THE
ARC STANDARD RASTER PRODUCT
SPECIFICATION

(ASRP)

Produced and issued under the direction of the
Director General of Military Survey MOD (UK) on behalf of the
Digital Geographic Information Working Group (DGIWG).

Edition 1.2 March 1995

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LIST OF ENCLOSURES

The following Enclosures are extracts from DIGEST (Reference 1):

ASRP ENCLOSURE	DIGEST REFERENCE	DESCRIPTION
1	Part 4 Annex B	Attribute and Value Codes. **NOTE:** Only those FACC codes which are used in this specification are included here (eg CDP, NST). This is therefore an incomplete copy of the DIGEST Annex.
2	Part 3 Clause 7	Grid Codes.
3	Part 3 Clause 8	Ellipsoid Codes.
4	Part 3 Clause 9	Datum Codes.
5	Part 3 Clause 6	Projection Codes and Parameters.
6	Part 3 Clause 13	Use of CIE Values.
7	Part 3 Clause 11	Country Codes.
8	Part 3 Clause 12	Codes for Media Recording Standards.
9	Part 3 Clause 10	Units of Measure Codes.
10	Part 2 Annex D	Volume Transmittal Form.

NOTE. These enclosures are included for "completeness of documentation" purposes. Responsibility for their maintenance lies with the relevant DIGEST custodian nation.

NOTICE TO USERS

This international specification for the ARC Standard Raster Product (ASRP) has been designed to state the content and format of one of DGIWG's standard raster products. This specification now forms the baseline from which both system developers and National Survey organisations can plan their development and production activities.

Research with all aspects of DGI is continuing within the DGIWG forum and any subsequent potential changes will be subject to formal change control procedures.

RECORD OF AMENDMENTS

No.	Date	Entered By	Remarks

FOREWORD

AUTHORITY

1. This document is issued under the authority of the Digital Geographic Information Working Group. DGIWG comprises a group of international defence mapping agencies which is charged with encouraging the use of its standards in both the civil and defence worlds. Current members of DGIWG are Belgium, Canada, Denmark, France, Germany, Italy, Netherlands, Norway, Spain, the UK, and the USA.

PURPOSE AND SCOPE

2. Digital Geographic Information has evolved into one of the primary and most essential elements of many system applications both for the Mapping, Charting and Geodesy (MC&G) Community and for many other users. This document provides the necessary data structure, file organisation, format and capture specifications to enable the production of seamless raster data sets, ARC Standard Raster Products (ASRP), on a common world-wide datum. Other forms of this same basic file organisation and format have been created to enable the exchange of other types of MC&G raster data not explicitly for use in seamless data sets.

3. The data will be available on a common world wide reference datum of World Geodetic System 1984 (WGS 84).

APPLICATION

4. This specification applies to all activities involved in the capture, processing and dissemination of ASRP data.

AMENDMENTS

5. Amendments to this specification will be the responsibility of the custodian, on behalf of and in agreement with DGIWG, and will be issued as necessary, through National Points of Contact, to known document holders.

DISTRIBUTION

6. International distribution of this specification will be the responsibility of DGIWG. Within each DGIWG country this will be through the relevant national representative (point of contact). National points of contact can distribute freely outside DGIWG nations.

PROPOSED CHANGES

7. Any proposed changes or comments should be keyed to the specific page, paragraph and line of the text. Reasons should be provided for each comment to ensure understanding and complete evaluation. Comments should be addressed to the original Point of Contact who will then forward the details to the custodian nation. DGIWG will ensure that all such comments are processed through formal change control procedures.

TECHNICAL QUERIES

8. Any queries with regard to the content or application of this specification should be addressed to the original Point of Contact.

SECURITY

9. This product specification is unclassified but the copying of this document is prohibited without the authority of the original Point of Contact.

CUSTODIAN

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ACRONYMS AND ABBREVIATIONS

ADRG	ARC Digitized Raster Graphics
ANSI	American National Standards Institute
ARC	Equal Arc-Second Raster Chart System
ASCII	American National Standard Code for Information Interchange
ASRP	ARC Standard Raster Product
CHUM	CHart Update Manual
CIE	Commission Internationale de l'Eclairage (International Commission on Illumination)
CPI	Characters Per Inch
DGI	Digital Geographic Information
DGIWG	Digital Geographic Information Working Group
DIGEST	Digital Geographic Information Exchange Standard
FIPS	Federal Information Processing Standards
FIPS PUB	Federal Information Processing Standards Publication
GCR	Group-Coded Recording
ISO	International Organization for Standards
MC&G	Mapping, Charting and Geodesy
PE	Phase-Encoded
SRG	Standardized Raster Graphics
UPS	Universal Polar Steographic Projection
USRP	UTM/UPS Standardized Raster Products
UTM	Universal Transverse Mercator Projection
WGS 84	World Geodetic System 1984

1.0 SCOPE.

1.1 Digital Geographic Information (DGI) has evolved into one of the primary and most essential elements of many information system applications both for the Mapping, Charting and Geodesy (MC&G) Community and for other, diverse users. This document provides the necessary data structure, file organisation, format and capture specifications to enable the exchange of seamless raster data sets, ARC Standardised Raster Products (ASRP), on a common world-wide datum. Other forms of this same basic file organisation and format have been created to enable the exchange of other types of MC&G raster data not explicitly for use in a seamless data sets.

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2.0 REFERENCES

1. Digital Geographic Information Working Group, "Digital Geographic Information Exchange Standards (DIGEST)":

Part 1: General Description; Edition 1.2, January 1994.

Part 2: Theoretical Model, Exchange Structure, and Encapsulation Rules; Edition 1.2, January 1994.

Part 3: Codes, Parameters, and Tags; Edition 1.2, January 1994.

Part 4: Feature and Attribute Coding Catalogue (FACC); Edition 1.2, January 1994.

2. DMA Technical Report (DMATR) 8350.2, "DoD World Geodetic System 1984: Its Definition and Relationship with Local Geodetic Systems"; 2nd Edition; 1 September 1991.

3. Defense Mapping Agency Standard Printing Color Catalog for Mapping, Charting, Geodetic Data and Related Products, January 1987

4. European Computer Manufacturer's Association (ECMA), "Standard for Data Interchange on Read-Only 120 mm Optical Data Disks (CD-ROM) ECMA/TTC31/87/47, September 1987. (DRAFT)

5. ISO 646 - "Information processing -- ISO 7 -bit coded character set for information interchange", Second Edition, 1983.

6. ISO 1001 - "Information Processing -- File Structure and Labelling of Magnetic Tapes for Information Interchange Ed.2", 1986

7. ISO 2022: - "Information Processing -- ISO7 Bit and 8 Bit Coded Character Sets -- Code Extension Techniques Ed. 3", 1986.

8. ISO 3788 - "Information Processing -- 9 Track. 12,7 mm (0.5 in) Wide Magnetic Tape for Information Interchange recorded at 63 cpmm (1600 cpi), Phase Encoded. Ed. 1", 1976.

9. ISO 5652 - "Information processing -- 9 track 12.7 mm (0.5 in.) wide magnetic tape for information interchange formats and recording, using group coding 246 cpmm (6,250 cpi)"

10. ISO 8211 - "Information processing - Specification for a data descriptive file for information interchange", 1985

11. ISO 9660 - "Information Processing -- Volume and File Structure of CD-ROM for Information Interchange. Ed. 1", 1988.

12. STANAG 2215- Edition 4 - Evaluation of Land Maps. Dated 19 December, 1983

13. STANAG 3671 Edition Designation System for Land Maps, Aeronautical Charts and Military Geographic Documentation, Edition 2

14. STANAG 3716 Map Series Numbering, Edition 1.

15. DLMS Accuracy Working Group, "Accuracy Determination Method".

16. ISO 8859 -1— Information processing — 8-bit single-byte coded graphic character sets — Part 1: Latin alphabet No. 1, First Edition 1987-02-15

17. ISO 6937 — Information Processing — Coded character sets for text communication, Ed. 1, 1983.

18. ISO/IEC/10646 -1 — Information technology - Universal Multiple-Octet Coded Character Set (UCS), Part 1: Architecture and Basic Multilingual Plane, First edition 1993-05-01

3.0 GENERAL INFORMATION

3.1 Description of ARC Standardised Raster Products (ASRP).

3.1.1 Standardised Raster Graphics (SRGs) are digital replicas of graphic products. To digitally replicate the multiple colours present on many graphic products, each multicolour graphic 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 are normally scanned at a resolution of 100 microns or less.

3.1.2 The Equal ARC-Second Raster Chart (ARC) system is the projection and coordinate system for all ASRP data. The design objective of ARC is to provide graphic data in a virtually seamless manner and permit direct display in a nearly conformal presentation. The ASRP consists not only of the transformed graphic data but also a record that contains datum shift and projection parameters with which users can transform ASRP back to the source graphic's datum or projection; a graphic information record that contains textual information about the source graphics; graphical representations of legend images; and an optional supplementary text field that contains textual descriptions of items depicted on the original graphic.

3.2 THE ARC SYSTEM.

3.2.1 ASRP data consists of colour-coded images with 100 microns (254 lines per inch) sample size, trimmed at the graphic's neat line and transformed to the Equal Arc-Second Raster Chart/Map (ARC) system frame of reference. Data on the ARC system will be maintained as a world-wide seamless data base of scanned graphic data on World Geodetic System 1984 (WGS 84). The ARC structure consists of 18 overlapping latitudinal zones into which the data are divided - 9 Northern Hemisphere zones, including a Polar zone; and 9 Southern Hemisphere zones, including a Polar zone (see Figure 3-1).

3.2.2 Each zone is subdivided into an array of tiles, the number of which varies depending on the zone and the scale of the scanned image. Each tile represents 12.8 mm square (approximately .5 by .5 inch) of a hardcopy graphic image for all scales and geographic locations. Each pixel nominally represents 100 microns square of hardcopy graphic data.

3.2.3 Polar zones are square arrays of tiles overlaid mathematically on a polar azimuthal equidistant projection. The use of the equidistant projection is only an intermediate mathematical step to simplify the formula and establish a simple relationship between a pixel and its geographic coordinates.

3.2.4 An ASRP geo data subset will contain one or more geodata files. Within each (non-legend image) geo data file, data will be on the same zone reference system which includes overlap areas into the adjoining zone.

3.2.5 Images overlapping zone boundaries into the next higher numbered zone will include an overlap of 1024-1151 pixels into that zone (see Figures 3-2 and 3-3). The overlap is between 8 and 9 whole tiles.

3.3 DATUMS.

The vertical datum for ASRP data is the same as the vertical datum of the source graphic. The horizontal datum is the World Geodetic System 1984. The constants for the WGS 84 ellipsoid (extracted from Reference 2) are:

$$\mathbf{a} = 6378137.0 \text{ meters}$$

$$\mathbf{b} = 6356752.3142 \text{ meters}$$

$$\mathbf{e^2} = 0.00669437999013$$

A set of polynomial coefficients is provided with the data so that a user may shift back to the original geodetic system. These coefficients are derived from Reference 2.

> Currently, 7-term cubic polynomials are used. The polynomial coefficients are derived from representative control points available in both systems, using a fitting process such as least-squares. The control points are obtained using a geodetic datum transformation such as those described in Reference 2.

3.4 ACCURACY REQUIREMENTS

Raster data will be captured and processed in a way which satisfies the following accuracy requirements.

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.

3.4.1 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:

3.4.1.1 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 Standard Error (at 90% confidence limit) of their deviations, 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:

$$HAV = (AAH^2 + X^2_{ERROR} + Y^2_{ERROR})^{1/2}$$

An example is for a 1: 50,000 scale map where:

- AAH = 50 metres
- The sampling interval is 100 microns
- The Standard Error at 90% confidence limit is 200 microns (i.e. 2 pixels) which gives 2 x 100 x 50,000 = 10 meters in both X and Y.

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

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

3.5 COLOUR DEFINITION AND CODING.

3.5.1 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 (see Enclosure 6) 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 the Quality Record subfield FRM (Section A.2.4). 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 $\sum_{i=1}^{n} P_i = 1$

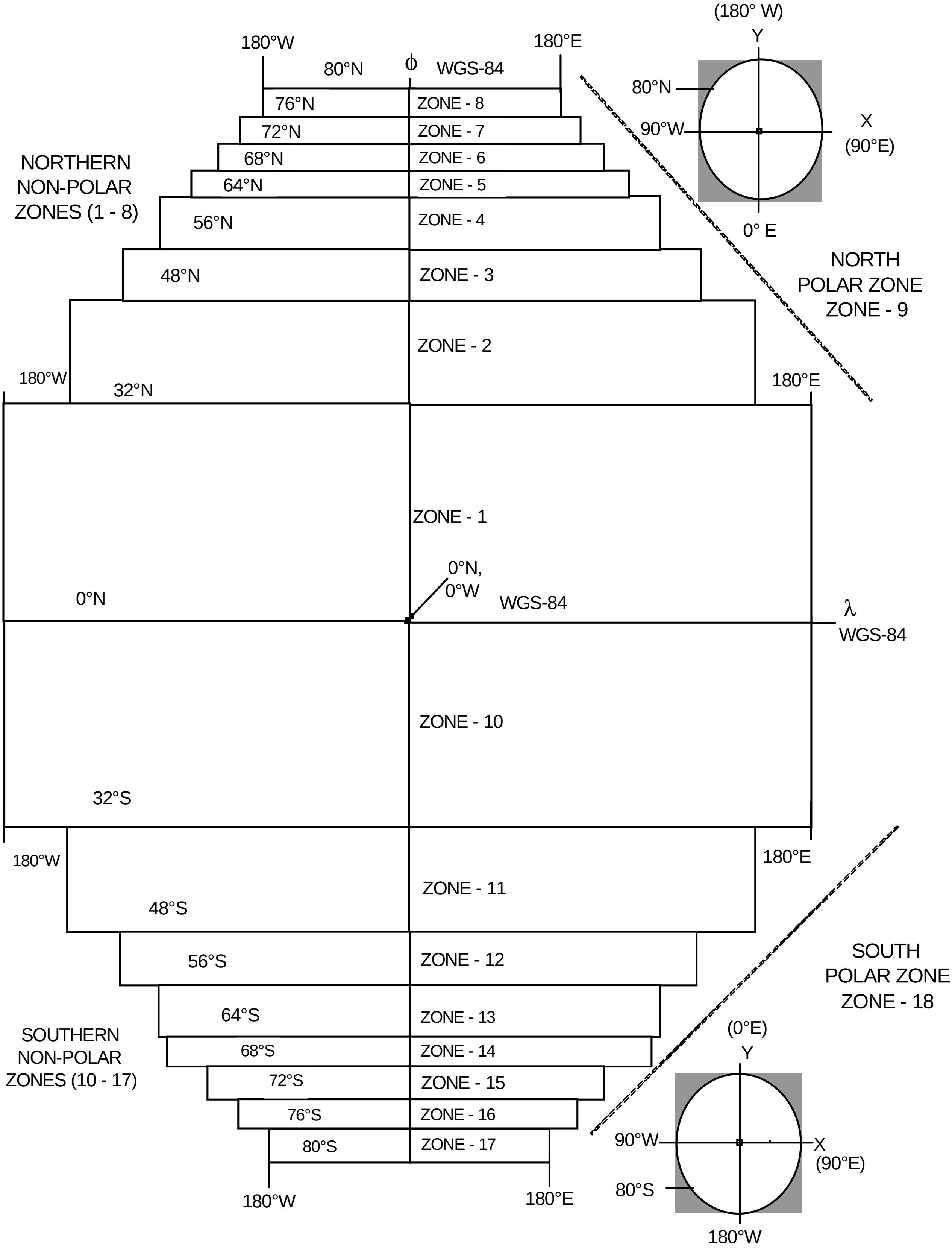


Figure 3-1. ARC System zone layout.

