
5[R,M]	**Latitude/Northing**	SOU.MAG.lat-m
4[R,O]	Grid convergence	
5[R,M]	**Convergence Angle**	SOU.MAG.gca
5[R,M]	**Unit**	SOU.MAG.unigca

SUPPLEMENTARY TEXT is within the SUPPLEMENTARY TEXT Field (SPT.SUP) composed of an array of Subfield with one column per occurrence of SUPPLEMENTARY TEXT.

*3[C,O]	**SUPPLEMENTARY TEXT**	
4[C,M]	**Text Field Type**	SPT.SUP.trv
4[C,O]	**Text Field Reference ID**	SPT.SUP.tri
4[C,M]	**Free text**	SPT.SUP.txt

LEGEND DESCRIPTION is within the repeating Legend Record.

*3[R,O]	LEGEND DESCRIPTION	
4[R,M]	LEGEND DATA	
5[R,O]	**Name**	LEG.LGI.nam-l
5[R,M]	**Data Structure**	LEG.LGI.str-l
5[R,M]	**Legend ID**	LEG.SPR-L.bad-d
4[R,D]	BANDS DESCRIPTION	(OMITTED)
4[R,M]	PIXELS/ELEMENTS ENCODING	(See Layer Metadata: Switch GEN.spr-r or spr-a into LEG.spr-l and GEN.tim-r or tim-a into LEG.tim-l)

COORDINATE SYSTEM is within the Source Field (SOU.SOR), which includes also the part of the GENERAL DESCRIPTION, within the Projection Field (SOU.PRR), and possibly within the Metric Support Record (MSD).

[2[R,S] V/A,O]	COORDINATE SYSTEM	
3[C,M]	GEODETIC PARAMETERS	
4[C,M]	HORIZONTAL DATUM	
5[C,M]	**Geodetic Datum Name**	SOU.SOR.dag
5[C,M]	**Geodetic Datum Code**	SOU.SOR.dcd
4[C,M]	GEODETIC ELLIPSOID	
5[C,M]	**Ellipsoid Name**	SOU.SOR.ell
5[C,M]	**Ellipsoid Code**	SOU.SOR.elc
4[C,D]	VERTICAL DATUM	
5[C,M]	**Vertical Datum reference**	SOU.SOR.dvr
5[C,M]	**Code of Vertical Datum Ref.**	SOU.SOR.vdcdvr
4[C,D]	SOUNDING DATUM	
5[C,M]	**Sounding Datum Name**	SOU.SOR.sda
5[C,M]	**Sounding Datum Code**	SOU.SOR.vdcsda
3[C,M]	PROJECTION	
4[C,M]	**Projection Name**	SOU.PRR.prn
4[C,M]	**Projection Code**	SOU.PRR.pco
4[C,M]	PROJECTION PARAMETER(S)	
*5[C,M]	**Parameter**	SOU.PRR.paa (pab, pac, pae, ...paz)

4[C,D]	PROJECTION FALSE ORIGIN	
5[C,M]	**X false origin**	SOU.PRR.xor
5[C,M]	**Y false origin**	SOU.PRR.yor
3[C,D]	GRID SYSTEM	
4[C,M]	**Grid code**	SOU.SOR.grd-c
4[C,O]	**Grid description**	SOU.SOR.grn-c
4[C,D]	**Grid Zone Number**	SOU.SOR.zna

ARC SYSTEM METRIC SUPPORT PARAMETERS are within the Normalization Constants Field (MSD.NCD), the Source Datum Coefficients Data Field (MSD.SDC), and the Map Projection Coefficients Data Field (MSD.MPC).

3[R/A,O]	METRIC SUPPORT PARAMETERS	
4[R/A,O]	ARC SYSTEM METRIC SUPPORT PARAMETERS	
5[R/A,M]	NORMALIZATION CONSTANTS	
6[R/A,M]	**Latitude Scale Factor**	MSD.NCD.tsf
6[R/A,M]	**Longitude Scale Factor**	MSD.NCD.gsf
6[R/A,M]	**Latitude Translation Term**	MSD.NCD.ttt
6[R/A,M]	**Longitude Translation Term**	MSD.NCD.gtt
6[R/A,M]	**Northing Scale Factor**	MSD.NCD.nsf
6[R/A,M]	**Easting Scale Factor**	MSD.NCD.esf
6[R/A,M]	**Northing Translation Term**	MSD.NCD.ntt
6[R/A,M]	**Easting Translation Term**	MSD.NCD.ett
5[R/A,M]	SOURCE DATUM COEFFICIENTS	
6[R/A,M]	**Latitude Coefficient 1**	MSD.SDC.ax1
6[R/A,M]	**Latitude Coefficient 2**	MSD.SDC.ax2
6[R/A,M]	**Latitude Coefficient 3**	MSD.SDC.ax3
:	**:**	
6[R/A,M]	**Latitude Coefficient 7**	MSD.SDC.ax7
6[R/A,M]	**Longitude Coefficient 1**	MSD.SDC.bx1
6[R/A,M]	**Longitude Coefficient 2**	MSD.SDC.bx2
6[R/A,M]	**Longitude Coefficient 3**	MSD.SDC.bx3
:	**:**	
6[R/A,M]	**Longitude Coefficient 7**	MSD.SDC.bx7
5[R/A,M]	MAP PROJECTION COEFFICIENTS	
6[R/A,M]	**Northing Coefficient 1**	MSD.MPC.cx1
6[R/A,M]	**Northing Coefficient 2**	MSD.MPC.cx2
6[R/A,M]	**Northing Coefficient 3**	MSD.MPC.cx3
:	**:**	
6[R/A,M]	**Northing Coefficient 10**	MSD.MPC.cxa
6[R/A,M]	**Easting Coefficient 1**	MSD.MPC.dx1
6[R/A,M]	**Easting Coefficient 2**	MSD.MPC.dx2
6[R/A,M]	**Easting Coefficient 3**	MSD.MPC.dx3
:	**:**	
6[R/A,M]	**Easting Coefficient 10**	MSD.MPC.dxa

UTM/UPS SYSTEM METRIC SUPPORT PARAMETERS are within the Datum Change Constants Field (MSD.DCC), the Source Datum Coefficients Counter Field (MSD.SCC), the Source Datum Longitude Coefficients Field (MSD.SLG), the Source Datum Latitude Coefficients Field (MSD.SLT), and the Grid Rotation Coefficients Field (MSD.GRC).

4[R/A,O]	UTM/UPS SYSTEM METRIC SUPPORT PARAMETERS	
5[R/A,M]	DATUM CHANGE CONSTANTS	
6[R/A,M]	**Latitude normalizing offset**	MSD.DCC.tof
6[R/A,M]	**Longitude normalizing offset**	MSD.DCC.gof
6[R/A,M]	**Normalizing factor**	MSD.DCC.nzt
6[R/A,M]	**Eastern limit of validity**	MSD.DCC.elv
6[R/A,M]	**Western limit of validity**	MSD.DCC.wlv
6[R/A,M]	**Northern limit of validity**	MSD.DCC.nlv
6[R/A,M]	**Southern limit of validity**	MSD.DCC.slv
5[R/A,M]	SOURCE DATUM COEFFICIENT COUNTERS	
6[R/A,M]	**Number of longitude coefficients**	MSD.SCC.bct
6[R/A,M]	**Number of latitude coefficients**	MSD.SCC.act
*5[R/A,M]	SOURCE DATUM LONGITUDE COEFFICIENTS	
6[R/A,M]	**i long index**	MSD.SLG.cbi
6[R/A,M]	**j long index**	MSD.SLG.cbj
6[R/A,M]	**Coefficient of MRE $b_{i,j}$**	MSD.SLG.lgc
*5[R/A,M]	SOURCE DATUM LATITUDE COEFFICIENTS	
6[R/A,M]	**i lat index**	MSD.SLT.cai
6[R/A,M]	**j lat index**	MSD.SLT.caj
6[R/A,M]	**Coefficient of MRE $a_{i,j}$**	MSD.SLT.ltc
5[R/A,O]	GRID_ROTATION_COEFFICIENTS	
6[R/A,M]	**Normalized Eastings shift**	MSD.GRC.nes
6[R/A,M]	**Normalized Northings shift**	MSD.GRC.nns
6[R/A,M]	**Angle of orientation**	MSD.GRC.aor

INSET(S): INSET DESCRIPTION are within Inset Field (SOU.INS) composed of an Array of Subfields with one column per Inset description.

*2[R,D]	INSET(S): INSET DESCRIPTION	
3[R,M]	**Inset Identification**	SOU.INS.int
3[R,M]	**Reciprocal Scale**	SOU.INS.sca
3[R,M]	**Name**	SOU.INS.nam-i
3[R,M]	Absolute Coordinates	
4[R,M]	**longitude of lower left corner**	SOU.INS.ntl
4[R,M]	**latitude of lower left corner**	SOU.INS.ttl
4[R,M]	**longitude of upper left corner**	SOU.INS.nvl
4[R,M]	**latitude of upper left corner**	SOU.INS.tvl
4[R,M]	**longitude of upper right corner**	SOU.INS.ntr
4[R,M]	**latitude of upper right corner**	SOU.INS.ttr
4[R,M]	**longitude of lower right corner**	SOU.INS.nvr
4[R,M]	**latitude of lower right corner**	SOU.INS.tvr
3[R,M]	Relative Coordinates	
4[R,M]	**longitude of lower left corner**	SOU.INS.nrl
4[R,M]	**latitude of lower left corner**	SOU.INS.trl
4[R,M]	**longitude of upper left corner**	SOU.INS.nsl
4[R,M]	**latitude of upper left corner**	SOU.INS.tsl
4[R,M]	**longitude of upper right corner**	SOU.INS.nrr
4[R,M]	**latitude of upper right corner**	SOU.INS.trr
4[R,M]	**longitude of lower right corner**	SOU.INS.nsr-i
4[R,M]	**latitude of lower right corner**	SOU.INS.tsr

12.2.2.5 Dataset [Library] Metadata: Sensor Parameters Description in ISO 8824

The Sensor Parameters Description is within the Source File (SOU) which, in that case, includes a single Record the Auxilliary Parameters Record (AUP). There is one Source File per Sensor Parameters Description within a DIGEST information package.

Derived Layer is within the Source Summary Field (SOU.SGF) as a repeating Subfield. EXTENT OF DERIVED DATA is within the Repeating field Bounding Polygon (SOU.RCI) composed of an array of subfields with one column per point.

2[R,D]	FIELD OF APPLICATION	
*3[R,D]	**Derived Layer**	AUP.SGF.bad-x
*3[R,D]	EXTENT OF DERIVED DATA: BOUNDING POLYGON	
*4[R,M]	Point	
5[R,M]	**Longitude/Easting**	AUP.RCI.lon
5[R,M]	**Latitude/Northing**	AUP.RCI.lat

SOURCE IMAGE BAND IDENTIFICATION is within the Original Scene Band Id Field (AUP.BDF) composed of an array of subfields with one column per band.

*2[R,M]	SOURCE IMAGE BAND IDENTIFICATION	
3[R/A,M]	**Band designation**	AUP.BDF.bid-f
3[R,M]	Band description	
4[R,M]	**Signal Lower Limit**	AUP.BDF.ws1
4[R,M]	**Signal Upper Limit**	AUP.BDF.ws2

IMAGE RESOLUTION is within the Resolution and Ground Sample Distance Field (AUP.BDF) composed of an array of subfields with one column per band.

2[R,M]	IMAGE RESOLUTION	
3[R,M]	**Resolution in columns**	AUP.RSD.rex
3[R,M]	**Resolution in rows**	AUP.RSD.rey
3[R,O]	**Ground Sample Distance at source in columns**	AUP.RSD.gsx
3[R,O]	**Ground Sample Distance at source in rows**	AUP.RSD.gsy
3[R,O]	**Location of Pixel for Ground Sample Distances**	AUP.RSD.gsl
3[R,M]	**Unit for resolution**	AUP.RSD.unires

BASIC AUXILIARY PARAMETERS are within the Basic Auxiliary Parameters Field (AUP.BAP).