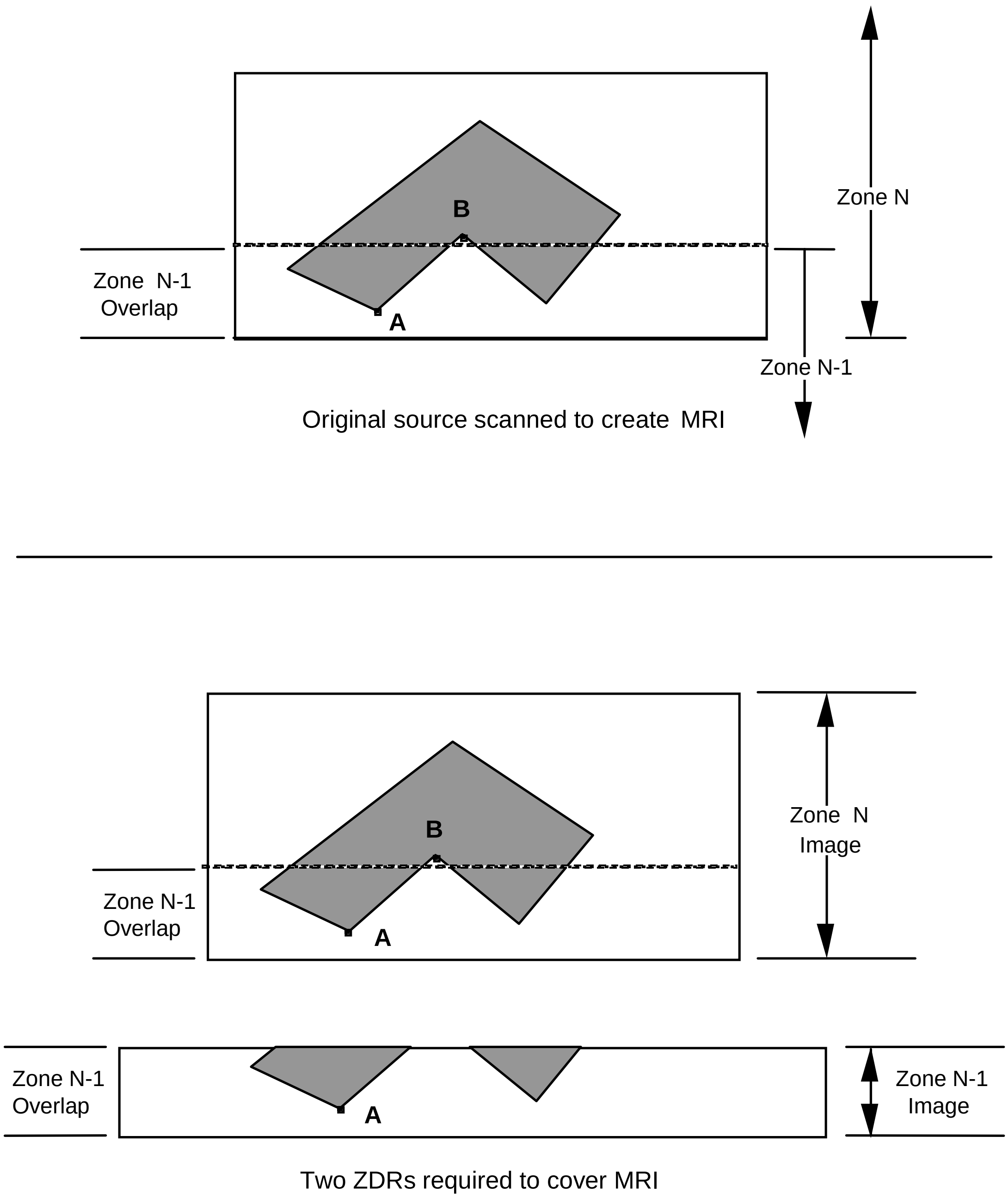


Figure 3-2. An ASRP Main Raster Image (MRI) divided into component Zone Distribution Rectangles (ZDRs) (Northern Hemisphere)

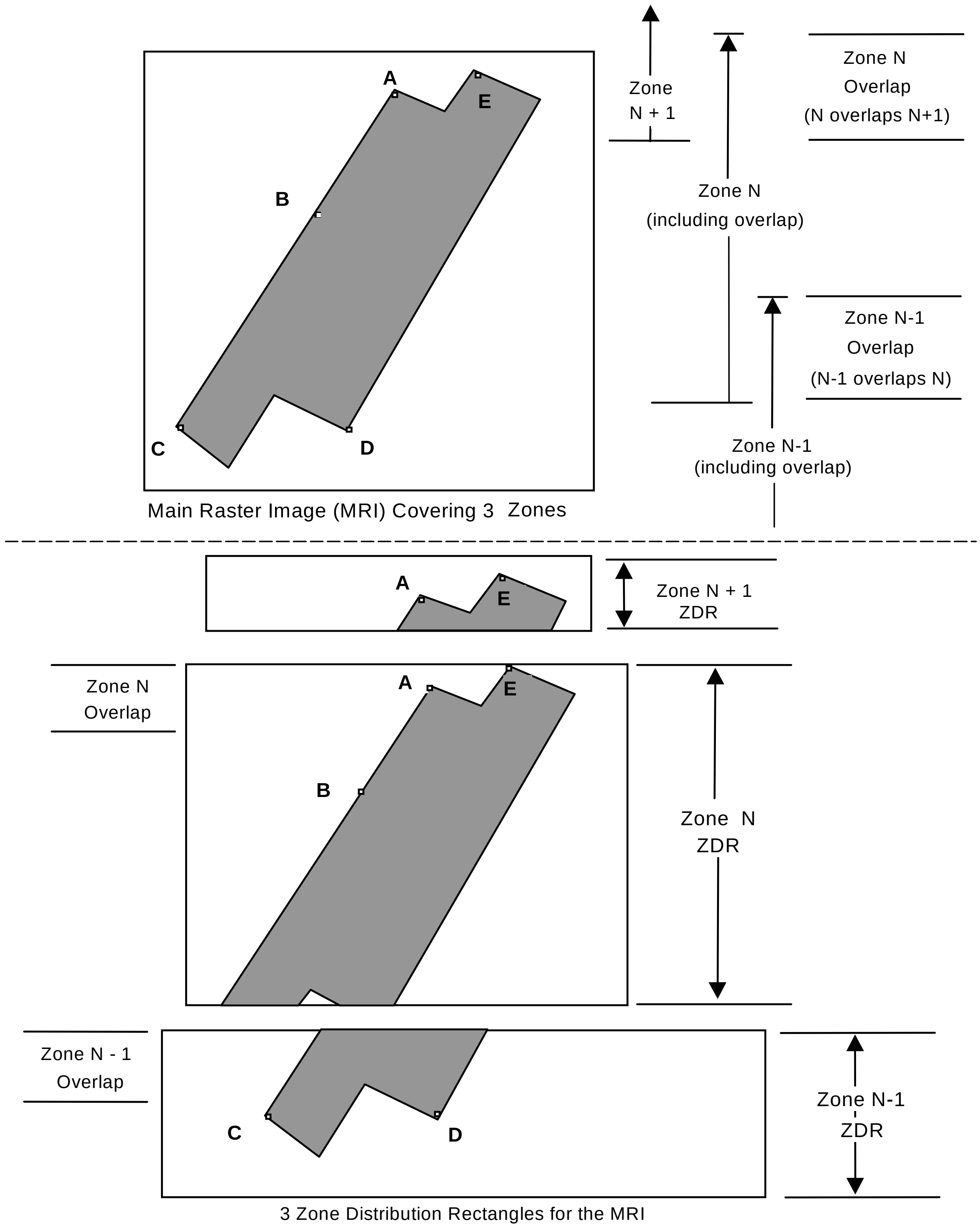


Figure 3-3. A multi-zoned ASRP divided into component Zone Distribution Rectangles (Northern Hemisphere)

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 equation for CC5 will be :

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

The use of the equation 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 equations 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:

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

$$Y = Y$$

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

3.5.2 If repromat is used, each layer (band) will be assigned a standard colour-code which matches the printing colour for which this repromat stands.

3.6 INSETS AND OUTSETS.

3.6.1 Insets. An inset is a separate map positioned within the neatline of a larger map. There are two types:

a. External Inset. This is an area geographically outside a sheet but included therein for convenience of publication, usually at the same scale.

b. Internal Inset. This is a portion of a map or chart, usually representing a highly congested area, in which a decongested version of the area is depicted in the same sheet, but in a different area of the sheet from the congested version. Internal insets may be at a different scale from the scale of the host graphic.

3.6.2 Outsets. An outset occurs where part of a map protrudes beyond the neatline, causing a break in the neatline. Every such protruding part is called an outset.

3.6.3 Treatment of External Insets. Any external insets which occur on the source graphic will not be described in the Source File. The inset is shifted to its correct geographic location in the zone image and replaced in the main map by null pixels (see Figure 5-4). This method can only apply to **external** insets displayed in the same coordinate system as the main map.

3.6.4 Treatment of Internal Insets. Any internal insets which appear on the source graphic will be described in the Source File (described in Section 5.2.4). The INSET field provides the necessary information to define a local transformation of the row and column number into geographic or cartographic coordinates. This method can only apply to **internal** insets displayed in the same coordinate system as the main map.

3.6.5 An Alternative: Additional Geo Data Layers. The inset is extracted and held as another geo data layer within the same dataset. This method can only apply to data sets displayed in the same coordinate system as the main map. These could be either **internal** or **external** insets.

3.6.6 Treatment of Outsets. When the detail contained in the outset is duplicated on the adjacent map sheet, then it is trimmed to the neatline. If it does not appear on the adjacent map sheet, it is included as an extension of the main image and the bounding polygon is adjusted to enclose the outset (see Figure 5-3).

3.7 MARGINALIA.

3.7.1 Legend images, which provide valuable information on the source graphic but are outside the neat lines, will be provided in separate data files (Sections 5.2.4 and 5.2.6). Legend images are typically a minimum size to encompass the type of images described below. The intention is that legend images are capable of being displayed in less than a display screen full of data, and therefore the image on the source may be subdivided for display convenience.

3.7.2 A legend image has no relationship to any geographic location. Each legend image is contained in its own file and is related to the source graphic by the LEGEND_IMAGE_RECORD in the SOURCE_FILE.

3.7.3 Some examples of legend images are described below.

(a) Index Diagram. The index diagram shows the approximate geographic position of the graphic and its relationship to other graphics in the region (Figure 3-4).

(b) Elevation/Depth (Bathymetric)Tint Diagram. The elevation/depth tint diagram is a multi-colour graphic depicting the colours and/or tints used to represent different elevation or depth bands on the printed map/chart (Figure 3-5).

c) Glossaries. Glossaries are brief lists of foreign geographical terms appearing on the graphic with their translated or transliterated equivalents (Figure 3-6).

d) Feature Symbols. Landmark feature symbols are used to indicate navigationally-prominent entities (Figure 3-7).

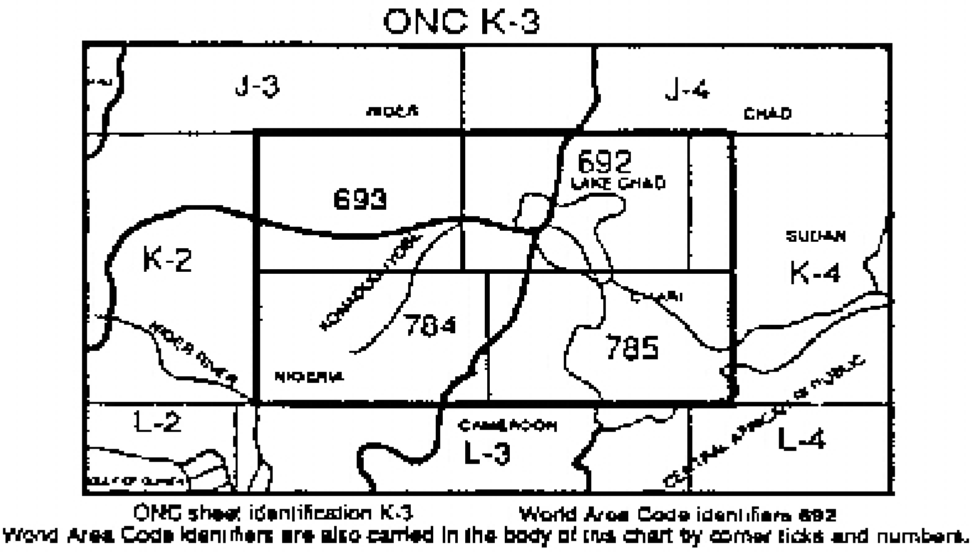


Figure 3-4. An example Index Diagram

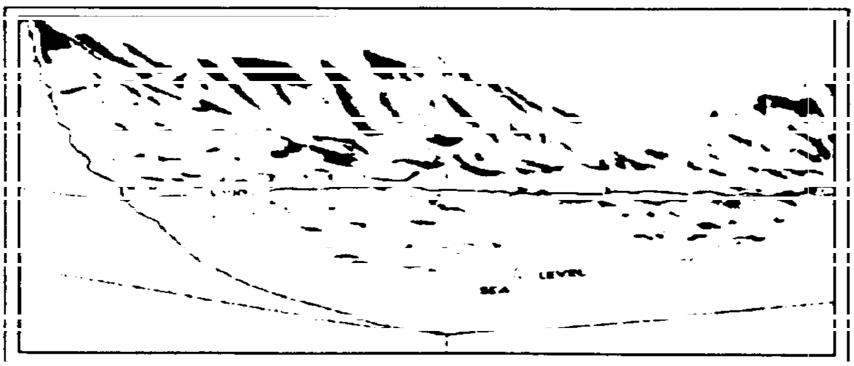


Figure 3-5. An example Elevation/Depth (Bathymetric) Tint Diagram

GLOSSARY

Bir	well
bahr	wadi
Èché	wadi
Hosérè	hill
Hosere	hill
Lac	lake
Massif	mountains
Mayo	stream
Monts	mountains
Ouadi	wadi
Plateau	plateau
Souli	well
Vallée	wadi

Figure 3-6. An example Glossary

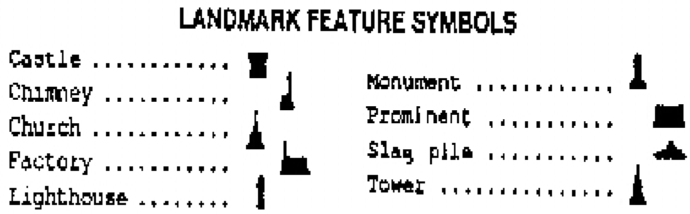


Figure 3-7. An example Feature Symbol table

3.7.4 <u>Supplementary Text Data.</u>
Supplementary text appears on many maps and charts, most often to provide textual data associated with special annotations. This may appear in the margin or on the back of the chart, and will be provided in a separate record in the appropriate Source File on the ASRP volume (Section A.2.4). In addition, supplementary text may be used to capture items such as convergence tables, extended copyrights, etc.

4.0 EXCHANGE SPECIFICATION.

4.1 OVERVIEW OF SPECIFICATION.

This specification is designed to enable the exchange of ASRP and has been structured to include:

a) Volume contents
b) Header Data Subset
c) Specific graphic details:
   i) Identification/descriptive details
   ii) Data Set coverage and organisation
   iii) Source information
   iv) Security aspects/classification
   v) Data accuracy statements
   vi) Graphic data content
d) Exchange media

Derived by reference to the DGIWG Digital Geographic Information Exchange Standard (DIGEST, Reference 1), this specification identifies and details those criteria that are necessary to permit the exchange of data in a form that is direct, informative, and above all else, complete. Some flexibility has been allowed in the areas of data field sizes, colour representation, and the ordering of the data to enable full benefit to be gained in data density and in run length encoding as required. Alternatively, some rules have been fixed to ensure conformity of product and hence, ease of data receipt and handling by the recipient.

4.2 OVERVIEW OF THE RASTER DATA STRUCTURE.

4.2.1 An image may be separated into one or more image bands as depicted in Figure 4-1. The image bands will be formatted into Sub Blocks. Each pixel value is represented by a maximum of eight bits. The upper left corner of each Sub Block is the origin of the numbering sequence of lines and pixels (samples). Each Sub Block consists of 128 lines of 128 pixels (i.e. 128 pixels square).

4.2.2 Each tile in the image has the property that its upper-left (0,0) pixel is at a distance from the ARC system origin for its zone which is an integral multiple of 128 pixels in each of the row and column directions. This is brought about by the definition of the image origin (the upper-left pixel of the upper-left tile).

> In a non-polar zone, the image origin must be an exact multiple of 128 pixels from the Equator and an exact multiple of 128 pixels from the Prime Meridian.
>
> In either polar zone, the image origin must be an exact multiple of 128 pixels from the X axis and an exact multiple of 128 pixels from the Y axis.

The precise image origin coordinates are defined in Annex B.

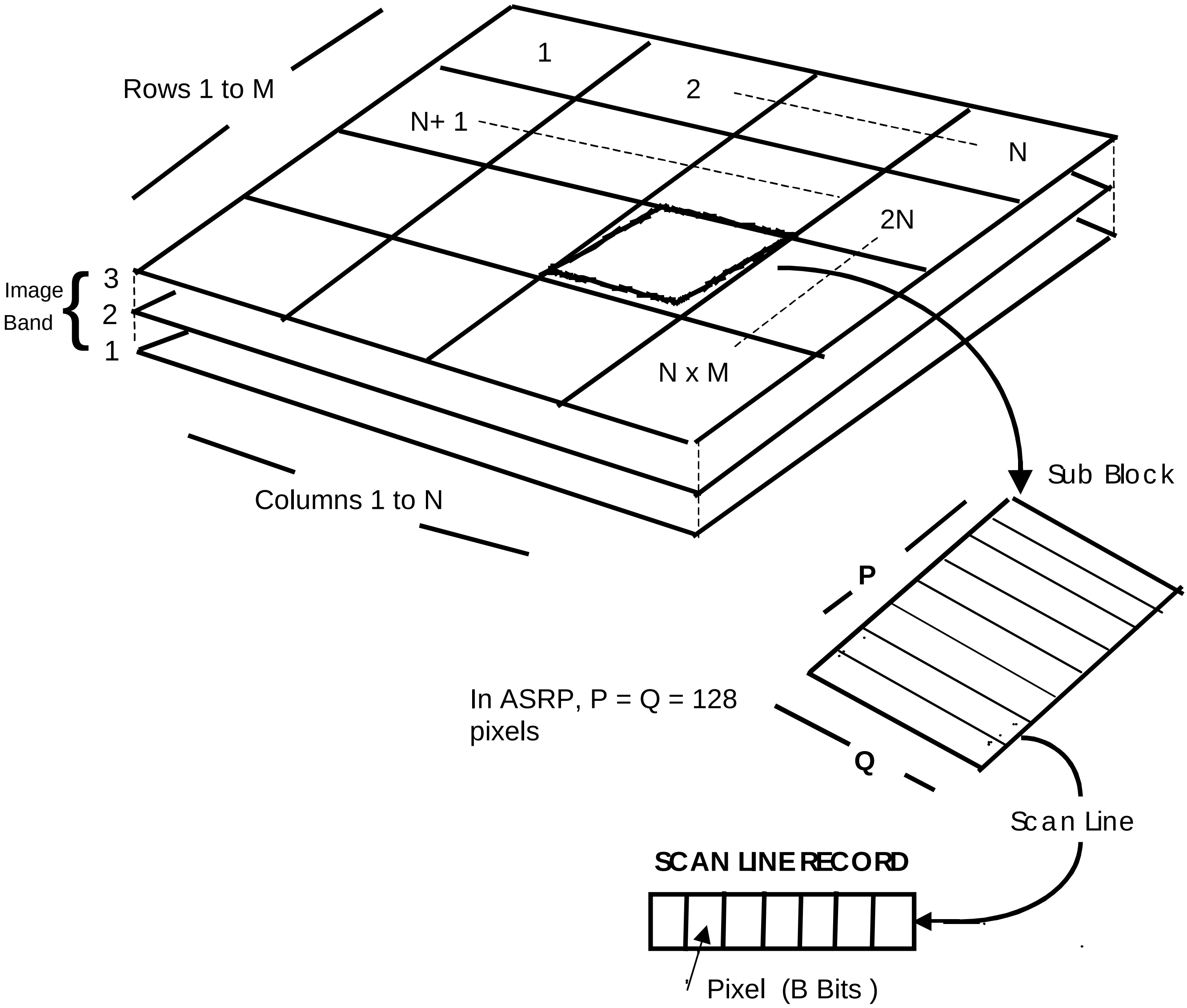


Figure 4-1. Sub Block and Pixel organisation within an Image

4.2.3 The ordering of Sub Blocks has the first Sub Block appearing in the very most Northwest corner and the last Sub Block in the very most Southeast corner. An example is as follows: From west to east, there will be **N** number of Sub Blocks. From north to south, there will be **M** number of Sub Blocks. Begin each sequence from the upper left corner of a graphic. That position will be (1), and Sub Block numbers are incremented by 1 along the row to **N.** Therefore the Sub Block to the east will be (2). The Sub Block to the south of Sub Block (1) will be Sub Block (**N**+1). The Sub Block in the Southeast corner will be Sub Block (**N** x **M**). Pixel values within a Sub Block are recorded in the same order.

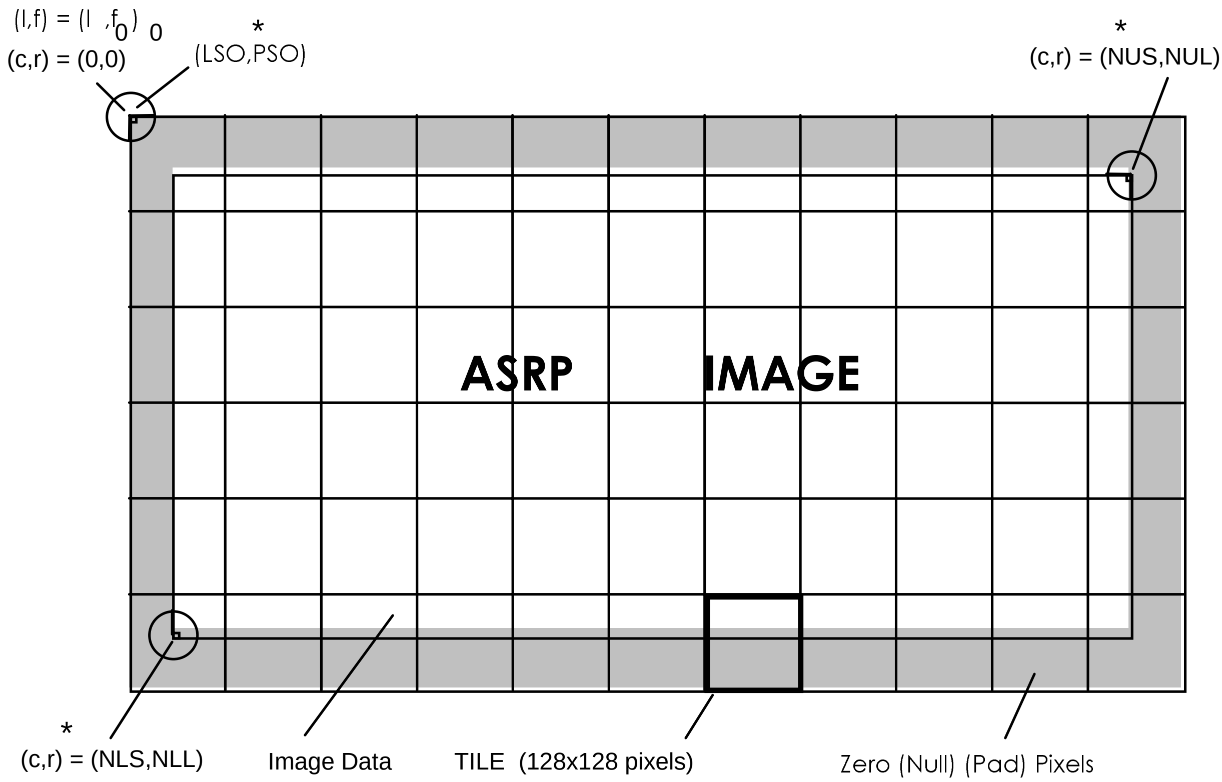
4.2.4 Zero fill (or null fill, or Pad) is defined as the colour-code zero. Zero fill may be used within a Sub Block at the beginning, middle or end of each line. If the actual number of samples per image line is not an integer multiple of 128, zero fill will be added to produce the next integer multiple of 128 samples. Zero fill may be used preceding the first line or following the last line of actual image data in a Sub Block. If the actual number of lines is not an integer multiple of 128, zero fill will be added to produce the next integer multiple of 128 lines. Therefore for these reasons, zero fill for a zone image may be on any or all edges. (See Figure 4-2)

4.2.5 Full tiles of zero (null) pixels may be omitted from an image. Tiles (Sub Blocks) containing non-zero (non-null) pixels are placed into the image file in sequential order but without leaving space for omitted tiles. In this case 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 tiles sequence position or starting byte address, in the image file. M (c,r) is defined by:

M (c,r) = 0 or null	if tile (c,r) is omitted
M (c,r) = (sequence number >0 or start byte address)	if tile (c,r) is present

If the image is compressed (i.e. Run Length Encoded) then the start byte address of each tile is the byte number within the image data (SCN field) numbering from one (the first byte). If the image is uncompressed (i.e. not Run Length Encoded) then it is the tile sequence position in the image file and when M (c,r) > 0 the value (M (c,r)-1) indicates how many tiles of stored data in the image file must be skipped to access the tile in column c, row r of the image (see Fig 4-3). The Tile Index Map is present only when tiles have been omitted from the image file or optionally the data is Run Length Encoded. A flag is provided to indicate if the tile map is present.

4.2.6 The files of an ASRP data exchange must conform to the specifications of ISO 8211. Annex A specifies files, records, fields and their contents. That Annex also specifies the field tags and subfield labels to be utilised. Under all circumstances data types must agree with the data and conform to ISO 8211.



* Note: The subfield values NUS, NUL, NLS and NLL are image coordinates given in the DATA_SET_PARAMETERS Field (SPR).
The subfield values LSO and PSO are image origin coordinates given in the GENERAL_INFORMATION Field (GEN) for each zone (including any pad pixels) in the Main Raster Image (MRI).

Figure 4-2. ASRP Image Tile structure

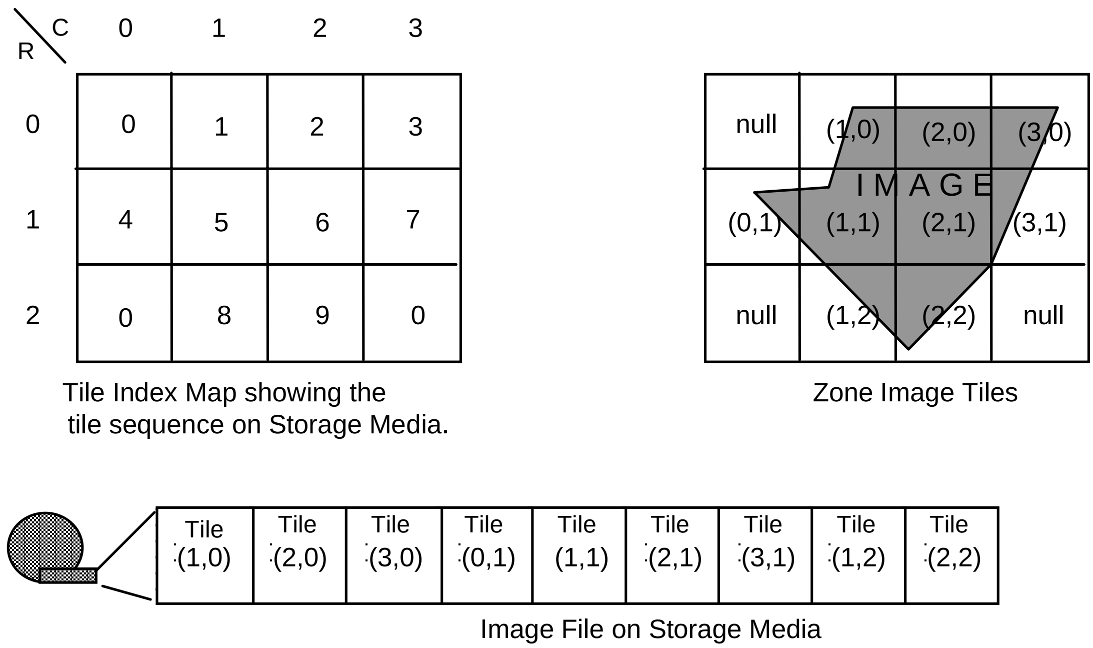


Figure 4-3. Tile Index Map example with null tiles

4.3 SCAN LINES.

Each scan line contains the pixel data for a line of pixels in a Sub Block. Because of the repetitive nature of pixel/raster data, the PIX subfield contains two implicit elements which are fixed length binary integers with no separators between them. Each scan line starts on a byte boundary, any remaining bits in the final byte are ignored (i.e. padding with any combinations of 0's and 1's). The implicit elements of the PIX Subfield have the logical form as depicted below, where each run of pixels is composed of two elements:

- Pixel count
- Pixel value

Pixel Count 1	Pixel Value 1	Pixel Count 2	Pixel Value 2	*	*	*	Pixel Count 'n'	Pixel Value 'n'
run 1		run 2					run "n"	

4.3.1 The Pixel Count subfield defines the number of pixels with the value of the following Pixel Value. The sum of all the Pixel Counts in a scan line of a Sub Block (tile) will be equal to 128 pixels (i.e. Wrap-around of pixel runs to following scan lines is not allowed since pixels would not be physically adjacent).

$$PNC = \sum_{i=1}^{n} (\text{pixel count})_i = 128$$

(where PNC represents the number of pixels per scanline)

4.3.2 The lengths of the binary integer subfields are defined (in bits) in the General Information Record (GIN) of the General Information File by the following attributes:

PCB = Size of Pixel Count element in Bits (ie 0 or 4 or 8).
PVB = Size of Pixel Value element in Bits (ie 0 or 8).

4.3.3 If PCB is set to 0, then there is no count subfield and the value of the count is assumed to be one in all cases and the scan line structure reduces to an uncompressed form as follows:

Value 1	Value 2	*	*	*	Value 128

4.3.4 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 attribute PVB can be set to 0 (zero) and the scan line reduces to a string of count elements as follows:

Count 1	Count 2	*	*	*	Count 'n'

PNC

The convention used is that the first count in this scan line refers to the colour defined for the 'off' state, which is the subfield "WS2" in the GENERAL_ INFORMATION_ FILE. This element count may therefore be zero. Subsequent count elements alternate in the colour they apply to. As before, the sum of the Pixel Counts will be equal to 128 pixels.

4.4 GENERAL REQUIREMENTS.

4.4.1 FIELD USE When a field is present, all subfields are mandatory. Where information is not available, or not applicable:

- fixed-format subfields will be filled with ASCII spaces (i.e. character position 2/0 as defined in ISO 646).

- variable-width subfields will have a null value (ie consist solely of the delimiter).

4.4.2 DECIMAL MARK The decimal mark in all numeric representation will be the FULL STOP (i.e. character position 2/14 as defined in ISO 646).