2[R,M]	BASIC AUXILIARY PARAMETERS	
3[R,M]	Image and sensor identification	
4[R,M]	**Vector or Mission Name**	AUP.BAP.vec
4[R,M]	**Sensor or Instrument Name**	AUP.BAP.sns
4[R,M]	**Spectral Mode**	AUP.BAP.mod
4[R,M]	**Processing Level**	AUP.BAP.prl
4[R,O]	**Source image ID**	AUP.BAP.cdv07
4[R,M]	**Acquisition Date and Time**	AUP.BAP.atm
3[R,O]	Incidence Angle	
4[R,M]	**Angle value**	AUP.BAP.ang
4[R,M]	**Angle unit**	AUP.BAP.uniang
3[R,O]	Altitude	
4[R,M]	**Altitude value**	AUP.BAP.alt
4[R,M]	**Unit of Altitude**	AUP.BAP.unialt
3[R,M]	Image Centre Location	

4[R,M]	**Longitude**	AUP.BAP.lon-sc
4[R,M]	**Latitude**	AUP.BAP.lat-sc
3[R,O]	Solar angles at Image Centre	
4[R,M]	**Solar Azimuth**	AUP.BAP.saz
4[R,M]	**Solar Elevation**	AUP.BAP.sel
4[R,M]	**Unit of Solar Angles**	AUP.BAP.unisae
3[R,O]	Attitude angles at Image Centre	
4[R,M]	**Roll**	AUP.BAP.rol
4[R,M]	**Pitch**	AUP.BAP.pit
4[R,M]	**Yaw**	AUP.BAP.yaw
4[R,M]	**Unit of Attitude Angles**	AUP.BAP.unirpy
3[R,O]	Pixel Time	
4[R,M]	**Pixel Time**	AUP.BAP.pxt
4[R,M]	**Unit of Pixel Time**	AUP.BAP.unipxt
3[R,O]	Attitude speed at Image Centre	
4[R,M]	**Roll Speed**	AUP.BAP.ros
4[R,M]	**Pitch Speed**	AUP.BAP.pis
4[R,M]	**Yaw Speed**	AUP.BAP.yas
4[R,M]	**Unit of Attitude Speed**	AUP.BAP.unispe

ADDITIONAL AUXILIARY PARAMETERS are within the Additional Auxiliary Parameters Field (AUP.BAP) composed of an array of subfields with one column per parameter.

2[R,O]	ADDITIONAL AUXILIARY PARAMETERS	
3[R,O]	**Number of Aux. Parameters**	(OMITTED)
*3[R,M]	PARAMETER ID AND VALUE	
4[R,M]	**Aux. Param. Identification**	AUP.AAP.api
4[R,M]	**Aux. Param. Value Format**	AUP.AAP.apf
4[R,M]	**Unit of Auxiliary Parameter**	AUP.AAP.uniapx
4[R,D]	**Aux. Param. Integer Value**	AUP.AAP.apn
4[R,D]	**Aux. Param. Real Value**	AUP.AAP.apr
4[R,D]	**Aux. Param. Characters String**	AUP.AAP.apa

12.2.2.6 Dataset [Library] Metadata: Quality Description in ISO 8824

The Quality Description is within the Quality File (QAL) which includes the Quality Record (QAL) and at least one of the following records: Accuracy Record (QAI), Horizontal Accuracy Record (HOR), or Vertical Accuracy Record (VER).

SECURITY AND RELEASE is within the Security and Release Field (QAL.QSR).

2[C,M]	SECURITY AND RELEASE	
3[C,M]	**Security Classification**	QAL.QSR.qss
3[C,M]	**Downgrading**	QAL.QSR.qod
3[C,O]	**Downgrading date**	QAL.QSR.cdv10
3[C,M]	**Releasability**	QAL.QSR.qle

UP-TO-DATENESS is transmitted within the Up-to-dateness Field (QAL.QUV).

2[C,M]	UP-TO-DATENESS	
3[C,M]	**Edition Number**	QAL.QUV.edn-u
3[C,M]	**Creation Date**	QAL.QUV.cdv07-u
3[C,D]	**Revision Date**	QAL.QUV.cdv24
3[C,O]	**Recompilation Count**	QAL.QUV.rec-u
3[C,O]	**Revision Count**	QAL.QUV.rev-u
3[C,O]	**Earliest Source**	QAL.QUV.cdv20
3[C,O]	**Latest Source**	QAL.QUV.cdv21
3[C,O]	PRODUCT SPECIFICATION	
4[C,M]	**edition id**	QAL.QUV.src-u
4[C,M]	**amendment**	QAL.QUV.spa-u
4[C,M]	**edition date**	QAL.QUV.cdv22

VECTOR DATA QUALITY is within the Completeness and consistency Field (QAL.QCC) and the Attribute Accuracy Field (QAL.QAA).

2[V,O]	VECTOR DATA QUALITY	
3[V,O]	COMPLETENESS AND CONSISTENCY	
4[V,O]	**Feature Completeness**	QAL.QCC.qfc
4[V,O]	**Attribute Completeness**	QAL.QCC.qac
4[V,O]	**Consistency**	QAL.QCC.qlc
3[V,O]	ATTRIBUTE ACCURACY	
4[V,O]	**Quantitative Attribute**	QAL.QAA.qut
4[V,O]	**Qualitative Attribute**	QAL.QAA.qul
4[V,O]	**Collection Criteria**	QAL.QAA.ccr

POSITIONAL ACCURACY SUBREGION(S) are within the repeating Accuracy Records (QAI), Horizontal Accuracy Records (HOR), or Vertical Accuracy Records (VER). ACCURACY STATEMENT is within the Accuracy Field (QAI.QAP), the Horizontal Accuracy Field (HOR.ASH) or the Vertical accuracy Field (VER.ASV). The Extent of the Accuracy Subregion is within the bounding polygon field within each record (QAI.RCI, HOR.RCI,VER.RCI) which contains an array of subfields with one column per point.

*2[C,M]	POSITIONAL ACCURACY SUBREGION(S)	
3[C,M]	ACCURACY STATEMENT	
POSITIONAL ACCURACY STATEMENT		
4[C,M]	Absolute Horizontal Accuracy	
5[C,M]	**Accuracy value**	QAI.QAP.aah-p
5[C,M]	**Unit of Measure**	QAI.QAP.uniaah
4[C,M]	Absolute Vertical Accuracy	
5[C,M]	**Accuracy value**	QAI.QAP.aav
5[C,M]	**Unit of Measure**	QAI.QAP.uniaav
4[C,M]	Point to Point Horizontal Accuracy	
5[C,M]	**Accuracy value**	QAI.QAP.aph
5[C,M]	**Unit of Measure**	QAI.QAP.uniaph
4[C,M]	Point to Point Vertical Accuracy	
5[C,M]	**Accuracy value**	QAI.QAP.apv
5[C,M]	**Unit of Measure**	QAI.QAP.uniapv
HORIZONTAL ACCURACY STATEMENT		
4[C,M]	Absolute Horizontal Accuracy	
5[C,M]	**Accuracy value**	HOR.ASH.aah-h
5[C,M]	**Unit of Measure**	HOR.ASH.uniaah-h
4[C,M]	Point to Point Horizontal Accuracy	
5[C,M]	**Accuracy value**	HOR.ASH.aph-h
5[C,M]	**Unit of Measure**	HOR.ASH.uniaph-h
VERTICAL ACCURACY STATEMENT		
4[C,M]	Absolute Vertical Accuracy	
5[C,M]	**Accuracy value**	VER.ASV.aav-v
5[C,M]	**Unit of Measure**	VER.ASV.uniaav-v
4[C,M]	Point to Point Vertical Accuracy	
5[C,M]	**Accuracy value**	VER.ASV.apv-v
5[C,M]	**Unit of Measure**	VER.ASV.uniapv-v
3[C,M]	EXTENT OF ACCURACY SUBREGION:	
*4[C,M]	Point	
5[C,M]	**Longitude/Easting**	QAI(| HOR | VER).RCI.lon
5[C,M]	**Latitude/Northing**	QAI(| HOR | VER).RCI.lat

COLOUR PATCH is within the repeating Colour Patch Type Field (QAL.CPT), the Colour patch ID Field (QAL.CPI) and the Dataset Parameters field (QAL.SPR).

2[R,O]	COLOUR PATCH	
3[R,M]	**Colour Patch Reference**	QAL.CPT.scr
3[R,D]	**Colour Patch Identification**	QAL.SPR.bad-c
*3[R,O]	COLOUR IDENTIFIER	
4[R,M]	**Colour Name**	QAL.CPI.pnm
4[R,M]	**Red**	QAL.CPI.pir
4[R,M]	**Green**	QAL.CPI.pig
4[R,M]	**Blue**	QAL.CPI.pib
3[R,D]	BANDS DESCRIPTION	(OMITTED: RBG only)
3[R,D]	PIXELS/ELEMENTS	(see Layer Metadata
	ENCODING	switch GEN.SPR into QUAL.SPR)

OTHER QUALITY INFO is transmitted within the Other Quality information field (QAL.QOI)

2[C,O]	OTHER QUALITY INFO	
3[C,M]	**Free text**	QAL.QOI.oqi

12.2.2.7 Layer [Coverage] Metadata in ISO 8824

The Layer [Coverage] Metadata constitutes the main part of the repeating General Information Record (GIN) within the General Information File (GEN). The General Information Record (GIN) occurs once for each Layer [Coverage] Metadata.

Layer [Coverage] designation, coincident with the Geo Data file name, is within the Dataset Parameters Field (GIN.SPR). IDENTIFICATION, reciprocal scale and GEOGRAPHIC EXTENT are part of the General Information Field (GIN.GEN).

2[C,M]	GENERAL DESCRIPTION	
3[C,M]	IDENTIFICATION	
4[C,M]	**designation**	GIN.SPR.bad-d
4[C,O]	**description**	(OMITTED)
4[C,O]	**structure**	GIN.GEN-V.str-v / GEN-R str-r / GEN-M str-a

3[R,D]	**reciprocal scale**	GIN.GEN-V.sca-v / GEN-R sca-r / GEN-M sca-a
3[C,O]	GEOGRAPHIC EXTENT	
4[V/A,O]	**Data Cover**	GIN.GEN-V.cov-v / GEN-M cov-a
4[C,O]	WGS84 MBR	
5 [C,M]	**Longitude of SW Corner**	GIN.GEN.swo-mb
5 [C,M]	**Latitude of SW Corner**	GIN.GEN.swa-mb
5 [C,M]	**Longitude of NE Corner**	GIN.GEN.neo-mb
5 [C,M]	**Latitude of NE Corner**	GIN.GEN.NEA-mb
3[C,O]	**General comment**	GIN.GEN-R txt-r / GEN-M txt-a

LAYER POSITIONAL ACCURACY SUBREGION(S) are transmitted within the repeating Accuracy Records (QAI), Horizontal Accuracy Records (HOR), or Vertical Accuracy Records (VER) of the Quality File. A BAD Subfield is then added to the Accuracy Field (QAI.QAP), the Horizontal Accuracy Field (HOR.ASH) or the Vertical accuracy Field (VER.ASV), in order to indicate to which Layer the information applies. This BAD Subfield must be filled with the Layer designation as in GIN.SPR.BAD.

*3[C,O]	LAYER POSITIONAL ACCURACY SUBREGION(S) (see Quality Description: POSITIONAL ACCURACY SUBREGION(S))

2[V,O] [A/R,M] DATA TYPE SPECIFIC DESCRIPTION

Within VECTOR SPECIFIC DESCRIPTION, LOCAL COORDINATE SYSTEM, VECTOR COMPONENTS and MBR/GRP Units are transmitted as part of the General Information Field (GIN.GEN).