4.4.3 DIGEST SPECIFIC DATA SYNTAX Data items having DIGEST specific syntax (e.g. dates) will be coded according to the applicable Section, Appendix or Annex of Reference 1. Relevant enclosures from that document are included at the end of this specification.

4.4.4 INTERPRETATION OF BINARY FIELDS The bits in a byte are identified by b_8, b_7, b_6, b_5, b_4, b_3, b_2, b_1, where b_8 is the highest order bit and b_1 is the lowest order bit. For binary fields representing scanlines, the bits will be sequenced highest order to lowest order. Thus when PCB = 4 and PVB = 0 then bits b_8 to b_5 will be valued first, followed by bits b_4 to b_1. Note that when PCB = 4 and PVB = 8, pixel values will span alternate byte boundaries subject to the restrictions in paragraph 4.3.

5.0 LOGICAL STRUCTURE

ASRP data transfers are composed of the Transmittal Header File (THF) which occurs once and one or more data sets, each of which consist of the Header Data Subset and the Geo Data Subset. Information about the volume security, number of data sets on the volume (optional), and the volume number will be present in the ISO media label, in accordance with the standards described in Section 6. The logical view of these two data subsets is explained below. The THF will be described in Section 5.2.1 below (see Figure 5-1).

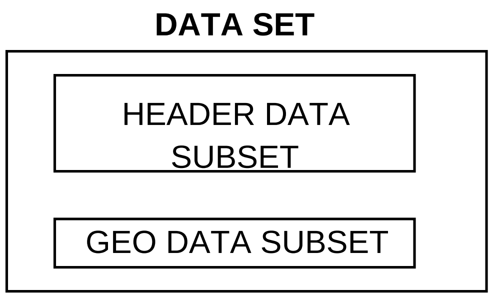


Figure 5-1. Logical Data Set

5.1 LOGICAL DESCRIPTION OF DATA SUBSETS

5.1.1 HEADER DATA SUBSET

The Header Data Subset is a logical construct composed of the following:

1. A General Information File	Occurrence:	Once per geo data set
2. A Geo Reference File	Occurrence:	Once per geo data set
3. A Source File	Occurrence:	Once per source (several sources may occur per geo data subset)
4. A Quality File	Occurrence:	Once per geo data set

5.1.2 GEO DATA SUBSET

The Geo Data Subset is a logical construct defined as a collection of digital information representing either physical and cultural characteristics of the earth's surface (which is called the Main Raster Image or MRI); or legend information (which is called the raster Legend Image). The Geo Data Subset is a logical construct composed of the following:

A Geo Data File — Occurrence: One file per zone image (noting that there may be more than one zone image per MRI).

5.2 FILE STRUCTURES

5.2.1 TRANSMITTAL HEADER FILE

The TRANSMITTAL_HEADER_FILE occurs only once on each transmittal and for serial media is located at the beginning immediately following the volume label. It contains a general description of the contents of the Transmittal.

The TRANSMITTAL_HEADER_FILE consists of two records with the fields as shown below.

TRANSMITTAL DESCRIPTION Record

001 RECORD_ID Field. Identifies the record.

VDR TRANSMITTAL_HEADER Field. Provides information about the originator of the transfer, relevant media standard, and other information pertinent to the transfer.

FDR DATA_SET_DESCRIPTION Field. Contains information about the geographic extent, identification, and structure of each data set in the transfer.

SECURITY AND UPDATE Record

001 RECORD_ID Field. Identifies the record.

QSR SECURITY_AND_RELEASE Field. Provides information about the security classification of the transfer as a whole.

QUV UP_TO_DATENESS Field. Provides information regarding the ASRP specification edition to which this transfer conforms.

5.2.2 GENERAL INFORMATION FILE

The GENERAL_INFORMATION_FILE contains information pertaining to formatting, sequencing and file organisation which is helpful for the user and machine reading of the file. The file also includes other general information about the actual content of the Data Set File.

The GENERAL_ INFORMATION_ FILE contains two record types with the fields as shown below.

GENERAL INFORMATION Record (Repeated for each zone in the dataset)

001 RECORD_ID Field. Identifies the record.

DSI DATA_SET_ID Field. Gives information about the Geo Data Sub-set identification.

GEN GENERAL_INFORMATION Field. Gives information about the Geo Data Subset content.

GEN GENERAL_INFORMATION Field. Gives information about the Geo Data Subset content.

SPR DATA_SET_PARAMETERS Field. Gives information which provides parameters to interpret the Geo Data Subset.

BDF BAND_ID Field. Gives information about each individual band in a raster image. The order in which the colour bands are recorded in this field is the order they must appear in the Geo_Data_File.

TIM TILE_INDEX_MAP Field. Contains information regarding Sub blocks/tiles (see section 4.2.5 for usage criteria).

DATASET DESCRIPTION Record

001 RECORD_ID Field. Identifies the record.

DRF DATASET_DESCRIPTION Field. Contains information on the number of accuracy subregions, zone images, and source graphics in the dataset.

5.2.3 GEO REFERENCE FILE

The GEO_REFERENCE_FILE occurs only once.

The GEO_REFERENCE_FILE contains one record with the fields as shown below.

GEO REFERENCE Record

001 RECORD_ID Field. Identifies the record.

GEP GEO_PARAMETERS Field.

5.2.4 SOURCE FILE; (Repeated as necessary, once per source document)

The SOURCE_FILE provides information about source documents only to which the data set file refers. A source document is usually a single map or chart from which the image or part of an image was derived. If this file is repeated the sources will normally be from the same map series.

The SOURCE_FILE contains four records with the fields as shown below.

SOURCE Record

001 RECORD_ID Field. Identifies the record.

SGF SOURCE_SUMMARY Field. Identifies the number of supplementary text records, legend images and insets from each source graphic.

SOR SOURCE Field. Provides information on the source(s) used or referenced to create the data contained in the data set file.

MAG MAGNETIC_INFORMATION Field. Provides Magnetic information on a given source. The subfields will be repeated if more than one set of magnetic information 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.

RCI BOUNDING_POLYGON_COORDINATES Field. Lists the coordinates of the source polygon.

PRR PROJECTION_FIELD. Provides information about the map projection used in the Source Data.

QSR SECURITY_AND_RELEASE Field. Provides information about the security and releasibility of the source to which it refers).

INS INSET Field. Provides information about the relative and absolute coordinates of the inset. The field will be repeated if there is more than one inset.

CPY COPYRIGHT Field. A free text field which contains applicable copyright information for the source graphic.

LEGEND Record (Optional. Repeat as required)

001 RECORD_ID Field. Identifies the record.

LGI LEGEND Field. Provides information on the legend information captured to permit an easier interpretation of the source to which it relates.

SPR DATA_SET_PARAMETERS Field. Provides parameters to interpret the Legend Image Data.

TIM TILE_INDEX_MAP Field. Contains information regarding Sub blocks/tiles (see section 4.2.5 for usage criteria).

METRIC SUPPORT Record

Refer to Annex B for the math model equations which utilise the coefficients and normalisation constants given in the fields.

001 RECORD_ID Field. Identifies the record.

NCD NORMALIZATION_CONSTANTS Field. Provides constants that are used in applying the coefficients in the Source Datum Coefficients Data Field to compute geographic coordinates relative to the source datum geographics from ARC system geographic coordinates.

SDC SOURCE_DATUM_COEFFICIENTS_DATA Field. Provides coefficients that are used in conjunction with the normalisation constants to compute geographic coordinates relative to the source datum geographics from ARC system geographic coordinates.

MPC MAP_PROJECTIONS_COEFFICIENTS_DATA Field. Provides coefficients that are used to compute the map projection from geographic coordinates given on the source datum.

SUPPLEMENTARY TEXT Record (Optional

001 RECORD_ID Field. Identifies the record.

SUP SUPPLEMENTARY_TEXT Field. Provides free format text for a variety of purposes including alternative for media descriptions.

5.2.5 QUALITY FILE

The QUALITY_FILE gives information about the whole Geo Data Subset quality. It contains three records as shown below.

QUALITY Record:

001 RECORD_ID Field. Identifies the record.

QSR SECURITY_AND_RELEASE Field. Provides security classification, handling and release information).

QUV UP_TO_DATENESS Field. Provides information about currency of the data set file.

COL COLOUR_CODE_ID Field. Gives red, green, blue values each averaged over pixels scanned from uniform intensity colour reference samples intended for colour coded processing.

QOI OTHER_QUALITY_INFORMATION Field. Provides information defining specific descriptors related to data quality.

HORIZONTAL ACCURACY Record (Repeat as necessary)

001 RECORD_ID Field. Identifies the record.

ASH HORIZONTAL_ACCURACY Field. Provides information about the area of horizontal accuracy delineated by the bounding polygon (see RCI below).

RCI BOUNDING_POLYGON_COORDINATES Field. Provides the geographic coordinates (latitude and longitude) of the polygon which delineates the accuracy region of the Geo Data Subset.

VERTICAL ACCURACY Record (Repeat as necessary)

001 RECORD_ID Field. Identifies the record.

ASV VERTICAL_ACCURACY Field. Provides information about the area of vertical accuracy delineated by the bounding polygon (see RCI below).

RCI BOUNDING_POLYGON_COORDINATES Field. Provides the geographic coordinates (longitude and latitude) of the polygon which delineates the accuracy region of the Geo Data Subset.

5.2.6 RASTER GEO DATA FILE

A RASTER_GEO_DATA_FILE of the Geo Data Subset provides the actual data (pixels) of a raster image.
Note: There is one RASTER_GEO_DATA_FILE per zone for the main raster image (including insets within the same zone) and possibly several RASTER_GEO_DATA_FILEs for legend images. (Figures 5-2, 5-3, 5-4, and 5-5 are examples of main raster images). A RASTER_GEO_DATA_FILE contains one or more records as follows:

IMAGE Record

001 RECORD_ID Field. Identifies the record.

PAD PADDING Field. Optional, to be used to pad the IMAGE Record so that the following PIXEL Field can start at the beginning of a physical block on the transfer media if desired. The field contains sufficient characters including the field terminator to achieve this result.

SCN PIXEL Field. Consists of a string of bytes which should be considered to be subdivided into logical subfields (i.e. not ISO 8211 subfields) in the manner described in Section 4.3.

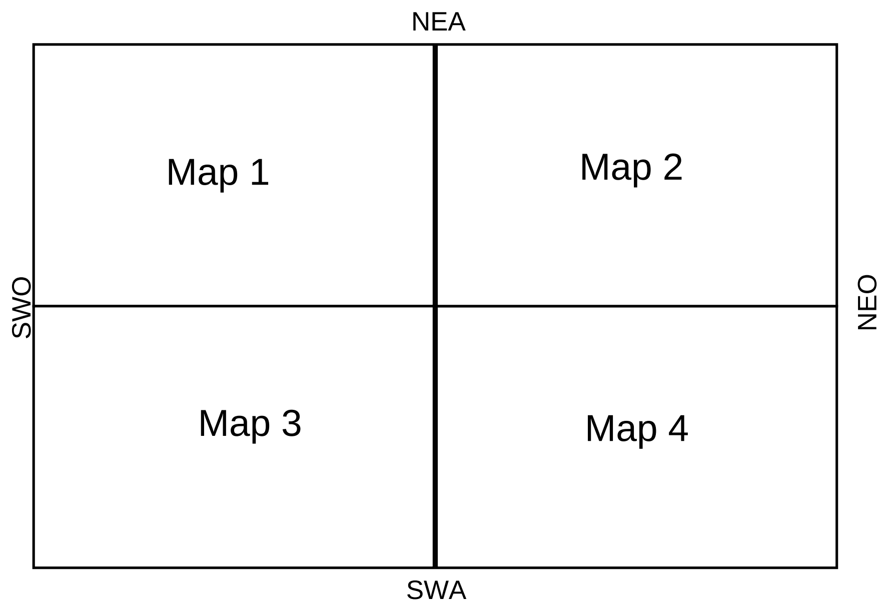


Figure 5-2. A seamless four-map Main Raster Image (MRI).

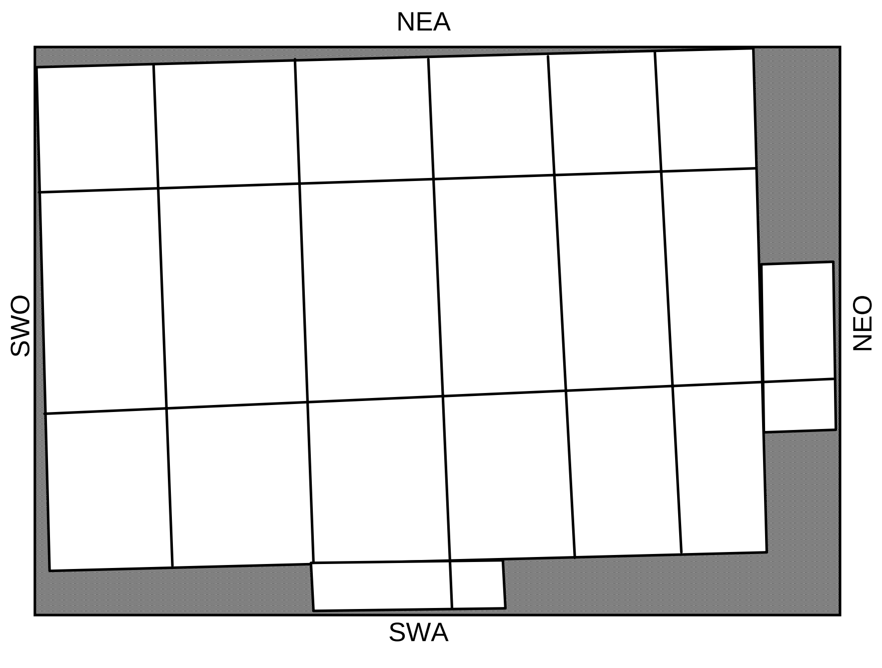
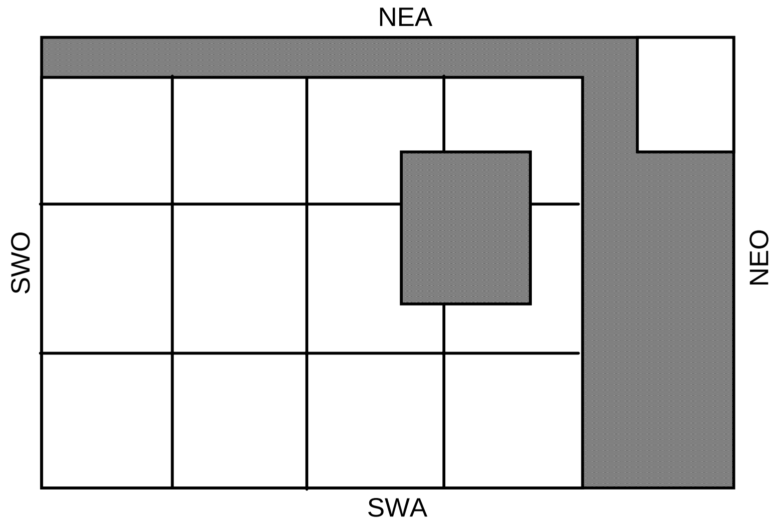
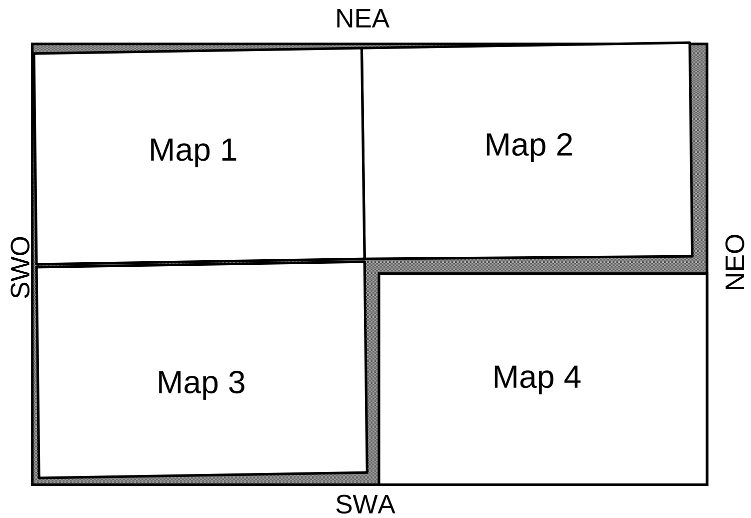


Figure 5-3. MRI for source graphics with outsets.



An MRI formed by a map and its inset. The inset is an external inset at the same scale as the main map. The inset is placed at the correct geographic area in the ASRP image, and the inset area on the main graphic filled with zero (null) pixels.

Figure 5-4. MRI for source graphic with inset.



Four maps in a Main Raster Image (MRI). Maps 1,2, and 3 are on the same datum, while map 4 is on a different datum.The difference between the two datums causes a gap in the MRI. The size of the gap depends on the datums and scale involved. The larger the scale, the larger the gap (in pixels).

Figure 5-5. MRI for source graphics on different datums.

6.0 EXCHANGE MEDIA.

6.1 PURPOSE. The aim of this standard 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.

6.2 CHARACTER REPRESENTATION. Two types of character encoding are defined in this standard. Basic Text is used for all text subfields 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. Four lexical levels of alphabetic repertoire of General Text characters are defined (Lexical Level 0 corresponds to Basic Text).

- 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 - Full Latin alphabet text ASCII (all accents, diacritical marks and special characters for Latin alphabet based languages (ISO 6937 repertoire))
- 3 - Universal Character Set (Base Multilingual plane of ISO 10646) (note: 2 bytes per character)

6.3 FORMS OF MEDIA

6.3.1 MAGNETIC TAPE.

Magnetic tape volumes containing data interchange files shall conform to ISO 1001, level 3, with one fixed length media record per physical block.

6.3.1.1. PHYSICAL BLOCK SIZE. The block size for this product is 8,192 (8 bit) bytes (i.e. 65,536 bits). The completion of a block, if necessary, from the end of specified-recorded information should be by use of (5/E) characters.

6.3.1.2. RECORD STRUCTURE. Only fixed length records will be used, and these will be equal to the physical block size or a whole subdivision of it. The ISO 8211 file of DDR and DR records will be treated as a continuous string of bytes spanning, without separators or padding, the fixed length records and blocks of the magnetic tape. Any unused bytes in the last magnetic tape record of the file shall be filled with (5/E) characters.

6.3.1.3. 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).

6.3.1.4 RECORDED LABELS. Magnetic tapes will 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).

Volume Header Label one (VOL 1) and User Volume Label one (UVL1) will be present and will contain the information as follows:

First Volume Header Label (VOL 1):

Entity Name	Definition	ISO 1001 Byte Position (BP) and field name
Volume ID	ID for this specific volume	5 to 10 - Volume identifier
Security Classification	Security Classification of this volume T = TOP SECRET S = SECRET C = CONFIDENTIAL R = RESTRICTED U = UNCLASSIFIED	11 - Volume Accessibility

User Volume Label One (UVL1):

Sequence Number	Sequential number of this volume within the volume set (transmittal)	5 to 7 Reserved for implementation use
Transmittal ID	Unique ID for the transmittal (volume set) to which this volume belongs	8 to 37 Reserved for implementation use
Number of Data Sets	Number of Data Sets on, or starting on, this volume (may be left blank)	38 to 40 Reserved for implementation use

Notes:

1. All fields shall be a-characters, even the numeric fields are numeric character fields.

2. The 'Number of Data Sets' field may be left blank. It is suggested that for Classified data that this field can be completed by leaving sufficient empty space on the magnetic tape to ensure completion of a known number of Data Sets before the physical 'End of Tape Mark'.

3. The 'Security Classification' of individual files may be defined by setting byte position (BP) 54 of the 'First File Header Label' to T, S, C, R or U as defined above for the Volume Label.

6.3.1.5 Except by bilateral agreement between exchanging parties, the ISO 1001 definition of an 8 bit/byte will be adopted.

6.3.2 OPTICAL DISK.

6.3.2.1 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) shall be = 0. The ISO 8211 records shall span the media records without further demarcation. 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. The information is defined as follows:

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 volume set (transmittal)	125-128	Volume sequence number
Transmittal ID	Unique ID for the transmittal (volume set) to which this volume belongs	191-318	Volume set identifier
Number of Data Sets	Number of Data Sets on, or starting on, this volume	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 Data Sets' shall be recorded according to paragraph 7.2.3 of ISO 9660 and the 'Security Classification' shall be a d-character (Annex A of ISO 9660).

6.3.2.2 CLASSIFICATION AT THE FILE LEVEL. Where present the classification of a file shall be defined by the first character in the system user area at the end of the directory record:

T = TOP SECRET
S = SECRET
C = CONFIDENTIAL
R = RESTRICTED
U = UNCLASSIFIED

6.3.2.3. Except by bilateral agreement between exchanging parties, the ISO 9660 definition of an 8 bit/byte will be adopted.

6.3.3 OTHER MEDIA

Other media will be addressed as the need arises.

6.4 FILE NAMING CONVENTIONS FOR USE WITH MEDIA LABELS

The TRANSMITTAL HEADER FILE name is always

"TRANSH01.THF"

All other file names conform to the following rules :

The purpose of this set of rules is to provide a mechanism to identify those files, which together comprise a single data set. Each file label will be of the form

ZZZZZZDD.XXX, where:

"ZZZZZZ" are six alphanumeric characters which uniquely identify the data set to which the file belongs

"DD" are two alphanumeric characters which identify the occurrence of the file type within the data set

"XXX" are three characters which must be selected from the sets below. For Header Data Subset files, the following are defined:

XXX	File Type
GEN	General Information File
GER	Geo Reference File
SOU	Source File
QAL	Quality File

For the Geo Data Subset files, use:

IMG	Main Raster Image
Lcc	Raster Legend Image (where 'cc' is the number assigned to the image's source graphic)

An example of the use of this structure is depicted below:

NOAMER01.SOU

This example defines a SOURCE_FILE which is part of a data set uniquely identified with NOAMER. If the data set contains more than one source file, the file name will be the same except that at least one of the characters, "0" or "1", must be changed.

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ANNEX A –– ISO 8211 IMPLEMENTATION SPECIFICATIONS

INDEX

A.1 SPECIFICATION OF ISO 8211 EXCHANGE FILE SETS

An ISO 8211 exchange set is usually a large data structure which must be specified in great detail. The following manner of specification is intended to enable a specification in a concise yet detailed manner.

This Annex contains specifications for the implementation of ASRP as ISO 8211 interchange files. The specifications include the data structures and data descriptions for the following:

1. the files of the ASRP transmittal file set,
2. the records and fields of each file,
3. the subfields of each field.

The first two items are specified as ordered, rooted fields with an explicit statement of the required or permitted subtrees. The third item is specified as the field descriptions of the component files. The details of the specification format are given in the next Section.

A.1.1 THE SPECIFICATION OF EXCHANGE SET CONTENT

Note: The following notation is in Backus Naur Form (BNF)

The structural model for a ISO 8211 exchange set is an ordered rooted tree. The general notation for the model is:

<tree root>
<r>-<subtree>

where <tree root> is the root of the tree structure
<r> is the repetition factor of the subtree, <subtree>.

In the usual manner of trees, each subtree type may comprise the root of further subtrees. The complete specification of an exchange set comprises the following generic subtrees:

<exchange set>
<r>-<file type>
<r>-<record type>**|**<file type>
<r>-<field type>**|**<record type>
<r>-<field type>
<field description>

where:

<exchange set> is the exchange set name

<r> is a specified repetition factor for a subtree, where:
= integer, meaning a specific repetition factor
= null means r = 1
= R, meaning indefinite repetition

<file type>, <record type> and <field type> level may have an instance of the same type as a subtree (i.e. a file can be the subtree of a file, etc.)

<file type>	::=	File: external file title i.e. contents of ISO 8211 DDR; tag = 0...0
<record type>	::=	Record: record name
<field type>	::=	<tag>(<structure>:<order>)-<field name>
<tag>	::=	an ISO 8211 field tag (which associates this field uniquely to its data description)
<structure>	::=	a succinct description of the structure

where	(n)	is an n-tuple (with n = integer)
	(m*n)	is a 2-D array of m rows and n columns
	(*n)	is a repeating 2-D table with n columns

(i*j*k) is a 3-D array with extents i, j and k

Note: The intent of field <structure> is to provide the user with a clue to the repetition pattern of the subfields within the field. "n,m,i,j,k" represent the maximum values of the contents of the field. These may be less if optional subfields are omitted.

<order> ::= a succinct statement of any intra- or inter-field ordering requirements

where O implies the order of the subfields is significant

O, <tag>, implies the order of the subfields is correlated with the order of the subfields in the field bearing the tag(s), <tag>

```
<field name>    ::= the ISO 8211 field name corresponding to <tag>
```

<field description> is the ISO 8211 data description for a field.

The details of field description are given in the next Section.

The presentation diagram for ordered, rooted trees is:

```
<tree root>
|
|-<r><subtree 1>
*-<r><subtree 2>      <subtree 2> or <sub tree 3> but not both.
*-<r><subtree 3>
```

NOTA BENE: In these representations, the preorder traversal sequence rule is: top down, right hand branch first. The parent of any subtree is readily apparent and the parent tags for fields must coincide with the field description. The traversal of the tree encounters the repetition factor, perhaps the default of one, of a subtree as the subtree is entered. Further repetition may be indicated in the field descriptions.

Spaces may be introduced into the text for readability and for large exchange sets the description may be compartmentalized into subtrees for reasons of clarity. The root of each subtree identifies its nodal position in its parent tree.

The above tree structures for each file define the order and structure of the data descriptive records (DDRs) and the order and structure of the data records (DRs).

A.1.2 ISO 8211 DATA FIELD DESCRIPTION

The format of the machine- and human-readable field description is described below. The format comprises a series of one-line records easily maintained by an editor. There are four record types: a control record, tag definition records, subfield definition records and interspersed comment records.

Control line:

The control line is the first line of the Field Data Description section.
Control==_(see DDR Header in ISO 8211)

Record title line:

[req]_Record:_Record name
where [req] can be [O] for optional.

Tag definition line (one per field):

___0_tag_ptag_pg_field name

where:

tag	is an ISO 8211 field tag, A7
ptag	is a parent tag, A7
pg	are the printable graphics, A2, (usually ';&')
name	is an ISO 8211 field name, A48

Subfield definition line (one per subfield):

_nsi_label_dw_(r)_subfield comment

where:

nsi — is a sequence number
(1 = first, 999 = end of field description)

label — is an ISO 8211 label component, Akk
*label — initiates a vector label in a Cartesian label describing a 2-d data structure

d — is the subfield data type, A1 (d = A | I | R | S | B)
where:
A signifies character data;
I signifies implicit-point representation;
R signifies explicit-point unscaled representation;
S signifies explicit-point scaled representation;
B signifies bit field data.

w — is a fixed subfield width
(0 | SPACE = delimited, variable width)

(r) — is, when present, a qualifier on the subfield type:
- a fixed number of decimal places for R types.
- when L it indicates lexical alphanumeric type for A types.

comment — is a descriptive subfield comment

Comment records:

Comment records must start with five SPACEs or a "-" and may be located anywhere.

Further documentation conventions:

Fields are defined at their first occurrence in the data set and are included by tag reference (i.e. tag ==) at other locations.

Unique values or ranges of values of fields and subfields are specified in {}'s, e.g.:.

{RTY = THF}	The RTY subfield must contain the value THF.
{RID = 1}	The RID subfield must contain the value 1. It may be preceded by leading zeroes.
{NOV = 1 - 9}	The NOV subfield must contain a value in the range 1 to 9 inclusive.
{00 - 99}	The subfield must contain a value in the range 00 to 99 inclusive - leading zeroes are required if necessary to satisfy a fixed field width.
{0 | 4 | 8}	The subfield must contain either the value 0 or the value 4 or the value 8.
{RID = 1,...}	The RID subfield can contain any positive integer.

Sub-structure of subfields is specified in ()'s, e.g.:.

(XOR = ±mm...mm)	The XOR subfield must contain a positive or negative integer value expressed in metres.
(SWO = ±SSSSSS.SS)	The SWO subfield must contain ten characters representing a positive or negatively signed value expressed in seconds to a resolution of two decimal places.

A.2 ISO 8211 IMPLEMENTATION

The following specifies the content of an ASRP transmittal file set at the file level by an ordered, rooted tree structure using the notation described in Section A.1.

```
Exchange set: ASRP
|
|-File: TRANSMITTAL HEADER
```

```
|-R Geo Dataset
    |-File: GENERAL INFORMATION
    |-File: GEO REFERENCE
    |-R File: SOURCE
    |-File: QUALITY
    |-R File: RASTER GEO DATA
```

The following Sections specify the content and structure of each ASRP file at the record and field level. The specification for each file is given as an ordered rooted tree specifying the file contents by record and field followed by the ISO 8211 data description for each field.

A.2.1 TRANSMITTAL HEADER FILE

File Content by Record and Field:

```
File: TRANSMITTAL HEADER
|- Record: TRANSMITTAL DESCRIPTION
||-   001    (2)    Record Id                    {RTY=THF}
||-   VDR    (8)    Transmittal Header
||-R  FDR    (7)    Data Set Description
|
|- Record: SECURITY AND UPDATE
 |-   001    (2)    Record Id                    {RTY=LCF}
 |-   QSR    (4)    Security and Release
 |-R  QUV    (6)    Up_to_Dateness
```

Field Data Descriptions:

```
Control      ==      (see DDR Header in ISO 8211)
```

*Note: The values shown are minimum and should be modified based upon the dataset sizes (see Section A.1.2, control record).

```
0     000                {=TRANSMITTAL_HEADER_FILE}
1                        File title field, present only in DDR
999
```

Record: TRANSMITTAL DESCRIPTION

```
0     001                ;& RECORD_ID
1     RTY    A    3      Record type {RTY = THF}
2     RID    I           Record id number {RID = 1}
999

0     VDR    001         ;& TRANSMITTAL_HEADER
1     MSD    A    3      Media recording standard used for this transmittal
                         with leading zeroes (Valid codes listed at
                         Enclosure 8);                          {000-004}
2     VOO    A           Title and address of originator  (\ used as a line
```

				separator (free text)
3	ADR	A		Title and address of addressee (\ used as line separator, null for CD-ROM) (free text)
4	NOV	I	1	Number of media volumes in this transmittal (or zero for "unknown number of volumes") {0-9}
5	NOF	I	3	Number of Data Sets in this transmittal {001-999}
6	URF	A		Unique ID for this transmittal (free text)
7	EDN	I	3	Transmittal Edition Number {001-999}
8	CDV07	A	8	Creation date for this transmittal (YYYYMMDD)
999				

0	FDR	001		;& DATA_SET_DESCRIPTION (Repeat for each data set in the transmittal)
1	NAM	A	6	Data Set Id, the six alphanumeric characters which uniquely identify the dataset to which the file belongs (ZZZZZZ).
2	STR	I	1	Data structure code (=Raster Colour Coded) {4}
3	PRT	A		Product type and map series designation (ASRP,Series)
4	SWO	R	10 (2)	Westernmost longitude of the extent of the unpadded cartographic image. If either the north or south pole lies inside the cartographic image, the value will be -648000.00 seconds (i.e.-180 degrees) (±SSSSSS.SS)
5	SWA	R	10 (2)	Southernmost latitude of the extent of the unpadded cartographic image. If the south pole lies inside the cartographic image, the value will be -324000.00 seconds (i.e.-90 degrees) (±SSSSSS.SS)
6	NEO	R	10 (2)	Easternmost longitude of the extent of the unpadded cartographic image. If either the north or south pole lies inside the cartographic image, the value will be +648000.00 seconds (i.e. +180 egrees) (±SSSSSS.SS)
7	NEA	R	10 (2)	Northernmost latitude of the extent of the unpadded cartographic image. If the north pole lies inside the cartographic image, the value will be +324000.00 seconds i.e.+90 degrees) (±SSSSSS.SS)
999				