VECTOR SPECIFIC DESCRIPTION

3[V,O]	LOCAL COORDINATE SYSTEM	
4[V, M]	**Longitude/Easting of Origin**	GIN.GEN.lso-vv
4[V, M]	**Latitude/Northing of Origin**	GIN.GEN.pso-v
4[V, M]	**Coordinates scale factor**	GIN.GEN.csf-v
3[V,O]	VECTOR COMPONENTS	
4[V,O]	**Feature Count**	GIN.GEN.fec-v
4[V,O]	**Point Feature Count**	GIN.GEN.poc-v
4[V,O]	**Line Feature Count**	GIN.GEN.lic-v
4[V,O]	**Area Feature Count**	GIN.GEN.alc-v
4[V,O]	**Segment/Edge Count**	GIN.GEN.sgc-v
4[V,O]	**Node Record Count**	GIN.GEN.nec
4[V,O]	**Face Record Count**	GIN.GEN.fcc
4[V,O]	**Simple Feature Count**	GIN.GEN.sft
3[V,O]	**MBR/GRP Units**	GIN.GEN.mbu-v

VECTOR DATA QUALITY is within the Completeness and consistency Field (QAL.QCC) and the Attribute Accuracy Field (QAL.QAA) of the Quality Record (QAL) of the Quality File. A BAD subfield is then added to those fields in order to indicate to which Layer the information applies. This BAD subfield must be filled with the Layer designation.

3[V,O] VECTOR DATA QUALITY (see QUALITY DESCRIPTION)

RASTER OR MATRIX SPECIFIC DESCRIPTION

Within RASTER OR MATRIX SPECIFIC DESCRIPTION, LOCAL COORDINATE SYSTEM, is as part of the General Information Field (GIN.GEN).

3[A/R,D]	LOCAL COORDINATE SYSTEM	
4[A/R, M]	**Longitude/Easting of Origin**	GIN.GEN-R.lso-r / GEN-M lso-a
4[A/R, M]	**Latitude/Northing of Origin**	GIN.GEN-R.pso-r / GEN-M pso-a
4[A/R,M]	SCALING PARAMETERS	
Geographic Coordinate system		
5[R/A,M]	**longitude density**	GIN.GEN.arv
5[R/A,M]	**latitude density**	GIN.GEN.brv
Cartographic Coordinate system		
5[R/A,M]	**Easting interval**	GIN.GEN.lod
5[R/A,M]	**Northing interval**	GIN.GEN.lad
5[R/A,M]	**length unit**	GIN.GEN.uniloa

BAND DESCRIPTION is within the Band Identification Field (GIN.BDF).

3[R/A,M]	BANDS DESCRIPTION	
4[R/A,O]	Number of bands	(OMITTED)
*4[R/A,M]	BAND IDENTIFICATION	
5[R/A,M]	**Band designation**	GIN.BDF.bid-f
5[R,D]	Band description	
6[R,M]	**Wavelength Lower Limit**	GIN.BDF.ws1
6[R,M]	**Wavelength Upper Limit**	GIN.BDF.ws2

MBR and SIZE AND ORDER OF BLOCKS AND PIXELS are within the Dataset Parameters Field (GIN.SPR).

3[R/A,M]	PIXELS/ELEMENTS ENCODING	
4[R/A,O]	MBR	
5[R/A,M]	**row of upper right corner**	GIN.SPR.nul-g
5[R/A,M]	**column of upper right corner**	GIN.SPR.nus-g
5[R/A,M]	**row of lower left corner**	GIN.SPR.nll-g
5[R/A,M]	**column of lower left corner**	GIN.SPR.nls-g
5[R/A,O]	MBR size	(OMITTED may be derived from MBR)
4[R/A,M]	SIZE AND ORDER OF BLOCKS AND PIXELS	
5[R/A,M]	**vertical block number**	GIN.SPR.nfl-g
5[R/A,M]	**horizontal block number**	GIN.SPR.nfc-g
5[R/A,M]	**vertical pixel number**	GIN.SPR.pnc-g
5[R/A,M]	**horizontal pixel number**	GIN.SPR.pnl-g
5[R/A,M]	**Column Sequence**	GIN.SPR.cod-g
5[R/A,M]	**Row Sequence**	GIN.SPR.rod-g
5[R/A,M]	**Pixel or element Order**	GIN.SPR.por-g

ENCODING MECHANISM is as part of the Dataset Parameters Field (GIN.SPR) and within the Compression ID Field (GIN.CID).

4[R/A,M]	ENCODING MECHANISM	
5[R/A,D]	**Compression Code**	GIN.CID.com
5[R/A,O]	**Compression ratio**	GIN.CID.cpr
5[R/A,M]	**Value Length**	GIN.SPR.pvb
5[R/A,D]	**Count Length**	GIN.SPR.pcb
5[R/A,M]	**Tile Index Map Flag**	GIN.SPR.tif

COMPRESSION LOOKUP TABLES are within two repeating Fields; the Compression Lookup Table Description Field (GIN.LTD) contains the COMPRESSION LOOKUP TABLE DESCRIPTION and the Compression Lookup Table Value Field (GIN.LTV) contains COMPRESSION LOOKUP TABLE VALUES. Those two Fields occurs exactly the same number of times, and their order is significant.

*4[R/A,D]	COMPRESSION LOOKUP TABLES	
5[R/A,M]	COMPRESSION LOOKUP TABLE DESCRIPTION	
6[R/A,M]	**Compression Lookup Table Id**	GIN.LTD.lti
6[R/A,M]	**No of Compression LUT Rows**	GIN.LTD.nlr
6[R/A,M]	**No of Val. / Compr. LUT Row**	GIN.LTD.nva
6[R/A,O]	**Compr. LUT Value Bit Length**	GIN.LTD.vlb
5[R/A,M]	COMPRESSION LOOKUP TABLE VALUES	
*6[R/A,M]	**Compression LUT Value**	GIN.LTV.clv

COMPRESSION PARAMETERS are within Compresssion Parameters Field (GN.CPM) which is composed of an array of subfields with one column per Compression parameter.

*4[R/A,D]	COMPRESSION PARAMETER(S)	
5[R/A,M]	**Compression Parameter Id**	GIN.CPM.cqi
5[R/A,M]	**Compression Parameter Value**	GIN.CPM.cpv

TILE INDEX MAP is within Tile Index Map Field (GIN.TIM).

4[R/A,D]	TILE INDEX MAP	
*5[R/A,M]	**Tile Index Value**	GIN.TIM.tsi

3[A/R,M] DATA TYPE SPECIFIC PARAMETERS

MATRIX-SPECIFIC PARAMETERS are within the General Information Field (GIN.GEN) for the Matrix Units, and within the Nominal code Identifier Field of the Quality Record of the Quality File, for the NOMINAL CODE IDENTIFIER, where the BAD subfield designate the Layer to which the information applies.

MATRIX-SPECIFIC PARAMETERS

4[A,D]	**Matrix Units**	GIN.GEN.unimat-a
*4[A,M]	NOMINAL CODE IDENTIFIER	
5[A,M]	**Attribute Code Identifier**	QAL.NOM.nci
5[A,M]	**Description/Meaning of the Attribute value**	QAL.NOM.ndb
5[A,M]	**Nominal code assigned to the Attribute value**	QAL.NOM.ncd-n

RASTER-SPECIFIC PARAMETERS are within the General Information Field (GIN.GEN) for the SCANNING PARAMETERS, and for the COLOUR CODE IDENTIFIER, within the Colour code Identifier Field of the Quality Record of the Quality File where the BAD subfield designate the Layer to which the information applies.

RASTER-SPECIFIC PARAMETERS		
*4[R,D]	COLOUR CODE IDENTIFIER	
5[R,M]	**Name**	QAL.COL.cbd
5[R,M]	**Colour Code**	QAL.COL.ccd
5[R,O]	CIE colour description	
6[R,M]	**CIEx**	QAL.COL.cr1
6[R,M]	**CIEy**	QAL.COL.cr2
6[R,M]	**CIEY**	QAL.COL.cr3
5[R,M]	RGB colour description FRM	
6[R,M]	**Red (recorded)**	QAL.COL.nsr
6[R,M]	**Green (recorded)**	QAL.COL.nsg
6[R,M]	**Blue (recorded)**	QAL.COL.nsb
5[R,O]	**Mathematical relation to other colour codes**	QAL.COL.frm
3[R,O]	SCANNING PARAMETERS	
4[R,M]	**Pixel Spacing**	GIN.GEN.psp-r
4[R,O]	**Rectified Image**	GIN.GEN.imr-r

12.2.3 VRF Encapsulation (Annex C)

The building blocks of VRF encapsulated DIGEST information package are the following:

- VRF Tables are identified by a Table name, compliant to a Table definition, and composed of a header and at least one record
- All records within a VRF Table consist of exactly one value for each column of the VRF Table. The definition of a VRF Table contains a description of each of its column, identified by a column name and a column type. Each column value corresponds to a specific DIGEST data element value. Column types must be compatible with generic DIGEST data element types.

The following repetition mechanism may exist within a VRF encapsulated DIGEST information package:

- Repeating Tables : several Tables compliant to the same Table definition identified by different Table names may exist within a DIGEST information package;
- Repeating Records: several Records may exist within a VRF Table

Clauses 12.2.3.1 to 12.2.3.7 document the correspondence between DIGEST data elements and VRF encapsulation for the Metadata subsets. Columns values are designated by the following pattern: <Table Name>.<Column Name>

12.2.3.1 DIGEST Information Package Metadata in VRF

The DIGEST Information Package Metadata Subset is transmitted within the two mandatory VRF Tables at the Database level: the library attribute table (lat) and the database header table (dht).

DATABASE CONTEXT, DIGEST INFORMATION PACKAGE IDENTIFICATION, EXCHANGE CONTEXT and the number of Datasets/Libraries are transmitted within the database header table (dht).

2 [C,O]	DATABASE CONTEXT	
3[C,M]	DATABASE IDENTIFICATION	
4[C,M]	**designation**	dht.database_name
4[C,M]	**description**	dht.database_desc
3[C,O]	DATABASE TRANSMISSION	
4[C,M]	**media standard**	dht.media_standard
4[C,M]	**total number of DIGEST information packages**	dht.media_volumes
4[C,M]	**sequence number**	dht.seq_numbers
2[C,M]	DIGEST INFORMATION PACKAGE IDENTIFICATION	
3[C,M]	**identifier**	dht.transmittal_id
3[C,M]	**edition number**	dht.edition_number
3[C,M]	**exchange date**	dht.edition_date
2[C,M]	EXCHANGE CONTEXT	
3[C,M]	**originator**	dht.originator
3[C,O]	**addressee**	dht.addressee
2[C,M]	**number of Datasets/Libraries**	dht.num_data_sets

CONTENT: DATASET [LIBRARY] DESCRIPTION is transmitted within the library atttribute table(lat) which contains exactly one record per library.

*2[C,M]	CONTENT: DATASET [LIBRARY] DESCRIPTION	
3[C,M]	IDENTIFICATION	
4[C,M]	**designation**	lat.library_name
4[C,O]	**description**	(omitted)
4[C,O]	**dataset type**	(omitted)
4[C,M]	**structure**	(omitted)
4[C,D]	**encapsulation**	(omitted)

3[C,M]	WGS84 MBR	
4 [C,M]	**Longitude of SW Corner**	lat.xmin
4 [C,M]	**Latitude of SW Corner**	lat.ymin
4 [C,M]	**Longitude of NE Corner**	lat.xmax
4 [C,M]	**Latitude of NE Corner**	lat.ymax
3[C,D]	SPECIFICATION	(omitted — the whole DIGEST information package must comply to the same product specification)

SPECIFICATION and SECURITY AND RELEASE are transmitted within the database header table (dht).