Record: SECURITY AND UPDATE

001 == {RTY = LCF, RID = 1}

0	QSR	001		;& SECURITY_AND_RELEASE
1	QSS	A	1	Highest security classification of the transmittal (Top Secret, Secret, Confidential, Restricted, Unclassified) {T | S | C | R | U}
2	QOD	A	1	Originating agency's determination is required for downgrading {Y | N}

3	CDV10	A	8	Date of downgrading (If QOD is Y or QSS is U, these characters are ASCII spaces) (YYYYMMDD)
4	QLE	A		Releasability statement (free text)
999				

0	QUV	001	;& UP_TO_DATENESS	
1	SRC1	A	DIGEST Edition ID	{DIGEST 1.2}
2	CDV12	A 8	DIGEST Edition date value	{19940131}
3	SPA1	A	DIGEST Amendment number	{1 }
4	SRC2	A	ASRP specification Edition ID	{ASRP 1.2}
5	CDV22	A 8	ASRP specification Edition date value	{19950331}
6	SPA2	A	ASRP specification Amendment number	{0}
999				

A.2.2 GENERAL INFORMATION FILE

File Content by Record and Field:

```
File:   GENERAL INFORMATION
|-R  Record: GENERAL INFORMATION
||-  001     (2)      Record Id               {RTY=GIN}
||-  DSI     (2)      Data Set Id
||-  GEN     (14)     General Information
||-  SPR     (15)     Scanning Parameters
||-  BDF     (*3:O)   Band Id
||-  TIM     (*1)     Tile Index Map
|
|-Record: DATASET DESCRIPTION
 |-  001     (2)      Record Id               {RTY=DSS}
 |-  DRF     (4)      Dataset Description
```

Field Data Descriptions:

control	==	(see DDR Header in ISO 8211)
000	==	{=GENERAL_INFORMATION_FILE}

Record: GENERAL INFORMATION (Repeat for each zone of a data set)

001 == {RTY = GIN, RID = 1-...}

0	DSI	001		;& DATA_SET_ID
1	PRT	A		Product type and map series designation (ASRP,Series)
2	NAM	A	6	Data Set ID, the six alphanumeric characters which uniquely identify the dataset to which the file belongs (ZZZZZZ).
999				

0	GEN	001		;& GENERAL_INFORMATION	
1	STR	I	1	Structure of Data (Raster Colour Coding)	{4}
2	ZNA	I	3	ARC Zone number	{001-018}
3	SWO	R	10 (2)	Westernmost longitude of the extent within the zone (including overlap) of the unpadded cartographic image (±SSSSSS.SS)	
4	SWA	R	10 (2)	Southernmost latitude of the extent within the zone (including overlap) of the unpadded cartographic image (±SSSSSS.SS)	
5	NEO	R	10 (2)	Easternmost longitude of the extent within the zone (including overlap) of the unpadded cartographic image (±SSSSSS.SS)	
6	NEA	R	10 (2)	Northernmost latitude of the extent within the zone (including overlap) of the unpadded cartographic image (±SSSSSS.SS)	
7	SCA	I	9	Source graphic scale reciprocal	{000000000-999999999}
8	PSP	R	5 (1)	Sample (pixel) spacing at which the data was originally captured (in microns)	{000.0-100.0}
9	IMR	A	1	Image Rectified	{Y}
10	ARV	I	9	Number of pixels in 360^{o} arc (E-W) (Adjusted for scale and zone)	{000000001-999999999}
11	BRV	I	9	Number of pixels in 360^{o} arc (N-S) (Adjusted for scale)	{000000001-999999999}
12	LSO	R	10 (2)	Longitude of upper left pixel of the padded image within the zone, including overlap (±SSSSSS.SS)	
13	PSO	R	10 (2)	Latitude of upper left pixel of the padded image within the zone, including overlap (±SSSSSS.SS)	
14	TXT	A (L)		Text (e.g. describes digitizing system) (free text)	
999					

0	SPR	001		;& DATA_SET_PARAMETERS	
1	NUL	I	6	Row number of the upper right corner of the MBR of the ZDR Image in pixels (not to include zero value pixels)	{000000-127871}
2	NUS	I	6	Column number of the upper right corner of the MBR of the ZDR Image in pixels, including overlap (not to include zero value pixels)	{000000-127871}
3	NLL	I	6	Row number of the lower left corner of the MBR of the ZDR Image in pixels, including overlap (not to include zero value pixels)	{000000-127871}
4	NLS	I	6	Column number of the lower left corner of the MBR of the ZDR Image in pixels, including overlap (not to include zero value pixels)	{000000-127871}
5	NFL	I	3	Number of Sub Blocks North to South (M)	{001-999}
6	NFC	I	3	Number of Sub Blocks West to East (N)	{001-999}
7	PNC	I	3	Number of Pixels/Sub Block Line (Q)	{128}
8	PNL	I	3	Number of Lines/Sub Block (P)	{128}
9	COD	I	1	Column Sequence (left to right)	{0}
10	ROD	I	1	Row Sequence (top to bottom)	{1}

11	POR	I	1	Pixel order (Column in row, in band, in SubBlock) {0}
12	PCB	I	1	Size of pixel count in bits (e.g. for Run Length Encoding) {0 | 4 | 8}
13	PVB	I	1	Size of pixel value in bits (eg for Run Length Encoding) {0 | 8}
14	BAD	A	12	Image File Name (ISO Media file label name. See Section 6.3) (ZZZZZZDD.IMG)
15	TIF	A	1	Tile Index Map flag (See Section 4.2.4) "Y" indicates there is an index, "N" indicates there is none. {Y | N}
999				

0	BDF	001		;& BAND_ID
1	*BID	A	5	Band Identification (eg. RED, GREEN or BLUE)
2	WS1	I	5	ON-colour-code value (See Section 4.3.4) {00000-00255}
3	WS2	I	5	OFF-colour-code value (See Section 4.3.4) {00000-00255}
999				

0	TIM	001		;& TILE_INDEX_MAP
1	*TSI	I	11	Tile Index Map values (See Section 4.2.4) Repeat this subfield as required. {00000000000-99999999999}
999				

Record: DATASET DESCRIPTION

001 == {RTY = DSS, RID = 1}

0	DRF	001		;& DATASET_DESCRIPTION	
1	NSH	I	2	Number of horizontal accuracy sub-regions	{01-99}
2	NSV	I	2	Number of vertical accuracy sub-regions	{01-99}
3	NOZ	I	2	Number of zone image files	{01-99}
4	NOS	I	2	Number of source graphics	{01-99}
999					

A.2.3 GEO REFERENCE FILE

File Content by Record and Field:

```
File: GEO REFERENCE
|- Record: GEO REFERENCE
|     |-   001    (2)     {RTY=GEO}
|     |-   GEP    (6)     Geo Parameters
```

Field Data Descriptions:

```
Control  ==     (see DDR Header in ISO 8211)

000      ==     {=GEO_REFERENCE_FILE}
```

Record: GEO REFERENCE

```
0     001           ;& RECORD_ID
1     RTY    A 3    Record Type          {RTY=GEO}
2     RID    I      Record id number     {RID=1}
999

0     GEP    001    ;& GEO_PARAMETERS
1     TYP    A 3    Data Type            {GEO}
2     UNI    A 3    Unit of measurement for coordinates {SEC}
3     ELL    A      Ellipsoid Name       {World Geodetic System 1984}
4     ELC    A 3    Ellipsoid Code       {WGE}
5     DAG    A      Datum Geodetic Name  {World Geodetic System 1984}
6     DCD    A 4    Datum Geodetic Code  {WGE}
999
```

A.2.4 SOURCE FILE

File Content by Record and Field:

```
      File: SOURCE
      |- Record: SOURCE
      | |-  001     (2)      Record Id                        {RTY=SOU}
      | |-  SGF     (3)      Source Summary
      | |-  SOR     (28)     Source
      | |-  MAG     (*10)    Magnetic Information
      | |-R RCI     (*2)     Bounding Polygon Coordinates
      | |-  PRR     (8)      Projection
      | |-  QSR     (4)      Security and Release
      | |-  INS     (*19)    Inset
      | |-  CPY     (1)      Copyright
      |
[O]   |-R Record: LEGEND
      | |-  001     (2)      Record Id                        {RTY=LEG}
      | |-  LGI     (2)      Legend
      | |-  SPR     (15)     Scanning Parameters
      | |-  TIM     (*1)     Tile Index Map
      |
      |-Record: METRIC SUPPORT
      | |-  001     (2)      Record Id                        {RTY=MSD}
      | |-  NCD     (8)      Normalization Constants
      | |-  SDC     (14)     Source Datum Coefficients Data
      | |-  MPC     (20)     Map Projections Coefficients Data
      |
```

```
[O]    |-Record: SUPPLEMENTARY TEXT
         |-  001     (2)     Record Id                    {RTY=SPT}
         |-  SUP     (*3)    Supplementary Text
```

Field Data Descriptions:

```
control       ==    (see DDR Header in ISO 8211)
000           ==    {= SOURCE_FILE}
```

Record: SOURCE

```
001           ==  {RTY = SOU, RID  = 1 - ...}
```

0	SGF	001		;& SOURCE_SUMMARY	
1	NST	I	4	Number of supplementary text records	{0000-9999}
2	NLI	I	2	Number of legend images	{00-99}
3	NIN	I	2	Number of insets	{00-99}
999					

0	SOR	001		;& SOURCE	
1	PRT	A	10	Series Designator: Will be used in conformance with STANAG 3716	
2	URF	A	20	Unique Source ID (Item): The Item number or name when used in conjunction with the Series and Edition will identify a unique source.	
3	EDN	A	7	Source Edition Identifier: Will be used in conformance with STANAG 3671	
4	NAM	A		Full Name: The complete name of a graphic (free text)	
5	CDP	I		Type of significant date. A designated date that most accurately describes the basic date of the product for computation of the probable obsolescence date. It can be the completion date, revision date, or other date depending on the product and circumstances (Valid codes listed at Enclosure 1, CDP)	
6	CDV	A	8	Significant Date value: (YYYYMMDD)	
7	COU	A	2	Country Code: used to identify the primary geopolitical area associated with the product (See Enclosure 7)	
8	CDV27	A	8	Perishable information date (YYYYMMDD)	
9	SCA	I	9	Cartographic Scale: A designation of the product's cartographic scale reciprocal	{000000000-999999999}
10	GRD	A		Cartographic Grid : An identification of the cartographic grid(s) used on the product (Format nA2) (See Enclosure 2) (GRD1,GRD2,...,GRDn)	
11	SQU	I		Area Coverage: This component indicates the area coverage that is included in the product	
12	UNIsqu	A	3	Area Coverage Unit of Measurements the unit of	

				measure of the area coverage (See Enclosure 9)
13	PCI	I	4	Contour Interval: Value of the primary/basic interval between contour lines on the map or chart {0000-9999}
14	UNIpci	A	3	Contour Unit of Measurement: Identifies the unit of measure of the interval between consecutive contour lines on the product (See Enclosure 9)
15	WPC	I	3	Percent Water: The percentage of the source that is covered by water (999 if unknown). {000-100 **|** 999}
16	NST	I	3	Navigation System Type (See Enclosure 1,NST)
17	ELL	A		Ellipsoid Name: This component contains the name of the ellipsoid on which the product was produced. (free text)
18	ELC	A	3	Ellipsoid Code: This Component contains a code of the name of the ellipsoid on which the product was produced (See Enclosure 3)
19	DVR	A		Datum of Vertical Reference Name: Name used to describe the vertical reference system on which the product was produced. Usually the name of the port or city where the datum is located (Example: MSL at Cagliari 1955-57)
20	VDCdvr	A	4	Datum of Vertical Reference Code (See Enclosure 1,VDC)
21	SDA	A		Sounding Datum Name
22	VDCsda	A	4	Sounding Datum Code (See Enclosure 1,VDC)
23	DAG	A		Geodetic Datum Name: Represents the product's geodetic control datum (See Enclosure 8)
24	DCD	A	4	Geodetic Datum Code: Code used to represent the Geodetic Datum (See Enclosure 4)
25	HKE	I	6	Highest Known Elevation (of the source - ASCII spaces if unknown) {000000-999999}
26	UNIhke	A	3	Units of the elevation value (See Enclosure 9)
27	LON	R	10 (2)	Longitude of the Highest Known Elevation (±SSSSSS.SS)
28	LAT	R	10 (2)	Latitude of the Highest Known Elevation (±SSSSSS.SS)
999				

0	MAG	001		;& MAGNETIC_INFORMATION
1	*CDP	I		Type of magnetic date rate
2	CDV	A	8	Date of information (magnetic) (YYYYMMDD)
3	RAT	R	8	Magnetic rate of change
4	UNIrat	A	3	Units magnetic rate of change) (See Enclosure 9)
5	GMA	R	8	Grid Magnetic Angle (GMA): Grid North to Magnetic North (clockwise regarded as positive)
6	UNIgma	A	3	Units of G-M angle (See Enclosure 9)
7	LON	R	10 (2)	Longitude of the G-M angle reference point (±SSSSSS.SS)
8	LAT	R	10 (2)	Latitude of the G-M angle reference point (±SSSSSS.SS)

9	GCA	R	8	Grid Convergence Angle
10	UNIgca	A	3	Units of Grid Convergence Angle (See Enclosure 9)
999				

0	RCI	001		;& BOUNDING_POLYGON_COORDINATES
1	*LON	R	10 (2)	Longitude Coordinate (±SSSSSS.SS)
2	LAT	R	10 (2)	Latitude Coordinate (±SSSSSS.SS)
999				

0	PRR	001		;& PROJECTION
1	PRN	A		Projection Name: Name given the cartographic projection of the source graphic. (free text)
2	PCO	A	2	Projection Code: Projection may have up to 4 parameters (see Enclosure 5), as follows: (Null if Geo)
3	PAA	R	10	Projection Parameter 1 (±SSSSSS.SS if latitude or longitude)
4	PAB	R	10	Projection Parameter 2 (±SSSSSS.SS if latitude or longitude)
5	PAC	R	10	Projection Parameter 3 (±SSSSSS.SS if latitude or longitude)
6	PAE	R	10	Projection Parameter 4 (±SSSSSS.SS if latitude or longitude)
7	XOR	R	8	X false origin of the map grid (+0000000 if not applicable) (±mmmmmmm)
8	YOR	R	8	Y false origin of the map grid (+0000000 if not applicable) (±mmmmmmm)
999				

0	QSR	001		;& SECURITY_AND_RELEASE
1	QSS	A	1	Security classification of the source (Top Secret, Secret, Confidential, Restricted, Unclassified) {T | S | C | R | U}
2	QOD	A	1	Originating agency's determination is required for downgrading {Y | N}
3	CDV10	A	8	Date of downgrading (If QOD is Y or QSS is U, these characters are ASCII SPACE) (YYYYMMDD)
4	QLE	A		Releasability statement (free text)
999				

0	INS	001		;& INSET
1	*INT	A	2	Unique ID for inset {00-99}
2	SCA	I	9	Reciprocal cartographic scale of inset {000000000-999999999}
3	NAM	A		Inset Name (free text)
4	NTL	R	10 (2)	Absolute longitude of Lower Left Corner of the inset as stated in the inset's coordinates (±SSSSSS.SS)

5	TTL	R	10 (2)	Absolute latitude of Lower Left Corner of the inset as stated in the inset's coordinates (±SSSSSS.SS)
6	NVL	R	10 (2)	Absolute longitude of Upper Left Corner of the inset as stated in the inset's coordinates (±SSSSSS.SS)
7	TVL	R	10 (2)	Absolute latitude of Upper Left Corner of the inset as stated in the inset's coordinates (±SSSSSS.SS)
8	NTR	R	10 (2)	Absolute longitude of Upper Right Corner of the inset as stated in the inset's coordinates (±SSSSSS.SS)
9	TTR	R	10 (2)	Absolute latitude of Upper Right Corner of the inset as stated in the inset's coordinates (±SSSSSS.SS)
10	NVR	R	10 (2)	Absolute longitude of Lower Right Corner of the inset as stated in the inset's coordinates (±SSSSSS.SS)
11	TVR	R	10 (2)	Absolute latitude of Lower Right Corner of the inset as stated in the inset's coordinates (±SSSSSS.SS)
12	NRL	R	10 (2)	Relative longitude of Lower Left Corner of the inset as stated in the host graphic's coordinates (the value of these coordinates are stated in terms of host graphic, as if the inset did not appear on the host graphic) (±SSSSSS.SS)
13	TRL	R	10 (2)	Relative latitude of Lower Left Corner of the inset as stated in the host graphic's coordinates (the value of these coordinates are stated in terms of host graphic, as if the inset did not appear on the host graphic) (±SSSSSS.SS)
14	NSL	R	10 (2)	Relative longitude of Upper Left Corner of the inset as stated in the host graphic's coordinates (the value of these coordinates are stated in terms of host graphic, as if the inset did not appear on the host graphic) (±SSSSSS.SS)
15	TSL	R	10 (2)	Relative latitude of Upper Left Corner of the inset as stated in the host graphic's coordinates (the value of these coordinates are stated in terms of host graphic, as if the inset did not appear on the host graphic) (±SSSSSS.SS)
16	NRR	R	10 (2)	Relative longitude of Upper Right Corner of the inset as stated in the host graphic's coordinates (the value of these coordinates are stated in terms of host graphic, as if the inset did not appear on the host graphic) (±SSSSSS.SS)
17	TRR	R	10 (2)	Relative latitude of Upper Right Corner of the inset as stated in the host graphic's coordinates (the value of these coordinates are stated in terms of

				host graphic,as if the inset did not appear on the host graphic) (±SSSSSS.SS)
18	NSR	R	10 (2)	Relative longitude of Lower Right Corner of the inset as stated in the host graphic's coordinates (the value of these coordinates are stated in terms of host graphic, as if the inset did not appear on the host graphic) (±SSSSSS.SS)
19	TSR	R	10 (2)	Relative latitude of Lower Right Corner of the inset as stated in the host graphic's coordinates (the value of these coordinates are stated in terms of host graphic, as if the inset did not appear on the host graphic) (±SSSSSS.SS)
999				

0	CPY	001		;& COPYRIGHT
1	CPZ	A		Copyright statement (free text)
999				

[O] Record: LEGEND

001 == {RTY = LEG, RID = 1 - ...}

0	LGI	001		;& LEGEND	
1	NAM	A		Legend name (i.e. TYPE of legend image) (See Section 3.7) (free text)	
2	STR	I	1	Data Structure Code (Raster Colour Coding)	{4}
999					

SPR	==	(see General Information Record, although for SPR in the Legend Record, Subfield BAD has sub-structure ZZZZZZDD.Lcc)
TIM	==	(see General Information Record)

Record: METRIC SUPPORT

Refer to Annex B for the math model equations which utilize the coefficients and normalization constants given in the fields.

001 == {RTY = MSD, RID = 1}

0	NCD	001		;& NORMALIZATION_CONSTANTS
1	TSF	S	22	Latitude Scale Factor
2	GSF	S	22	Longitude Scale Factor
3	TTT	S	22	Latitude Translation Term
4	GTT	S	22	Longitude Translation Term
5	NSF	S	22	Northing Scale Factor
6	ESF	S	22	Easting Scale Factor
7	NTT	S	22	Northing Translation Term
8	ETT	S	22	Easting Translation Term
999				

0	SDC	001		;& SOURCE_DATUM_COEFFICIENTS_DATA
1	AX1	S	22	Latitude coefficient 1
2	AX2	S	22	Latitude coefficient 2
3	AX3	S	22	Latitude coefficient 3
4	AX4	S	22	Latitude coefficient 4
5	AX5	S	22	Latitude coefficient 5
6	AX6	S	22	Latitude coefficient 6
7	AX7	S	22	Latitude coefficient 7
8	BX1	S	22	Longitude coefficient 1
9	BX2	S	22	Longitude coefficient 2
10	BX3	S	22	Longitude coefficient 3
11	BX4	S	22	Longitude coefficient 4
12	BX5	S	22	Longitude coefficient 5
13	BX6	S	22	Longitude coefficient 6
14	BX7	S	22	Longitude coefficient 7
999				

0	MPC	001		;& MAP_PROJECTIONS_COEFFICIENTS_DATA
1	CX1	S	22	Northing coefficient 1
2	CX2	S	22	Northing coefficient 2
3	CX3	S	22	Northing coefficient 3
4	CX4	S	22	Northing coefficient 4
5	CX5	S	22	Northing coefficient 5
6	CX6	S	22	Northing coefficient 6
7	CX7	S	22	Northing coefficient 7
8	CX8	S	22	Northing coefficient 8
9	CX9	S	22	Northing coefficient 9
10	CXA	S	22	Northing coefficient 10
11	DX1	S	22	Easting coefficient 1
12	DX2	S	22	Easting coefficient 2
13	DX3	S	22	Easting coefficient 3
14	DX4	S	22	Easting coefficient 4
15	DX5	S	22	Easting coefficient 5
16	DX6	S	22	Easting coefficient 6
17	DX7	S	22	Easting coefficient 7
18	DX8	S	22	Easting coefficient 8
19	DX9	S	22	Easting coefficient 9
20	DXA	S	22	Easting coefficient 10
999				

[O] Record: SUPPLEMENTARY TEXT

001 == {RTY = SPT, RID = 1}

0	SUP	001		;& SUPPLEMENTARY_TEXT
1	*TRY	A	4	Supplementary text record type. This subfield will contain a code identifying the supplementary text type. The following types have been defined:

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).
2	TRI	A	4	Supplementary text field reference identifier. Used to index several entries of the same type. {0001-9999}	
3	TXT	A		This variable length subfield will contain the actual supplementary textual information as described above. (Free text)	
999					

A.2.5 QUALITY FILE

File Content by Record and Field:

```
File: QUALITY
|-Record: QUALITY
||-   001    (2)    Record Id                          {RTY=QAL}
||-   QSR    (4)    Security and Release
||-   QUV    (10)   Up_to_Dateness
||-   COL    (*9)   Colour Code Id
||-   QOI    (1)    Other Quality Information
|
|-R Record: HORIZONTAL ACCURACY
||-   001    (2)    Record Id                          {RTY=HOR}
||-   ASH    (4)    Horizontal Accuracy
||-   RCI    (*2)   Bounding Polygon Coordinates
|
|-R Record: VERTICAL ACCURACY
 |-   001    (2)    Record Id                          {RTY=VER}
 |-   ASV    (4)    Vertical Accuracy
 |-   RCI    (*2)   Bounding Polygon Coordinates
```

Field Data Descriptions:

control	==	(see DDR Header in ISO 8211)
000	==	{=QUALITY_FILE}

Record: QUALITY

001	==	{RTY = QAL, RID = 1}

0	QSR	001		;& SECURITY_AND_RELEASE
1	QSS	A	1	Highest security classification of the referenced object (Top Secret,Secret, Confidential, Restricted, Unclassified) {T | S | C | R | U}
2	QOD	A	1	Originating agency's determination is required for downgrading {Y | N}
3	CDV10	A	8	Date of downgrading (If QOD is Y or QSS is U, then these characters are ASCII SPACE) (YYYYMMDD)
4	QLE	A		Releasability statement (free text)
999				

0	QUV	001		;& UP_TO_DATENESS
1	EDN	I	3	Edition Identifier of this dataset: Will be used in conformance with STANAG 3671
2	CDV07	A	8	Date of creation of data set (YYYYMMDD)
3	CDV24	A	8	Date of revision or update (YYYYMMDD)
4	REC	I	3	Recompilation count {000-999}
5	REV	I	3	Revision count {000-999}
6	SRC	A		Specification ID for ASRP (free text)
7	CDV22	A	8	Date of specification (YYYYMMDD)
8	SPA	A		ASRP Specification amendment identifier (free text)
9	CDV20	A	8	Date of earliest source (YYYYMMDD)
10	CDV21	A	8	Date of latest source (YYYYMMDD)
999				

0	COL	001		;& COLOUR_CODE_ID
1	*CBD	A		Name and/or Description for Colour Code (graphic colour) (free text)
2	CCD	I	3	Colour Code assigned in the data set {000-255}
3	CR1	I	6	CIE x (real values scaled by 1000000)
4	CR2	I	6	CIE y (real values scaled by 1000000)
5	CR3	I	6	CIE Reflectance (Y) (real values scaled by 1000000)
6	FRM	A		Mathematical Relation to other colour-codes (See Section 3.4.2) (free text)
7	NSR	I	3	Colour Intensities (RED nominal) {000-255}
8	NSG	I	3	Colour Intensities (GREEN nominal) {000-255}
9	NSB	I	3	Colour Intensities (BLUE nominal) {000-255}
999				

0	QOI	001		;& OTHER_QUALITY_INFORMATION
1	OQI	A		Free text
999				

Record: HORIZONTAL ACCURACY

001 == {RTY = HOR,RID = 1 - ...}

0	ASH	001		;& HORIZONTAL_ACCURACY

```
1     AAH    I   5    Absolute Horizontal Accuracy          {00000-99999}
2   UNIaah   A   3    Unit of measure (see Enclosure 9)
3     APH    I   5    Relative Horizontal Accuracy          {00000-99999}
4   UNIaph   A   3    Unit of measure (see Enclosure 9)
999

RCI             ==    (see Source Record)
```

Record: VERTICAL ACCURACY

```
001             ==    {RTY = VER, RID = 1 - ...}

0     ASV    001      ;& VERTICAL_ACCURACY
1     AAV    I   5    Absolute Vertical Accuracy            {00000-99999}
2  UNIaav    A   3    Unit of measure (see Enclosure 9)
3     APV    I   5    Relative Vertical Accuracy            {00000-99999}
4  UNIapv    A   3    Unit of measure (see Enclosure 9)
999

RCI             ==    (see Source Record)
```

A.2.6 RASTER GEO DATA FILE

File Content by Record and Field:

```
|-File:          RASTER GEO DATA
 |-R Record:     IMAGE
  |- 001         (2)      Record Id                 {RTY=IMG}
  |- PAD         (1)      Padding
  |- SCN         (*1)     Pixel Field
```

Field Data Descriptions:

```
control         ==    (see DDR Header in ISO 8211)
000             ==    {=RASTER_GEO_DATA_FILE}
```

Record: IMAGE

```
001             ==    {RTY = IMG,RID = 1 - ...}

0     PAD    001      ;& PADDING
1     PAD    A        Padding characters added to pad the file so that the
                      image pixels start at the beginning of a physical block
                      on the media.
999
0     SCN    001      ;& PIXEL
1     *PIX   B   8    Pixel Values - edit to B(8)             (BBBBBBBB)
999
```

A.3 BACKWARD COMPATIBILITY

Existing Interchange files conforming with ASRP 1.0 or with ADRG may be imported as they are, or converted into conforming files using the alternate subfield definitions.

Where changes have occured, subfields are given an alternate subfield definition which describes the way the information will be transmitted in these existing DIGEST interchange files. The alternate subfield definition contains:

- an alternate name (possibly the same)
- an alternate sub-field type (possibly the same)
- the transformation to be applied to the alternate subfield value.

Notation:

	subfield label	subfield type		alternate label	alternate type	transformation

"— " = same name or type

ex:

2	RID	I	Record ID number	—	A2	A_TO_I

A.3.1 TRANSFORMATION FUNCTIONS AND THEIR C IMPLEMENTATION

There are five types of transformation required for defining the alternate sub-fields:

SAME_I may only apply when the alternate type and the subfield type is I, the length of the field is the only change, the value will be the same, right justified, padded on the left with "0"s if required.

SAME_R may only apply when the alternate type and the subfield type is R, the length of the field is the only change, the value will be the same, right justified, padded on the left with "0"s if required.

SAME_A may only apply when the alternate type and the subfield type is A, the length of the field is the only change, the value will be the same, left justified, padded on the right with blank spaces, or truncated, if required.

A_TO_I may only apply when the alternate type is A and the subfield type is I, the value, a character string representing an integer number, will be converted in an integer value.

A_TO_R may only apply when the alternate type is A and the subfield type is R, the value, a character string representing an explicit real number, will be converted in a real value.

DATE_V may only apply when the alternate type is A 12 and the subfield type is A 8, only the last 8 characters representing a date value will be kept.

DATE_P may only apply when the alternate type is A 12 and the subfield type is I 3, only the first 3 characters representing a date type code will be converted to an integer value.

UNIT may only apply when the alternate type is I 3 and the subfield type is A 3, the I 3 value taken from FACC 1.1 (or ADRG) units codification is converted to the corresponding value in DIGEST 1.2 part 3 Table 10.

D_TO_S may only apply when the alternate type is A 10 or A 11 and the subfield type is R 10, the geographic coordinate expressed in sexagesimal degrees (±(D)DDMMSS.SS) is converted to seconds (±SSSSSS.SS).