2[C,D]	SPECIFICATION	
3[C,M]	DIGEST SPECIFICATION	

The following three elements are concatenated within a single column

4[C,M]	**edition id**	|
4[C,M]	**amendment**	| dht vrf version
4[C,M]	**edition date**	|
3[C,O]	PRODUCT SPECIFICATION	
4[C,M]	**edition id**	dht.other_std_name
4[C,M]	**amendment**	dht.other_std_ver
4[C,M]	**edition date**	dht.other_std_date
2[C,M]	SECURITY AND RELEASE	
3[C,M]	**Security Classification**	dht.security_class
3[C,M]	**Downgrading**	dht.downgrading
3[C,O]	**Downgrading date**	dht.downgrade_date
3[C,M]	**Releasability**	dht.releasability

12.2.3.2 Dataset [Library] Metadata: General Information in VRF

The General Information is transmitted within two of the VRF Tables at the Library level: the coverage attribute table (cat) and the library header table (lht).

DATASET IDENTIFICATION is transmitted within the library header table (lht).

2[C,M]	DATASET IDENTIFICATION	
3[C,M]	**designation**	lht.library_name
3[C,O]	**description**	lht.description
3[C,O]	**dataset type**	lht.product_type
3[C,O]	**structure**	lht.data_struct_code
3[C,D]	**encapsulation**	lht. encapsulation

CONTENT: LAYER [COVERAGE] is transmitted within the coverage attribute table(cat) which contains exactly one record per coverage.

*2[C,M]	CONTENT: LAYER [COVERAGE]	
3[C,M]	IDENTIFICATION	
4[C,M]	**designation**	cat.coverage_name
4[C,O]	**description**	cat.description
4[C,M]	**structure**	cat.level
4[C,D]	**encapsulation**	"tileref.aft".encapsulation
3[C,O]	WGS84 MBR	(omitted)
2[C,O]	NUMBER OF COMPONENTS	(OMITTED)

12.2.3.3 Dataset [Library] Metadata: Geo Reference Description in VRF

The Geo Reference Description is transmitted within at least one and possibly three of the VRF Tables at the Library level: the geographic reference table (grt), the diagnostic point table (dpt), and the registration point table (rpt).

Coordinate System Type, Coordinate units, GEODETIC PARAMETERS, PROJECTION and Z Values false origin are transmitted within the geographic reference table (grt).

2[C,M]	**Coordinate System Type**	grt.data_type
2[C,M]	**Coordinate Units**	grt.units
2[C,M]	GEODETIC PARAMETERS	
3[C,M]	HORIZONTAL DATUM	
4[C,M]	**Geodetic Datum Name**	grt.geo_datum_name
4[C,M]	**Geodetic Datum Code**	grt.geo_datum_code
3[C,M]	GEODETIC ELLIPSOID	
4[C,M]	**Ellipsoid Name**	grt.ellipsoid_name
4[C,M]	**Ellipsoid Code**	grt.ellipsoid_code
3[V/A,D]	VERTICAL DATUM	
4[V/A,M]	**Vertical Datum Reference**	grt.vert_datum_name
4[V/A,M]	**Code of Vertical Reference**	grt.vert_datum_code
3[V/A,D]	SOUNDING DATUM	
4[V/A,M]	**Sounding Datum Name**	grt.sound_datum_name
4[V/A,M]	**Sounding Datum Code**	grt.sound_datum_code
2[C,D]	PROJECTION	
3[C,M]	**Projection Name**	grt.projection_name
3[C,M]	**Projection Code**	grt.projection_code
3[C,M]	PROJECTION PARAMETER(S)	
4[C,M]	**Parameter**	grt.parameter1(.parameter2, .parameter3, .parameter4)

3[C,D]	PROJECTION FALSE ORIGIN	
4[C,M]	**X false origin**	grt.false_origin_x
4[C,M]	**Y false origin**	grt.false_origin_y
2[C,O]	GRID SYSTEM	(OMITTED)
2[C,D]	**Z Values False Origin**	grt.false_origin_z

REGISTRATION POINT(S) are transmitted within the registration point table (rpt) which contains exactly one record per registration point.

*2[C,O]	REGISTRATION POINT(S)	
3[C,M]	**Registration Point ID**	rpt.reg_pt_id
3[C,M]	**Longitude/Easting**	rpt.reg_long
3[C,M]	**Latitude/Northing**	rpt.reg_lat
3[C,D]	**Elevation**	rpt.reg_z
3[C,M]	**Local X coordinate**	rpt.reg_table_x
3[C,M]	**Local Y coordinate**	rpt.reg_table_y
3[C,D]	**Local Z coordinate**	rpt.reg_table_z

DIAGNOSTIC POINT(S) are transmitted within the diagnostic point table (dpt) which contains exactly one record per diagnostic point.

*2[C,O]	DIAGNOSTIC POINT(S)	
3[C,M]	**Diagnostic Point ID**	dpt.diag_pt_id
3[C,M]	**Longitude/Easting**	dpt.diag_long
3[C,M]	**Latitude/Northing**	dpt.diag_lat
3[C,D]	**Elevation**	dpt.diag_z
3[C,M]	**Local X coordinate**	dpt.diag_table_x
3[C,M]	**Local Y coordinate**	dpt.diag_table_y
3[C,D]	**Local Z coordinate**	dpt.diag_table_z
*2[R/A,O]	LOCATION GRID(S)	(NOT APPLICABLE)

12.2.3.4 Dataset [Library] Metadata: Source Graphic Description in VRF

The Source Graphic Description is transmitted within one VRF Table at the Library level: the library header table (lht) which contains one record per source graphic used as source for the whole dataset. Source graphic description may be also found in the Data quality coverage.

2[C,D]	FIELD OF APPLICATION	(omitted - the source description transmitted at this level must be valid for the whole dataset; specific sources description may be transmitted within a data quality coverage)
2[C,O]	NUMBER OF COMPONENTS	(omitted)
2[C,M]	GENERAL DESCRIPTION	
3[C,M]	GRAPHIC IDENTIFICATION	
4[C,S]	**Series**	lht.source_series
4[C,M]	**Source Identification**	lht.source_id
4[C,M]	**Edition**	lht.source_edition
4[C,S]	**Name**	lht.source_name
4[C,M]	**Significant Date**	lht.source_date
4[C,S]	**Perishable Date**	(omitted)
4[C,O]	**Source Reference Number**	(omitted)
3[C,M]	GRAPHIC DESCRIPTION	
4[C,S]	**Reciprocal Scale**	lht.scale
4[C,O]	Coverage	(omitted)
4[C,O]	Contour Interval	(omitted)
4[C,O]	**Water Coverage**	(omitted)
4[C,O]	**Navigational System Type**	(omitted)
4[R,O]	Highest Elevation	not applicable
3[C,M]	SECURITY AND RELEASE	
4[C,M]	**Security Classification**	lht.security_class
4[C,M]	**Downgrading**	lht.downgrading
4[C,O]	**Downgrading date**	lht.downgrading_date
4[C,M]	**Releasability**	lht.releasability
3[C,S]	COPYRIGHT	(omitted)
2[C,O]	MARGINALIA	(omitted)
2[C,M]	COORDINATE SYSTEM	(omitted)
*2[R,D]	INSET(S)	not applicable

12.2.3.5 Dataset [Library] Metadata: Sensor Parameters Description in VRF

NOT APPLICABLE

12.2.3.6 Dataset [Library] Metadata: Quality Description in VRF

The Quality Description is transmitted within one VRF Table at the Library level: the data quality table (dqt). The data quality table (dqt) may also exist at the Coverage level, when information pertains to a single coverage.

2[C,M]	SECURITY AND RELEASE	(omitted — defaulted to the same as the security and release as described in the database header table)
2[C,M]	UP-TO-DATENESS	
3[C,M]	**Edition Number**	dqt.edition_num | lht.edition_number
3[C,M]	**Creation Date**	dqt.creation_date | lht.edition_date
3[C,D]	**Revision Date**	dqt.revision_date
3[C,O]	**Recompilation Count**	omitted
3[C,O]	**Revision Count**	**omitted**
3[C,O]	**Earliest Source**	dqt.earliest_source
3[C,O]	**Latest Source**	dqt.latest_source
3[C,O]	PRODUCT SPECIFICATION	
The following two elements are concatenated within a single column		
4[C,M]	**edition id**	| dqt.spec_name
4[C,M]	**amendment**	**|**
4[C,M]	**edition date**	dqt.spec_date
2[V,O]	VECTOR DATA QUALITY	
3[V,O]	COMPLETENESS AND CONSISTENCY	
4[V,O]	**Feature Completeness**	dqt.feature_complete
4[V,O]	**Attribute Completeness**	dqt.attrib_complete
4[V,O]	**Consistency**	dqt.logical_consist
3[V,O]	ATTRIBUTE ACCURACY	
4[V,O]	**Quantitative Attribute**	dqt.quant_att_acc
4[V,O]	**Qualitative Attribute**	dqt.qual_att_acc
4[V,O]	**Collection Criteria**	dqt.collection_spec
*2[C,M]	POSITIONAL ACCURACY SUBREGION	
3[C,M]	ACCURACY STATEMENT POSITIONAL ACCURACY STATEMENT	
4[C,M]	Absolute Horizontal Accuracy	
5[C,M]	**Accuracy value**	dqt.abs_horiz_acc
5[C,M]	**Unit of Measure**	dqt.abs_horiz_units
4[C,M]	Absolute Vertical Accuracy	
5[C,M]	**Accuracy value**	dqt.abs_vert_acc
5[C,M]	**Unit of Measure**	dqt.abs_vert_units
4[C,M]	Point to Point Horizontal Accuracy	
5[C,M]	**Accuracy value**	dqt.rel_horiz_acc
5[C,M]	**Unit of Measure**	dqt.rel_horiz_units
4[C,M]	Point to Point Vertical Accuracy	
5[C,M]	**Accuracy value**	dqt.rel_vert_acc
5[C,M]	**Unit of Measure**	dqt.rel_vert_units

HORIZONTAL ACCURACY STATEMENT		VERTICAL ACCURACY STATEMENT
3[C,M]	EXTENT OF ACCURACY SUBREGION:	(omitted - the accuracy statement must be valid for the whole Library (or Coverage); specific accuracy statements may be transmitted within a data quality coverage)
2[R,O]	COLOUR PATCH	not applicable
2[C,O]	OTHER QUALITY INFO	
3[C,M]	**Free text**	dqt.comments

12.2.3.7 Layer [Coverage] Metadata in VRF

2[C,M]	GENERAL DESCRIPTION	
3[C,M]	IDENTIFICATION	
4[C,M]	**designation**	(DIRECTORY NAME)
4[C,O]	**description**	OMITTED
4[C,O]	**structure**	OMITTED
3 [V/A,O]	**reciprocal scale**	OMITTED
3[C,O]	GEOGRAPHIC EXTENT	OMITTED
3[C,O]	**General comment**	OMITTED
*3[C,O]	LAYER POSITIONAL ACCURACY SUBREGION (S) (see QUALITY DESCRIPTION)	
2[V,O]	DATA TYPE SPECIFIC DESCRIPTION	
VECTOR-SPECIFIC DESCRIPTION		
3[V,O]	LOCAL COORDINATE SYSTEM	.
The following two elements are concatenated within a single field		
4[V, M]	**Longitude/Easting of Origin**	|"tileref.aft".origin
4[V, M]	**Latitude/Northing of Origin**	|
4[V,M]	**Coordinates scale factor**	"tileref.aft".scale
3[V,O]	VECTOR COMPONENTS	(OMITTED)
3[V,O]	VECTOR DATA QUALITY (see QUALITY DESCRIPTION)	

12.2.4 IIF Encapsulation (Annex D)

In DIGEST 2.0 Part 2 (June 1997), Annex D and Clause 12.2.4 are interim descriptions of Image Interchange Format (IIF). They are only aligned with old drafts of NSIF. It is recommended that the DIGEST 2.1 Annex D is used for IIF implementation in preference to the DIGEST 2.0 version.

An IIF encapsulated DIGEST information package consists of a single file while one or more IIF files can be combined with other DIGEST files to constitute a DIGEST information package with mixed encapsulations. The building blocks of an IIF file are the following:

- A **File Header**, **Image Segments** containing a **Subheader** and an image, and a set of standard **Tagged Record Extensions** called the Geo Standard Data Extensions (GeoSDEs). The IIF Header/Subheaders/Extensions are composed of
- **Fixed-length Fields**, associated to a mnemonic identifier and defined by their size and their range of values.

The following repetition mechanisms may exist within an IIF File:

- **Repeating Segments**: several identified Image Segments may exist within an IIF File;
- **Repeating Fields**: within the File Header, an Image Subheader or a standard Tagged Record Extension, repeating Fields or set of repeating Fields are preceded by a Field indicating the number of repetitions.

When a whole DIGEST information package is IIF encapsulated:

- the DIGEST Information Package Metadata Subset is transmitted within the File Header (FH);
- the Dataset Metadata Subset is transmitted within the File Header (FH), the Image Subheaders and the associated GeoSDEs;
- the identifier of the DIGEST information package is the name of the IIF File;
- the DIGEST information package is composed of a single Dataset;
- the designation of the Dataset is also the name of the IIF File (without its extension);
- the extension of the IIF File name can be (but not necessarily) IIF.

When a DIGEST information package composed of many IIF Files or composed of mixed encapsulations including IIF Files:

- the Standard ASCII Table of Content (SATOC - See DIGEST Part 2 Annex E) indicates the encapsulation used for each Metadata Subset, including the DIGEST information package Metadata Subset. Since IIF provides a limited support of the DIGEST Metadata elements, the SATOC file serves as the encapsulation of the DIGEST information package metadata subset when the DIGEST information package is only composed of IIF Files.
- there is no relationship between the name of the IIF Files and the identifier of the DIGEST information package;

- each IIF File contains one or many layers of a single Dataset. When the IIF File is part of a dataset with mixed encapsulations, IIF is not able to be the encapsulation of the Dataset Metadata Subset;
- the name of each IIF File is defined in the SATOC File or is <name>. IIF where <name> is the designation of the Dataset or Layer corresponding to the IIF File.

Clauses 12.2.4.1 to 12.2.4.7 and the Annex D document the correspondence between the IIF Fields and the DIGEST data elements. The IIF Fields are designated by a pattern like <Tag>.<Mnemo>, where <Mnemo> is the mnemonic identifier of an IIF Field and <Tag> is **FH** for the File Header, **ISH** for an Image Subheader, **VQH** for a VQ Header of a VQ compressed Image or the tag identifying the extension for a GeoSDE.

12.2.4.1 DIGEST Information Package Metadata in IIF

When a DIGEST information package is IIF encapsulated, the DIGEST Information Package Metadata Subset is transmitted within the File Header (FH) as follows.

2[C,O]	DATABASE CONTEXT	(omitted)
2[C,M]	DIGEST INFORMATION PACKAGE IDENTIFICATION	
3[C,M]	**identifier**	(derived from the IIF File name)
3[C,M]	**edition number**	(defaulted to **999** — no tracking)
3[C,M]	**exchange date**	FH.FDT
2[C,O]	EXCHANGE CONTEXT	
3[C,M]	**originator**	FH.ONAME
3[C,O]	**adressee**	(omitted)
2[C,M]	**number of Datasets/Libraries**	(defaulted to **1**)
*2[C,M]	CONTENT: DATASET [LIBRARY] DESCRIPTION	(only one occurrence)
3[C,M]	IDENTIFICATION	
4[C,M]	**designation**	(derived from the IIF File name)
4[C,O]	**description**	(omitted)
4[C,O]	**dataset type**	FH.FTITLE
4[C,O]	**structure**	(omitted)
4[C,D]	**encapsulation**	(defaulted to **D** - the Dataset Metadata Subset of a mixed encapsulated dataset can't be IIF encapsulated)
3[C,M]	WGS84 MBR	(derived from the WGS84 MBR of the layers)
3[C,D]	SPECIFICATION	(omitted — all the Datasets composing the DIGEST information package are produced using the same specification)

2[C,D]	SPECIFICATION	
3[C,M]	DIGEST SPECIFICATION	(derived from FH.FVER and FH.FHDR)
3[C,O]	PRODUCT SPECIFICATION	(omitted)

2[C,M]	SECURITY AND RELEASE	
3[C,M]	**Security Classification**	FH.FSCLAS
3[C,M]	**Downgrading**	(derived from FH.FSDCTP)
3[C,O]	**Downgrading date**	FH.FSDCDT
3[C,M]	**Releasability**	FH.FSCLTX

12.2.4.2 Dataset [Library] Metadata: General Information in IIF

IIF conveys information of the Dataset [Library] Metadata Subset within the File Header (FH) and the Image Subheaders (ISH) as follows.

The DATASET IDENTIFICATION is conveyed within the File Header (FH).

2[C,M]	DATASET IDENTIFICATION	
3[C,M]	**designation**	(derived from the IIF File name)
3[C,O]	**description**	(omitted)
3[C,O]	**dataset type**	FH.FTITLE
3[C,O]	**structure**	(omitted)
3[C,O]	**encapsulation**	(defaulted to **D** - the Dataset Metadata Subset of a mixed encapsulated dataset can't be IIF encapsulated)

An Image Segment and the associated GeoSDEs contain all the information related to a DIGEST layer. When a layer is part of the Supporting Data Subset, the Image Segment does not include any of the GeoSDEs and the value of the ISH.ICAT Field is **LEG** (Legend), **PAT** (Colour patch) or **LOCG** (Location grid). All the Image Segments including the GeoSDEs (as defined in the Part 2 Annex D) are part of the Geo Data Subset. They are called the main Image Segments. Note that an IIF File can contain Image Segments which are out of the DIGEST scope (the expected GeoSDEs are not present and/or the ISH.ICAT value is not equal to LEG, PAT or LOCG). These Image Segments shall be ignored.

The data elements of the CONTENT: LAYER [COVERAGE] are conveyed for each layer of the IIF File within its corresponding main Image Segment. In case of a mixed encapsulated dataset, each layer shall be considered as part of the CONTENT: LAYER [COVERAGE] list through the mechanism defined for its encapsulation.

*2[C,M]	CONTENT: LAYER [COVERAGE]	
3[C,M]	IDENTIFICATION	
4[C,M]	**designation**	ISH.IID1
4[C,O]	**description**	ISH.IID2
4[C,O]	**structure**	(computed using ISH.IREP and ISH.ICAT)
4[C,D]	**encapsulation**	(defaulted to **D** - IIF does not support mixed encapsulated layers)
3[C,O]	WGS84 MBR	(computed using ISH.IGEOLO and ISH.ICORDS)
2[C,O]	NUMBER OF COMPONENTS	(omitted)

12.2.4.3 Dataset [Library] Metadata: Geo Reference Description in IIF

When the Geo Reference Description is IIF encapsulated, it is transmitted within the Geo positioning (GEOPS) and possibly the Projection parameters (PRJPS), the Registration points (REGPT) and the Grid Reference (GRDPS) extensions as follows.

GEOPS and PRJPS are associated to the IIF File Header.

2[C,M]	**Coordinate System Type**	GEOPS.TYP
2[C,M]	**Coordinate Units**	GEOPS.UNI
2[C,M]	GEODETIC PARAMETERS	
3[C,M]	HORIZONTAL DATUM	
4[C,M]	**Geodetic Datum Name**	GEOPS.DAG
4[C,M]	**Geodetic Datum Code**	GEOPS.DCD
3[C,M]	GEODETIC ELLIPSOID	
4[C,M]	**Ellipsoid Name**	GEOPS.ELL
4[C,M]	**Ellipsoid Code**	GEOPS.ELC
3[V/A,D]	VERTICAL DATUM	
4[V/A,M]	**Vertical Datum Reference**	GEOPS.DVR
4[V/A,M]	**Code (Category) of Vertical Reference**	GEOPS.VDCDVR
3[V/A,D]	SOUNDING DATUM	
4[V/A,M]	**Sounding Datum Name**	GEOPS.SDA
4[V/A,M]	**Sounding Datum Code**	GEOPS.VDCSDA
2[C,D]	PROJECTION	(present when the Coordinate Units are Metres)
3[C,M]	**Projection Name**	PRJPS.PRN
3[C,M]	**Projection Code**	PRJPS.PCO
3[C,M]	PROJECTION PARAMETER(S)	
*4[C,M]	**Parameter**	PRJPS.PRJ (occurs PRJPS.NUM_PRJ times)

3[C,D]	PROJECTION FALSE ORIGIN	
4[C,M]	**X false origin**	PRJPS.XOR
4[C,M]	**Y false origin**	PRJPS.YOR
2[C,D]	GRID SYSTEM	
3[C,M]	**Grid code**	GEOPS.GRD
3[C,O]	**Grid description**	GEOPS.GRN
3[C,D]	**Grid Zone Number**	GEOPS.ZNA
2[C,D]	**Z Values False Origin**	GEOPS.ZOR

When present, the REGPT extension of an Image Segment contains REGPT.NUM_PTS sets of fields. Each set defines a single REGISTRATION POINT which belongs to the layer corresponding to the Image Segment.

*2[C,O]	REGISTRATION POINT(S)	
3[C,M]	**Registration Point ID**	REGPT.PIDn
3[C,M]	**Longitude/Easting**	REGPT.LONn
3[C,M]	**Latitude/Northing**	REGPT.LATn
3[C,D]	**Elevation**	REGPT.ZVLn
3[C,M]	**Local X coordinate**	REGPT.DIXn
3[C,M]	**Local Y coordinate**	REGPT.DIYn
3[C,D]	**Local Z coordinate**	(omitted — it does not make sense for raster and gridded data)
3[C,D]	**Located Layer ID**	ISH.IID1 (where ISH is the Image Subheader to which the REGPT belongs)

Note that IIF supports only the registration points corresponding to the data contained in the IIF File. Each registration point shall be considered as part of the dataset REGISTRATION POINT(S) list.

DIAGNOSTIC POINT(S) are not transmitted within an IIF File.

*2[C,O]	DIAGNOSTIC POINT(S)	(omitted)

When present, the GRDPS extension of an Image Segment contains GRDPS.NUM_GRDS sets of fields. Each set defines a single LOCATION GRID which belongs to layer corresponding to the Image Segment.

*2[R/A,O]	LOCATION GRID(S)	
3[R/A,M]	**Location Grid ID**	GRDPS.BADn
3[R/A,M]	**Located Image ID**	ISH.IID1 (where ISH is the Image Subheader to which the GRDPS belongs)
3[R/A,O]	**Location Grid Elevation**	GRDPS.ZVLn
3[R/A,M]	Location Grid Parameters	
4 [R/A,M]	**Data density in columns**	GRDPS.LODn
4 [R/A,M]	**Data density in rows**	GRDPS.LADn
4 [R/A,M]	**Origin in columns**	GRDPS.LSOn
4 [R/A,M]	**Origin in rows**	GRDPS.PSOn
4 [R/A,M]	**Number of columns**	ISH.NCOLS (where the IID1 Field value of the corresponding ISH is equal to GRDPS.BADn)
4 [R/A,M]	**Number of rows**	ISH.NROWS (where the IID1 Field value of the corresponding ISH is equal to GRDPS.BADn)
3[R/A,M]	BANDS DESCRIPTION	(see Layer Metadata considering that the IID1 Field value of the corresponding ISH is equal to the GRDPS.BADn value)
3[R/A,M]	PIXELS/ELEMENTS ENCODING	(see Layer Metadata considering that the IID1 Field value of the corresponding ISH is equal to the GRDPS.BADn value)

Note that IIF supports only the location grids corresponding to the data contained in the IIF File. Each location grid shall be considered as part of the dataset LOCATION GRID(S) list.

12.2.4.4 Dataset [Library] Metadata: Source Graphic Description in IIF

When present, the SOURC extension of a given Image Segment contains SOURC.NUM_SOUR sets of fields. Each set defines a single GRAPHIC SOURCE DESCRIPTION which belongs to the layer corresponding to the Image Segment. Note that the same GRAPHIC SOURCE DESCRIPTION can appear in each SOURC extension of its corresponding layers. This redundancy shall be considered by the applications.

*1[C,D]	GRAPHIC SOURCE DESCRIPTION(s)	
2[C,D]	FIELD OF APPLICATION	(necessarily present -a GRAPHIC SOURCE DESCRIPTION is associated to a single layer within IIF)
*3[C,D]	**Derived Layer**	ISH.IID1 (no repetition - ISH is the Image Subheader to which the SOURC GeoSDE belongs)
*3[C,D]	EXTENT OF DERIVED DATA: BOUNDING POLYGON	(occurs SOURC.NUM_BPn)
*4[R,M]	Point	(occurs SOURC.NUM_PTSnp times)
5[C,M]	**Longitude/Easting**	SOURC.LONnpm
5[C,M]	**Latitude/Northing**	SOURC.LATnpm
2[C,O]	NUMBER OF COMPONENTS	(always present)
3[R,O]	**Number of Magnetic Information**	SOURC.NMIn
3[C,O]	**Number of Supplementary Text**	(omitted)
3[R,O]	**Number of Legend Images**	SOURC.NLIn
3[R,O]	**Number of Insets**	SOURC.NINn
2[C,M]	GENERAL DESCRIPTION	
3[C,M]	GRAPHIC IDENTIFICATION	
4[C,S]	**Series**	SOURC.PRTn
4[C,M]	**Source Identification**	SOURC.URFn
4[C,M]	**Edition**	SOURC.EDNn
4[C,S]	**Name**	SOURC.NAMn
4[C,M]	**Significant Date**	SOURC.CDPn, SOURC.CDVn
4[C,S]	**Perishable Date**	SOURC.CDV27n
4[C,O]	**Source Reference Number**	SOURC.SRNn
3[C,M]	GRAPHIC DESCRIPTION	
4[C,S]	**Reciprocal Scale**	SOURC.SCAn
4[C,O]	Coverage	(omitted when SOURC.SQUn is not present)

5[C,M]	**Coverage**	SOURC.SQUn
5[C,M]	**Unit of Measure for Coverage**	SOURC.UNISQUn
4[C,O]	Contour Interval	(omitted when SOURC.PCIn is not present)
5[C,M]	**Contour Interval**	SOURC.PCIn
5[C,M]	**Unit**	SOURC.UNIPCIn
4[C,O]	**Water Coverage**	SOURC.WPCn (always present)
4[C,O]	**Navigational System Type**	SOURC.NSTn (always present)
4[R,O]	Highest Elevation	(omitted when SOURC.HKEn is not present)
5[R,M]	**Highest Elevation**	SOURC.HKEn
5[R,M]	**Unit**	SOURC.UNIHKEn
5[R,S]	Highest Elevation Point	(never omitted)
6[R,M]	**Longitude/Easting**	SOURC.LONHKEn
6[R,M]	**Latitude/Northing**	SOURC.LATHKEn
3[C,S]	SECURITY AND RELEASE	(never omitted)
4[C,M]	**Security Classification**	SOURC.QSSn
4[C,M]	**Downgrading**	SOURC.QODn
4[C,O]	**Downgrading date**	SOURC.CDV10n
4[C,M]	**Releasability**	SOURC.QLEn
3[C,S]	COPYRIGHT	
4[C,M]	**Statement**	SOURC.CPYn
2[C,O]	MARGINALIA	
*3[R,O]	**MAGNETIC INFORMATION**	(occurs SOURC.NMIn times)
4[R,M]	**Date (magnetic)**	SOURC.CDV30np
4[R,M]	Annual rate of change	
5[R,M]	**Rate of Change**	SOURC.RATnp
5[R,M]	**Unit**	SOURC.UNIRATnp
4[R,M]	Grid Magnetic angle	
5[R,M]	**G-M Angle**	SOURC.GMAnp
5[R,M]	**Unit**	SOURC.UNIGMAnp
4[R,S]	Magnetic rate reference Point	(never omitted)
5[R,M]	**Longitude/Easting**	SOURC.LONGMAnp
5[R,M]	**Latitude/Northing**	SOURC.LATGMAnp
4[R,O]	Grid convergence	(omitted when SOURC.GCAnp is not present)
5[R,M]	**Convergence Angle**	SOURC.GCAnp
5[R,M]	**Unit**	SOURC.UNIGCAnp

*3[C,O]	SUPPLEMENTARY TEXT	(omitted)
*3[R,O]	LEGEND DESCRIPTION	
4[R,M]	LEGEND DATA	
5[R,O]	**Name**	ISH.IID2 (the IID1 Field value of the corresponding ISH is equal to the SOURC.BADnp value)
5[R,M]	**Data Structure**	(derived from ISH.IREP - the IID1 Field value of the corresponding ISH is equal to the SOURC.BADnp value)
5[R,M]	**Legend ID**	SOURC.BADnp
5[R,D]	BANDS DESCRIPTION	(see Layer Metatada - the IID1 Field value of the corresponding ISH is equal to the SOURC.BADnp value)
5[R,M]	PIXELS/ELEMENTS ENCODING (See Layer Metadata)	(see Layer Metatada - the IID1 Field value of the corresponding ISH is equal to the SOURC.BADnp value)
2[R,S] [A,O]	COORDINATE SYSTEM	(always present within IIF)
3[C,M]	GEODETIC PARAMETERS	
4[C,M]	HORIZONTAL DATUM	
5[C,M]	**Geodetic Datum Name**	SOURC.DAGn
5[C,M]	**Geodetic Datum Code**	SOURC.DCDn
4[C,M]	GEODETIC ELLIPSOID	
5[C,M]	**Ellipsoid Name**	SOURC.ELLn
5[C,M]	**Ellipsoid Code**	SOURC.ELCn
4[C,D]	VERTICAL DATUM	
5[C,M]	**Vertical Datum Reference**	SOURC.DVRn
5[C,M]	**Code (Category) of Vertical Datum Reference**	SOURC.VDCDVRn
4[C,D]	SOUNDING DATUM	
5[C,M]	**Sounding Datum Name**	SOURC.SDAn
5[C,M]	**Sounding Datum Code**	SOURC.VDCSDAn
3[C,M]	PROJECTION	
4[C,M]	**Projection Name**	SOURC.PRNn
4[C,M]	**Projection Code**	SOURC.PCOn
4[C,M]	PROJECTION PARAMETER(S)	(occurs SOURC.NUM_PRJn times)
*5[C,M]	**Parameter**	SOURC.PRJnp
4[C,D]	PROJECTION FALSE ORIGIN	(never omitted)
5[C,M]	**X false origin**	SOURC.XORn
5[C,M]	**Y false origin**	SOURC.YORn

3[C,S]	GRID SYSTEM	
4[C,M]	**Grid code**	SOURC.GRDn
4[C,O]	**Grid description**	SOURC.GRNn
4[C,D]	**Grid Zone Number**	SOURC.ZNAn
3[R/A,O]	METRIC SUPPORT PARAMETERS	(omitted)
*2[R,D]	INSET(S): INSET DESCRIPTION	
3[R,M]	**Inset Identification**	SOURC.INTnp
3[R,M]	**Reciprocal Scale**	SOURC.INS_SCAnp
3[R,M]	**Name**	ISH.IID2 (the IID1 Field value of the corresponding ISH is equal to the SOURC.INTnp value)
3[R,M]	Absolute Coordinates	
4[R,M]	**longitude of lower left corner**	SOURC.NTLnp
4[R,M]	**latitude of lower left corner**	SOURC.TTLnp
4[R,M]	**longitude of upper left corner**	SOURC.NVLnp
4[R,M]	**latitude of upper left corner**	SOURC.TVLnp
4[R,M]	**longitude of upper right corner**	SOURC.NTRnp
4[R,M]	**latitude of upper right corner**	SOURC.TTRnp
4[R,M]	**longitude of lower right corner**	SOURC.NVRnp
4[R,M]	**latitude of lower right corner**	SOURC.TVRnp
3[R,M]	Relative Coordinates	
4[R,M]	**longitude of lower left corner**	SOURC.NRLnp
4[R,M]	**latitude of lower left corner**	SOURC.TRLnp
4[R,M]	**longitude of upper left corner**	SOURC.NSLnp
4[R,M]	**latitude of upper left corner**	SOURC.TSLnp
4[R,M]	**longitude of upper right corner**	SOURC.NRRnp
4[R,M]	**latitude of upper right corner**	SOURC.TRRnp
4[R,M]	**longitude of lower right corner**	SOURC.NSRnp
4[R,M]	**latitude of lower right corner**	SOURC.TSRnp

Note that IIF supports only the GRAPHIC SOURCE DESCRIPTION(s) corresponding to the data contained in the IIF File. Each GRAPHIC SOURCE DESCRIPTION shall be considered as part of the dataset GRAPHIC SOURCE DESCRIPTION(s) list.

12.2.4.5 Dataset [Library] Metadata: Sensor Parameters Description in IIF

When present, the SNSPS extension of a given Image Segment contains SNSPS.NUM_SNS sets of fields. Each set defines a single SENSOR PARAMETERS DESCRIPTION which belongs to the layer corresponding to the Image Segment.

Note that the same SENSOR PARAMETERS DESCRIPTION can appear once in each SNSPS extension of its corresponding layers. This redundancy shall be considered by the applications.

*1[C,D]	SENSOR PARAMETERS DESCRIPTION(s)	
2[R,D]	FIELD OF APPLICATION	(necessarily present —a SENSOR PARAMETERS DESCRIPTION is associated to a single layer within IIF)
*3[R,D]	**Derived Layer**	ISH.IID1 (no repetition — ISH is the Image Subheader to which the SNSPS GeoSDE belongs)
*3[R,D]	EXTENT OF DERIVED DATA: BOUNDING POLYGON	(occurs NUM_BPn times)
*4[R,M]	Point	(occurs SNSPS.NUM_PTSnp times)
5[R,M]	**Longitude/Easting**	SNSPS.LONnpm
5[R,M]	**Latitude/Northing**	SNSPS.LATnpm
*2[R,M]	SOURCE IMAGE BAND IDENTIFICATION	(occurs SNSPS.NUM_BNDn times)
3[R/A,M]	**Band designation**	SNSPS.BIDnp
3[R,M]	Band description	
4[R,M]	**Signal Lower Limit**	SNSPS.WS1np
4[R,M]	**Signal Upper Limit**	SNSPS.WS2np
2[R,M]	IMAGE RESOLUTION	
3[R,M]	**Resolution in columns**	SNSPS.REXn
3[R,M]	**Resolution in rows**	SNSPS.REYn
3[R,O]	**Ground Sample Distance at Source in columns**	SNSPS.GSXn
3[R,O]	**Ground Sample Distance at Source in rows**	SNSPS.GSYn
3[R,O]	Location of Pixel for Ground Sample Distances	SNSPS.GSLn
3[R,M]	**Unit for resolution**	SNSPS.UNIRESn
2[R,M]	BASIC AUXILIARY PARAMETERS	
3[R,M]	Image and sensor identification	
4[R,M]	**Vector or Mission Name**	SNSPS.PLTFMn
4[R,M]	**Sensor or Instrument Name**	SNSPS.INSn
4[R,M]	**Spectral Mode**	SNSPS.MODn
4[R,M]	**Processing Level**	SNSPS.PRLn
4[R,O]	**Source image ID**	SNSPS.SIDn
4[R,M]	**Acquisition Date and Time**	SNSPS.ACTn
3[R,O]	Incidence Angle	(omitted when SNSPS.ANGn is not present)
4[R,M]	**Angle value**	SNSPS.ANGn
4[R,M]	**Angle unit**	SNSPS.UNIANGn

3[R,O]	Altitude	(omitted when SNSPS.ALTn is not present)
4[R,M]	**Altitude value**	SNSPS.ALTn
4[R,M]	**Unit of Altitude**	SNSPS.UNIALTn
3[R,M]	Image Centre Location	
4[R,M]	**Longitude**	SNSPS.LONSCCn
4[R,M]	**Latitude**	SNSPS.LATSCCn
3[R,O]	Solar angles at Image Centre	(omitted when SNSPS.SAZn and SNSPS.SELn are not present)
4[R,M]	**Solar Azimuth**	SNSPS.SAZn
4[R,M]	**Solar Elevation**	SNSPS.SELn
4[R,M]	**Unit of Solar Angles**	SNSPS.UNISAEn
3[R,O]	Attitude angles at Image Centre	(omitted when SNSPS.ROLn, SNSPS.PITn and SNSPS.YAWn are not present)
4[R,M]	**Roll**	SNSPS.ROLn
4[R,M]	**Pitch**	SNSPS.PITn
4[R,M]	**Yaw**	SNSPS.YAWn
4[R,M]	**Unit of Attitude Angles**	SNSPS.UNIRPYn
3[R,O]	Pixel Time	(omitted when SNSPS.ALTn is not present)
4[R,M]	**Pixel Time**	SNSPS.PXTn
4[R,M]	**Unit of Pixel Time**	SNSPS.UNIPXTn
3[R,O]	Attitude speed at Image Centre	(omitted when SNSPS.ROSn, SNSPS.PISn and SNSPS.YASn are not present)
4[R,M]	**Roll Speed**	SNSPS.ROSn
4[R,M]	**Pitch Speed**	SNSPS.PISn
4[R,M]	**Yaw Speed**	SNSPS.YASn
4[R,M]	**Unit of Attitude Speed**	SNSPS.UNISPEn
2[R,O]	ADDITIONAL AUXILIARY PARAMETERS	(omitted when SNSPS.NUM_AUXn is 0)
3[R,O]	**Number of Aux. Parameters**	SNSPS.NUM_AUXn
*3[R,M]	PARAMETER ID AND VALUE	(occurs SNSPS.NUM_AUXn times)
4[R,M]	**Aux. Param. Identification**	SNSPS.APInp
4[R,M]	**Aux. Param. Value Format**	SNSPS.APFnp
4[R,M]	**Unit of Auxiliary Parameter**	SNSPS.UNIAPXnp
4[R,D]	**Aux. Param. Integer Value**	SNSPS.APNnp
4[R,D]	**Aux. Param. Real Value**	SNSPS.APRnp
4[R,D]	**Aux. Param. Characters String**	SNSPS.APAnp

Note that IIF supports only the SENSOR PARAMETERS DESCRIPTION (s) corresponding to data contained in the IIF File. Each SENSOR PARAMETERS DESCRIPTION shall be considered as part of the dataset SENSOR PARAMETERS DESCRIPTION(s) list.

12.2.4.6 Dataset [Library] Metadata: Quality Description in IIF

Part of the Quality Description is transmitted using the Positional (ACCPO), Horizontal (ACCHZ) and Vertical (ACCVT) Accuracy extensions. The rest need to be computed using the Map Source extension (SOURC), the Image Subheader (ISH) and the File Header (FH).

SECURITY AND RELEASE and UP-TO-DATENESS are transmitted within the Image Subheader (ISH) and the File Header (FH).

2[C,M]	SECURITY AND RELEASE	
3[C,M]	**Security Classification**	(derived from ISH.ISCLAS)
3[C,M]	**Downgrading**	(derived from ISH.ISDCTP)
3[C,O]	**Downgrading date**	(derived from ISH.ISDCDT)
3[C,M]	**Releasability**	(derived from FH.FSCLTX)
2[C,M]	UP-TO-DATENESS	
3[C,M]	**Edition Number**	(defaulted to **999** — no tracking)
3[C,M]	**Creation Date**	FH.FDT
3[C,D]	**Revision Date**	(omitted — no tracking)
3[C,O]	**Recompilation Count**	(omitted — no tracking)
3[C,O]	**Revision Count**	(omitted — no tracking)
3[C,O]	**Earliest Source**	(omitted)
3[C,O]	**Latest Source**	(omitted)
3[C,O]	PRODUCT SPECIFICATION	(omitted)
2[V,O]	VECTOR DATA QUALITY	(not applicable)

IIF supports only the POSITIONAL ACCURACY SUBREGIONs corresponding to the data contained in the IIF File. Each LAYER POSITIONAL ACCURACY SUBREGION (see Layer Metadata) transmitted within an Image Segment of the IIF File shall be considered as part of the dataset list of POSITIONAL ACCURACY SUBREGION(s).

*2[C,M]	POSITIONAL ACCURACY SUBREGION(S)	(see Layer Metadata)

COLOUR PATCH is a Layer of the Supporting Data Subset. It corresponds to an Image Segment of the IIF File. The SOURC.PATCH Field contains the Identification (IID1 Field) of the Image Segment containing the COLOUR PATCH associated to the current Image Segment (and layer).

2[R,O]	COLOUR PATCH	(omitted when SOURC.CPATCH contains BCS Spaces)
3[R,M]	**Colour Patch Reference**	ISH.IID2 (the IID1 Field value of the corresponding ISH is equal to the SOURC.CPATCH Field value)
3[R,D]	**Colour Patch Identification**	SOURC.CPATCH
*3[R,O]	COLOUR IDENTIFIER	(derived from ISH.NELUTSn and ISH.NLUTDnm when present - the IID1 Field value of the corresponding ISH is equal to the SOURC.CPATCH field value)
3[R,D]	BANDS DESCRIPTION	(see Layer Metatada - the IID1 Field value of the corresponding ISH is equal to the SOURC.CPATCH value)
3[R,D]	PIXELS/ELEMENTS ENCODING	(see Layer Metatada - the IID1 Field value of the corresponding ISH is equal to the SOURC.CPATCH value)
2[C,O]	OTHER QUALITY INFO	(omitted)

12.2.4.7 Layer [Coverage] Metadata in IIF

The Layer [Coverage] Metadata is transmitted within the Image Subheader (ISH), the Positional (ACCPO), Horizontal (ACCHZ) and Vertical (ACCVT) Accuracy extensions, and possibly within the Local Geographic Coordinates System extension (GEOLO) or the Local Cartographic (Grid-based) Coordinates System extension (MAPLO).

2[C,M]	GENERAL DESCRIPTION	
3[C,M]	IDENTIFICATION	
4[C,M]	**designation**	ISH.IID1
4[C,O]	**description**	ISH.IID2
4[C,O]	**structure**	(derived from ISH.IREP)
3[R,D]	**reciprocal scale**	SOURC.IS_SCA
3[C,O]	GEOGRAPHIC EXTENT	
4[V/A,O]	**Data Cover**	(omitted)
4[C,O]	WGS84 MBR	(derived from ISH.IGEOLO and ISH.ICORDS)
3[C,O]	**General comment**	(omitted)

The ACCPO, ACCVT and ACCHZ extensions of a given Image Segment contain respectively ACCPO.NUM_ACPO, ACCVT.NUM_ACVT and ACCHZ.NUM_ACHZ sets of fields. Each set defines a LAYER ACCURACY SUBREGION (respectively POSITIONAL, VERTICAL and HORIZONTAL) which belongs to the layer corresponding to the Image Segment.

*3[C,O]	LAYER POSITIONAL ACCURACY SUBREGION (S)	
4[C,M]	ACCURACY STATEMENT	
(1st case)	POSITIONAL ACCURACY STATEMENT	
5[C,M]	Absolute Horizontal Accuracy	
6[C,M]	**Accuracy value**	ACCPO.AAHn
6[C,M]	**Unit of Measure**	ACCPO.UNIAAHn
5[C,M]	Absolute Vertical Accuracy	
6[C,M]	**Accuracy value**	ACCPO.AAVn
6[C,M]	**Unit of Measure**	ACCPO.UNIAAVn
5[C,M]	Point- to- Point Horizontal Accuracy	
6[C,M]	**Accuracy value**	ACCPO.APHn
6[C,M]	**Unit of Measure**	ACCPO.UNIAPHn
5[C,M]	Point- to- Point Vertical Accuracy	
6[C,M]	**Accuracy value**	ACCPO.APVn
6[C,M]	**Unit of Measure**	ACCPO.UNIAPVn
(2nd case)	HORIZONTAL ACCURACY STATEMENT	
5[C,M]	Absolute Horizontal Accuracy	
6[C,M]	**Accuracy value**	ACCHZ.AAHn
6[C,M]	**Unit of Measure**	ACCHZ.UNIAAHn
5[C,M]	Point- to- Point Horizontal Accuracy	
6[C,M]	**Accuracy value**	ACCHZ.APHn
6[C,M]	**Unit of Measure**	ACCHZ.UNIAPHn
(3rd case)	VERTICAL ACCURACY STATEMENT	
5[C,M]	Absolute Vertical Accuracy	
6[C,M]	**Accuracy value**	ACCVT.AAVn
6[C,M]	**Unit of Measure**	ACCVT.UNIAAVn
5[C,M]	Point- to- Point Vertical Accuracy	
6[C,M]	**Accuracy value**	ACCVT.APVn
6[C,M]	**Unit of Measure**	ACCVT.UNIAPVn
4[C,M]	EXTENT OF ACCURACY SUBREGION:	
*5[C,M]	Point	
6[C,M]	**Longitude/Easting**	(ACCPO.LONnm or ACCHZ.LONnm or ACCVT.LONnm depending on the STATEMENT)
6[C,M]	**Latitude/Northing**	(ACCPO.LATnm or ACCHZ.LATnm or ACCVT.LATnm depending on the STATEMENT)

The RASTER OR MATRIX-SPECIFIC DESCRIPTION is transmitted within the Image Subheader (ISH) and the Local Geographic Coordinates System extension (GEOLO) or the Local Cartographic (Grid-based) Coordinates System extension (MAPLO) depending on the Coordinate System Type (GEOPS.TYP).

2[A/R,M] RASTER OR MATRIX-SPECIFIC DESCRIPTION

When the Coordinate System Type (GEOPS.TYP) is MAP, the LOCAL COORDINATE SYSTEM is transmitted within the Local Geographic Coordinates System extension (GEOLO) as follows.

3[A/R,D]	LOCAL COORDINATE SYSTEM	(necessarily present when the Coordinate System Type is GEO)
4[A/R,M]	**Longitude/Easting of Origin**	GEOLO.LSO
4[A/R,M]	**Latitude/Northing of Origin**	GEOLO.PSO
4[A/R,M]	SCALING PARAMETERS	(Geographic Coordinate system)
5[R/A,M]	**longitude density**	GEOLO.ARV
5[R/A,M]	**latitude density**	GEOLO.BRV

When the Coordinate System Type (GEOPS.TYP) is MAP, the LOCAL COORDINATE SYSTEM is transmitted within the Local Cartographic (Grid-based) Coordinates System extension (MAPLO) as follows.

3[A/R,D]	LOCAL COORDINATE SYSTEM	(necessarily present when the Coordinate System Type is GEO)
4[A/R,M]	**Longitude/Easting of Origin**	MAPLO.LSO
4[A/R,M]	**Latitude/Northing of Origin**	MAPLO.PSO
4[A/R,M]	SCALING PARAMETERS	(Geographic Coordinate system)
5[R/A,M]	**Easting interval**	MAPLO.LOD
5[R/A,M]	**Northing interval**	MAPLO.LAD
5[R/A,M]	**length unit**	MAPLO.UNILOA

Note that the LOCAL COORDINATE SYSTEM is not present when the Coordinate System Type (GEOPS.TYP) is DIG.

BAND DESCRIPTION and PIXELS/ELEMENTS ENCODING are transmitted within the Image Subheader (ISH).

3[R/A,M]	BANDS DESCRIPTION	
4[R/A,O]	Number of bands	(equal to the greatest value of ISH.NBANDS and ISH.XBANDS)
*4[R/A,M]	BAND IDENTIFICATION	
5[R/A,M]	**Band designation**	(ISH.IREPBANDn or ISH.ISUBCATn)
5[R,D]	Band description	(omitted)

3[R/A,M]	PIXELS/ELEMENTS ENCODING	
4[R/A,O]	MBR	
	(Within IIF, the first row and the first column of the image contain necessarily significant pixels of the image. This implies a single and limited way of defining the MBR of the image.)	
5[R/A,M]	**row of upper right corner**	(Defaulted to **0**)
5[R/A,M]	**column of upper right corner**	(Equal to ISH.NCOLS - 1)
5[R/A,M]	**row of lower left corner**	(Equal to ISH.NROWS - 1)
5[R/A,M]	**column of lower left corner**	(Defaulted to **0**)
5[R/A,O]	MBR size	
6[R/A,M]	**number of significant rows**	ISH.NROWS
6[R/A,M]	**number of significant columns**	ISH.NCOLS
4[R/A,M]	SIZE AND ORDER OF BLOCKS AND PIXELS	
5[R/A,M]	**vertical block number**	ISH.NBPC
5[R/A,M]	**horizontal block number**	ISH.NBPR
5[R/A,M]	**vertical pixel number**	ISH.NPPBV
5[R/A,M]	**horizontal pixel number**	ISH.NPPBH
5[R/A,M]	**Column Sequence**	(derived from ISH.IGEOLO)
5[R/A,M]	**Row Sequence**	(derived from ISH.IGEOLO)
5[R/A,M]	**Pixel or element Order**	ISH.IMODE
4[R/A,M]	ENCODING MECHANISM	
5[R/A,D]	**Compression Code**	ISH.IC
5[R/A,O]	**Compression ratio**	ISH.COMRAT
5[R/A,M]	**Value Length**	ISH.NBPP
5[R/A,M]	**Value Type**	ISH.PVTYPE
5[R/A,D]	**Count Length**	(omitted — no RLE compression allowed)
5[R/A,M]	**Tile Index Map Flag**	ISH.IC

COMPRESSION LOOKUP TABLES are transmitted within the VQ Header (VQH) of each VQ Compressed Image.

*4[R/A,D]	COMPRESSION LOOKUP TABLES (occurs NDLOR times)	
5[R/A,M]	COMPRESSION LOOKUP TABLE DESCRIPTION	
6[R/A,M]	**Compression Lookup Table Id**	VQH.DLTIn
6[R/A,M]	**No of Compression LUT Rows**	VQH.NDLRn
6[R/A,M]	**No of Val. / Compr. LUT Row**	VQH.NVDLRn
6[R/A,O]	**Compr. LUT Value Bit Length**	VQH.DLVBLn
5[R/A,M]	COMPRESSION LOOKUP TABLE VALUES	
*6[R/A,M]	**Compression LUT Value**	VQH.DLVnmp (occurs NDLR * NVDLR times for each lookup Table)

When an image is VQ compressed, the COMPRESSION PARAMETERS are also transmitted within VQ Header (VQH) of each VQ Compressed Image. In this case :

*4[R/A,D]	COMPRESSION PARAMETER(S)	(occurs 3 times)
5[R/A,M]	**Compression Parameter Id**	Valid values are 100, 101 and 102
5[R/A,M]	**Compression Parameter Value**	VQH.NIR when Id is 100 VQH.NICR when Id is 101 VQH.ICBL when Id is 102

When present, the TILE INDEX MAP is transmitted within the IIF Image Mask (IM).

4[R/A,D]	TILE INDEX MAP	
5[R/A,M]	**Tile Index Value**	(derived from IM.BMRnBNDm)

The DATA TYPE SPECIFIC PARAMETERS are transmitted within the Image Subheader (ISH) and the FACCB extension.

3[A/R,M]	DATA TYPE SPECIFIC PARAMETERS	
(1st case)	MATRIX-SPECIFIC PARAMETERS	
4[A,D]	**Matrix Units**	FACCB.UNITSn
*4[A,M]	NOMINAL CODE IDENTIFIER	
5[A,M]	**Attribute Code Identifier**	FACCB.CODEn
5[A,M]	**Description/Meaning of the attribute value**	FACCB.VALnp
5[A,M]	**Nominal code assigned to the attribute value**	FACCB.DESCnp
(2nd case)	RASTER-SPECIFIC PARAMETERS	
*4[R,D]	COLOUR CODE IDENTIFIER	(derived from NELUTSn and NLUTDnm)
3[R,O]	SCANNING PARAMETERS	(omitted)

13 MEDIA STANDARDS

DIGEST data may be transmitted on any of the commonly used media such as 9-track magnetic tape, CD-ROM, CD-WO, 4 mm and 8mm magnetic tape. Several ISO, ANSI, and IEEE Standards apply when using these media. This clause identifies specific standards and describes how recorded labels should be written.

13.1 Magnetic Tape

Magnetic tape volumes containing data interchange files shall conform to ISO 1001, level 2, with one fixed length media record per physical block.

13.1.1 Physical Block Size

The computer system writing the magnetic tape may be constrained to physical block sizes with multiples of a certain number of bits. The block sizes are fixed and should be chosen such that they are also even multiples of eight bits, to ensure that they are generally readable. The recommended block size, and that chosen by DGIWG for 9-track tape media, is 8,192 bytes (other block sizes may be chosen by mutual agreement). DGIWG recommends 5,120-byte block size for 8 mm media. The completion of a block, if necessary, from the end of specified recorded information shall be by use of ISO 646 (5/E) characters.

13.1.2 Record Structure

Only fixed length records may be used, and these shall be equal to the physical block size or a whole subdivision of it. Any unused bytes in the last magnetic tape record of the file shall be filled with 5/E characters.

13.1.3 Physical Recording Alternatives

There are three physical recording alternatives:

- 6,250 GCR - Defined in FIPS PUB 50 which adopts ANSI X3.54-1976 (ISO 5652).
- 1,600 PE - Defined in FIPS PUB 25 which adopts ANSI X3.39-1973 (ISO 3788).
- 8 Millimetre - Defined in ANSI X3.202-1978.

The preferred density is 6250 cpi for 9-track tape and 2.3 Gigabytes for 8 mm tapes. Other densities are permitted as required (e.g., 1,600 PE).

13.1.4 Recorded Labels

Magnetic tapes shall have labels recorded as defined in FIPS PUB 79 which adopts ANSI X3.27-1978 (ISO 1001). Option labels defined in this standard may be used by particular implementations as desired, but must only contain data that may be ignored by the receiver, with the exception of the user volume label (UVL1).

This information will be located as follows:

First Volume Header Label (VOL1)

Entity Name	Definition	ISO 1001 Byte Position (BP) and field name	
Volume ID	ID for this specific volume	5 - 10	Volume Identifier
Security Classification	Security Classification of this volume T = TOP SECRET S = SECRET R = RESTRICTED U = UNCLASSIFIED	11	Volume Accessibility

User Volume Label one (UVL1)

Sequence Number	Sequential number of this volume within the volume set (DIGEST Information Package)	5 - 7	Reserved for implementation use
DIGEST Information Package IDentifier	Unique ID for the DIGEST Information Package (volume set) to which this volume belongs.	8 - 37	Reserved for implementation use
Number of Datasets	Number of Datasets on, or starting on, this volume (may be left blank)	38 - 40	Reserved for implementation use

Notes:

- Magnetic tape volumes shall be comprised of a single DIGEST Information Package.
- All fields shall be a-characters, as defined by ISO 1001, even the numeric fields (which are numeric character fields).
- The "Number of Datasets" field may be left blank. It is suggested that for Classified data that this field be completed by leaving sufficient empty space on the magnetic tape to ensure that completion of a known number of Datasets before the End of "Tape Mark".

- The "Security Classification" of individual files may be defined by setting BP54 of the "First File Header Label" to T, S, C, R, or U as defined above for the Volume Label.

When using 8 mm tapes for preprocessing into the ISO 9660 format, the 8 mm tape shall be compliant with ISO 9660 for single volume output. Block size 8,192 bytes using ANSI X3.27 - 1978 tape labels for volume tapes. Tapes shall contain the following:

VOL1
UVL1
HDR1
HDR2
File Mark
VRF Data in ISO 9660 Format
File Mark
EOV1
EOV2
EOF1
EOF2
File Mark
File Mark

The level 1 implementation specified in paragraphs 10.1 and 13.5.1 of ISO 9660 shall be used.

13.2 Optical Disk

13.2.1 CD-ROM Interchange

CD-ROM volumes shall conform to ISO 9660 and may use an "Extended Attribute Record" in any of the files in which case the "Record Format" (BP 79) of the “Extended Attribute Record” shall be = 0. The unused portion of the last block shall be padded with characters (5/E). Supplementary labels defined in this standard may be used by particular implementations as desired, but must only contain data that may be ignored by the receiver.

CD-ROM volumes may be used for the implementation of a DIGEST Exchange Medium as described in Annex E. The information defined in Annex E will be located in the Primary Volume Descriptor as follows:

Table 13-1 Primary Volume Descriptor

Entity Name	**Definition**	**ISO 9660 Byte Position (BP) and field name**	
Volume ID	ID for this specific volume	41 - 72	Volume identifier
Sequence Number	Sequential number of this volume within the sequence number volume set : EXCH_MED_NUM (general case) or PACK_NUM (for DIGEST Exchange mediums comprised of a single DIGEST Information Package) (see DIGEST Part 2 Annex E clause 4)	125 - 128	Volume sequence number
Transmittal ID	EXCH_MED_ID (general case) or PACK_ID (for DIGEST Exchange mediums comprised of a single DIGEST information Package) (see DIGEST Part 2 Annex E clause 4)	191 - 318	Transmittal identifier
Number of Datasets	Total number of DIGEST Datasets and non-DIGEST files within the DIGEST Exchange Medium (see DIGEST Part 2 Annex E clause 4)	884 - 887	Application use
Security Classification	Security Classification of this volume T = TOP SECRET S = SECRET C = CONFIDENTIAL R = RESTRICTED U = UNCLASSIFIED	888	Application Use

Note:

The first three fields shall be recorded according to ISO 9660. The "Number of Datasets" shall be a 16-bit numerical value, recorded according to paragraph 7.2.3 of ISO 9660 and the "Security Classification" shall be a d-character as defined by ISO 9660.

13.2.2 Classification at the File Level

Where present the classification of a file shall be defined by the first character in the System Use area at the end of the directory record.

T = TOP SECRET
S = SECRET
C = CONFIDENTIAL
R = RESTRICTED
U = UNCLASSIFIED

13.3 Other Media

DGIWG is reviewing the implementation of Compact Disc - Write Once (CD-WO) media standards. Initial reports are to comply with ISO 9660 using the level 1 implementation specified in Paragraph 10.1 and 13.5.1 of ISO 9660.

User data on sequential media (i.e. tapes) shall be formatted in accordance with the extended tar format, as defined in IEEE 1003.1, paragraph 10.1.1.

Other media will be reviewed as the need arises.