The C implementation of the functions is as follows:

```
#define  ERROR   (-1)
#define  NORMAL  0
typedef  enum    {ADRG, ASRP} Product;

int      SAME_I  (int *new, int old, int mini, int maxi)
{
         if (old < mini || old > maxi) {
            *new = 0;
            return ERROR;
         }
         *new = old;
         return NORMAL;
}

int      SAME_R  (double *new, double old, double minr, double maxr)
{
         if (old < minr || old > maxr) {
            *new = 0;
            return ERROR;
         }
         *new = old;
         return NORMAL;
}

int      A_TO_I  (int *new, char *old, int mini, int maxi)
{
         int i;
         i = atoi(old);
         if (i < mini || i > maxi) {
            *new = 0;
            return ERROR;
         }
         *new = i;
         return NORMAL;
}

int      A_TO_R  (double *new, char *old, double minr, double maxr)
{
         double r;
         r = atof(old);
         if (r < minr || r > maxr) {
            *new = 0;
            return ERROR;
         }
         *new = r;
         return NORMAL;
}
```

```
int DATE_V ( char *new, char *old)
{
      int y,m,d;
      strncpy(new,old+4,8);
      new[8] = '\0';
      if (sscanf(new, "%4d%2d%2d", &y, &m, &d) != 3) return ERROR;
      if (m < 1 || m > 12 || d < 1 || d > 31) return ERROR;
      return NORMAL;
}
int DATE_P (int *new, char *old)
{
      *new = atoi(old);
      if (*new < 0 || *new > 999) return ERROR;
      return NORMAL;
}

int SAME_A (char *new, char *old, int new_width)
/* new_width is the width of the new field, excluding NULL terminator */
{
      int i;
      for (i=0; i < new_width && *old; i++) *new++ = *old++ ;
      while (i++ < new_width) *new++ = ' ';
      *new = '\0';
      return NORMAL;
}
int UNIT ( char *new_unit, int old_unit, Product prod_id)
/* function to convert old ASRP  or ADRG unit of measure codes
   to new DIGEST 1.2 unit of measure codes   */
{
      int i;
      static struct { char  *code;     /* new code */
                      int   adrg;      /* ADRG code */
                      int   asrp;      /* ASRP code */
      }    unit[] = {"UNK",   0,    0, /* Unknown */
                    "UM",   16,   16, /* Micrometers */
                    "MM",    0,   23, /* Millimeters */
                    "CM",    0,   17, /* Centimeters */
                    "DM",    0,   18, /* Decimeters */
                    "M",     1,    1, /* Meters */
                    "KM",    0,   22, /* Kilometers */
                    "IN",    0,   21, /* Inches */
                    "FT",   14,   14, /* Feet */
                    "YD",    0,   28, /* Yards */
                    "FM",   15,   15, /* Fathoms */
                    "FF",    0,   20, /* Fathoms and Feet */
                    "MI",    0,   27, /* Statute Miles */
                    "NM",   11,   11, /* Nautical Miles */
                    "S",     3,    3, /* Seconds */
                    "N/A",  10,   10, /* +/- HH MM SS.S*/
                    "M/S",   4,    4, /* Meters per Second */
                    "KNOT", 12,   12, /* Knots */
                    "NM/D", 13,   13, /* Nautical Mile /Day*/
                    "ML",   17,   24, /* Mils */
                    "SEC",  18,   26, /* Seconds (of arc)*/
                    "MA",   19,   25, /* Minutes (of arc)*/
                    "DEG",  20,   19, /* Degrees (of arc)*/
```

```
                    "N/A", 9,    9, /* +/- DDD MM SS.S */
                    "KIP", 2,    2, /* Kips */
                    "V",   6,    6, /* Volts */
                    "W",   7,    7, /* Watts */
                    "HZ",  8,    8, /* Hertz */
                    "M3/S" 5,    5, /* Cubic Meters/ Second */
                   "OTH",999,  999 /* Other */
     };
     if (prod_id == ADRG) {
          for (i = 0; i < 30; i++) {
               if (old_unit == unit[i].adrg) {
                    strcpy(new_unit,unit[i].code);
                    return NORMAL;
               }
          }
     } else if (prod_id == ASRP) {
          for (i = 0; i < 30; i++) {
               if (old_unit == unit[i].asrp) {
                    strcpy(new_unit,unit[i].code);
                    return NORMAL;
               }
          }
     }
     return ERROR;
}

int D_TO_S (double *sec, char *dms)
/* function to convert lat or long in +/- (D)DDMMSS.SS format
   to seconds of arc */
{
     float d,m,s;
     char sign;

     if (strlen(dms) == 10) {
        if (sscanf(dms, "%c%2f%2f%5f", &sign, &d, &m, &s) != 4)
               return ERROR;
     } else if (strlen(dms) == 11){
        if (sscanf(dms, "%c%3f%2f%5f", &sign, &d, &m, &s) != 4)
               return ERROR;
     } else
          return ERROR;

     if ( d > 180.0 || m > 60.0 || s > 60.0 )  return ERROR;
     *sec = 3600.0 * d + 60.0 * m + s;
     if (sign == '-')
          *sec = -*sec;
     else if (sign != '+')
          return ERROR;

     return NORMAL;
}
```

A.3.2 TRANSFORMATIONS FROM ASRP 1.0

A.3.2.1 ASRP 1.2 FROM ASRP 1.0: TRANSMITTAL HEADER FILE

Record: TRANSMITTAL DESCRIPTION

0	001		;& RECORD_ID			
2	RID	I	Record ID number	—	A 2	A_TO_I
0	VDR	001	;& TRANSMITTAL_HEADER			
1	MSD	A 3	Media Volume and File Structure	—	A 1	SAME_A
8	CDV07	A 8	Creation date value	DAT	A12	DATE_V
0	FDR	001	& DATA_SET_DESCRIPTION			
1	NAM	**A 6**	Dataset ID	—	A 8	SAME_A

Record: SECURITY AND UPDATE

0	001		;& RECORD_ID			
2	RID	I	Record ID number	—	A 2	A_TO_I
0	QSR	001	;& SECURITY_AND_RELEASE			
3	CDV10	A 8	Date of downgrading	DAT	A12	DATE_V
0	QUV	001	;& UP_TO_DATENESS			

Best regarded as a new version of the field, with fixed contents.

A.3.2.2 ASRP 1.2 FROM ASRP 1.0: GENERAL INFORMATION FILE

Record: GENERAL INFORMATION

0	001		;& RECORD_ID			
2	RID	I	Record ID number	—	A 2	A_TO_I
0	DSI	001	;&DATA_SET_ID			
2	NAM	**A 6**	Dataset ID	—	A 8	SAME_A
10	ARV	**I 9**	Number of pixels in 360° (E-W)	—	I 8	SAME_I
11	BRV	**I 9**	Number of pixels in 360° (N-S)	—	I 8	SAME_I
0	GEN	001	;& GENERAL_INFORMATION			
2	ZNA	**I 3**	Zone number	—	I 2	SAME_I

Record: DATASET DESCRIPTION

0	001		;& RECORD_ID			
2	RID	I	Record ID number	—	A 2	A_TO_I

A.3.2.3 ASRP 1.2 FROM ASRP 1.0: GEO REFERENCE FILE

This file is new to ASRP 1.2 and its contents are fixed.

A.3.2.4 ASRP 1.2 FROM ASRP 1.0: SOURCE FILE

Record: SOURCE

0	001		;& RECORD_ID			
2	RID	I	Record ID number	—	A 2	A_TO_I
0	SOR	001	;& SOURCE			
5	CDP	I	Type of significant date	*1st* DAT	A12	DATE_P
6	CDV	A 8	Significant Date value	*1st* DAT	A12	DATE_V
8	CDV27	A 8	Perishable info date value	*2nd* DAT	A12	DATE_V
11	SQU	I	Area Coverage	—	I 6	SAME_I
12	UNIsqu	**A 3**	Unit for Area Coverage	—	I 3	UNIT
14	UNIpci	**A 3**	Unit for Contour Interval	—	I 3	UNIT
20	VDCdvr	**A 4**	Code for Datum	—	A 3	SAME_A
21	SDA	A	Sounding Datum Name	—	A 20	SAME_A
24	DCD	**A 4**	Geodetic Datum Code	—	A 3	SAME_A
26	UNIhke	**A 3**	Units of elev. value	—	I 3	UNIT
0	MAG	001	;& MAGNETIC_INFORMATION			
1	*CDP	I	Type of date	DAT	A12	DATE_P
2	CDV	A 8	Magnetic rate Date value	DAT	A12	DATE_V
4	UNIrat	A 3	Units of annual rate of change	—	I 3	UNIT
6	UNIgma	A 3	Units of grid magnetic angle	—	I 3	UNIT
10	UNIgca	A 3	Units of convergence angle	—	I 3	UNIT
0	QSR	001	;& SECURITY_AND_RELEASE			
3	CDV10	A 8	Date of downgrading	DAT	A12	DATE_V

Record: LEGEND

0	001		;& RECORD_ID			
2	RID	I	Record ID number {RID=1}	—	A 2	A_TO_I

Record: METRIC SUPPORT

0	001		;& RECORD_ID			
2	RID	I	Record ID number {RID=1}	—	A 2	A_TO_I

0 NCD 001 ;& NORMALIZATION_CONSTANTS

Subfields should already be S22, in which case no transformation is needed. (If type R22 was used, SAME_R is the appropriate transformation.)

0 SDC 001 ;& SOURCE_DATUM_COEFFICIENTS_DATA

Subfields should already be S22, in which case no transformation is needed. (If type R22 was used, SAME_R is the appropriate transformation.)

0 MPC 001 ;& MAP_PROJECTIONS_COEFFICIENTS_DATA

Subfields should already be S22, in which case no transformation is needed. (If type R22 was used, SAME_R is the appropriate transformation.)

Record: SUPPLEMENTARY TEXT

0	001		;& RECORD_ID			
2	RID	I	Record ID number {RID=1}	—	A 2	A_TO_I

A.3.2.5 ASRP 1.2 FROM ASRP 1.0: QUALITY FILE

Record: QUALITY

0	001		;& RECORD_ID				
2	RID	I	Record ID number {RID=1}		—	A 2	A_TO_I
0	QSR	001	;& SECURITY_AND_RELEASE				
3	CDV10	A 8	Date of downgrading		DAT	A12	DATE_V
0	QUV	001	;& UP_TO_DATENESS				
1	EDN	**I 3**	Edition Number of Dataset		—	A 20	A_TO_I
2	CDV07	A 8	Creation of dataset date value	*1st*	DAT	A12	DATE_V
3	CDV24	A 8	Revision or Update date value	*2nd*	DAT	A12	DATE_V
7	CDV22	A 8	Specification date value	*3rd*	DAT	A12	DATE_V
9	CDV20	A 8	Earliest source date value	*4th*	DAT	A12	DATE_V
10	CDV21	A 8	Latest source date value	*5th*	DAT	A12	DATE_V
0	COL	001	;& COLOUR_CODE_ID				
4	CR2	**I 6**	CIE y		—	I 5	See Note
5	CR3	**I 6**	CIE Reflectivity (Y)		—	I 5	See Note

To transform CR2 and CR3 from I5 to I6, multiply by 10 (or append 0 as 6th digit).

Record: HORIZONTAL ACCURACY

0	001		;& RECORD_ID			
2	RID	I	Record ID number	—	A 2	A_TO_I
0	QAP	001	;& HORIZONTAL_ACCURACY			
2	UNIaah	**A 3**	Unit of measure	—	I 3	UNIT
4	UNIaph	**A 3**	Unit of measure	—	I 3	UNIT

Record: VERTICAL ACCURACY

0	001		;& RECORD_ID			
2	RID	I	Record ID number	—	A 2	A_TO_I
0	QAP	001	;& VERTICAL_ACCURACY			
2	UNIaav	**A 3**	Unit of measure	—	I 3	UNIT
4	UNIapv	**A 3**	Unit of measure	—	I 3	UNIT

A.3.2.6 ASRP 1.2 FROM ASRP 1.0: RASTER GEO DATA FILE

(The equivalent ASRP 1.0 file is called GEO DATA FILE.)

Record: IMAGE

0	001		;& RECORD_ID			
2	RID	**I**	Record ID number	—	A 2	A_TO_I
0	SCN	001	;& PIXEL			
1	*PIX	**B 8**	Pixel Values - edit to B(8)	—	A 1	See Note

Each pixel value is unchanged, but is to be treated as bit-field data.

A.3.3 TRANSFORMATIONS FROM ADRG

A.3.3.1 ASRP 1.2 FROM ADRG: TRANSMITTAL HEADER FILE

Record: TRANSMITTAL DESCRIPTION

0	001		;& RECORD_ID				
1	RTY	A 3	Record type				See Note
2	RID	I	Record ID number		—	A 2	A_TO_I

The contents of subfield RTY are changed from VTH to THF.

0	VDR	001	;& TRANSMITTAL_HEADER				
1	MSD	A 3	Media Recording Standard		—	A 1	See Note
2	VOO	A	Originator		—	A 200	SAME_A
3	ADR	A	Addressee		—	A 1	SAME_A
8	CDV07	A 8	Creation date value		DAT	A12	DATE_V

Subfield MSD is effectively new (as it was space-filled in ADRG).

0	FDR	001	;& DATA_SET_DESCRIPTION			
1	NAM	**A 6**	Dataset ID	—	A 8	SAME_A
2	STR	**I 1**	Data structure code	—	—	See Note
3	PRT	A	Dataset type	—	A 4	SAME_A
4	SWO	**R 10 (2)**	Westernmost long.	—	A 11	D_TO_S
5	SWA	**R 10 (2)**	Southernmost lat.	—	A 10	D_TO_S
6	NEO	**R 10 (2)**	Easternmost long.	—	A 11	D_TO_S
7	NEA	**R 10 (2)**	Northernmost lat.	—	A 10	D_TO_S

For subfield STR the value 3 is replaced by 4 to reflect the change to colour-coded data.

Record: SECURITY AND UPDATE

0	001		;& RECORD_ID			
2	RID	I	Record ID number	—	A 2	A_TO_I
0	QSR	001	;& SECURITY_AND_RELEASE			
3	CDV10	A 8	Date of downgrading	DAT	A12	DATE_V
4	QLE	A	Releasability	—	A 200	SAME_A
0	QUV	001	;& UP_TO_DATENESS			

Best regarded as a new version of the field, with fixed contents.

A.3.3.2 ASRP 1.2 FROM ADRG: GENERAL INFORMATION FILE

Record: GENERAL INFORMATION

0	001		;& RECORD_ID			
2	RID	I	Record ID number	—	A 2	A_TO_I
0	DSI	001	;& DATA_SET_ID			
1	PRT	A	Dataset type	—	A 4	SAME_A
2	NAM	**A 6**	Dataset ID	—	A 8	SAME_A
0	GEN	001	;& GENERAL_INFORMATION			
2	ZNA	**I 3**	Zone number	—	I 2	SAME_I
3	SWO	**R 10 (2)**	Westernmost longitude	—	A 11	D_TO_S
4	SWA	**R 10 (2)**	Southernmost latitude	—	A 10	D_TO_S

5	NEO	**R 10 (2)**	Easternmost longitude	—	A 11	D_TO_S
6	NEA	**R 10 (2)**	Northernmost latitude	—	A 10	D_TO_S
10	ARV	**I 9**	Number of pixels in 360° (E-W)	—	I 8	SAME_I
11	BRV	**I 9**	Number of pixels in 360° (N-S)	—	I 8	SAME_I
12	LSO	**R 10**	Longitude/Easting. of origin	—	A 11	D_TO_S
13	PSO	**R 10**	Latitude/Northing of origin	—	A 10	D_TO_S
14	TXT	**A (L)**	Free Text	—	A 64	SAME_A
0	SPR	001	;& DATA_SET_PARAMETERS			
7	PNC	**I 3**	Pixels/Subblock Line	—	I 6	SAME_I
8	PNL	**I 3**	Scan Lines/Subblock	—	I 6	SAME_I
0	TIM	001	;& TILE_INDEX_MAP			
1	*TSI	**I 11**	Tile index map	—	I 5	SAME_I

Record: DATASET DESCRIPTION

0	001		;& RECORD_ID			
2	RID	I	Record ID number	—	A 2	A_TO_I

A.3.3.3 ASRP 1.2 FROM ADRG: GEO REFERENCE FILE

This file is new to ASRP 1.2 and its contents are fixed.

A.3.3.4 ASRP 1.2 FROM ADRG: SOURCE FILE

Record: SOURCE

0	001		;& RECORD_ID			
2	RID	I	Record ID number	—	A 2	A_TO_I
0	SOR	001	;& SOURCE			
4	NAM	A	Full Name of Source	—	A 100	SAME_A
5	CDP	I	Type of significant date	*1st* DAT	A12	DATE_P
6	CDV	A 8	Significant Date value	*1st* DAT	A12	DATE_V
8	CDV27	A 8	Perishable info date value	*2nd* DAT	A12	DATE_V
10	GRD	A	Cartographic Grid Code	—	A 4	SAME_A
11	SQU	I	Area Coverage	—	I 6	SAME_I
12	UNIsqu	**A 3**	Unit for Area Coverage	—	I 3	UNIT
14	UNIpci	**A 3**	Unit for Contour Interval	—	I 3	UNIT
17	ELL	A	Ellipsoid Name	—	A 15	SAME_A
19	DVR	A	Datum Vertical Reference	—	A 20	SAME_A
21	SDA	A	Sounding Datum Name	—	A 20	SAME_A
23	DAG	A	Geodetic Datum Name	—	A 21	SAME_A
24	DCD	**A 4**	Geodetic Datum Code	—	A 3	SAME_A
26	UNIhke	**A 3**	Units of elev. value	—	I 3	UNIT
27	LON	**R 10**	Longitude/Easting of HKE	—	A 11	D_TO_S
28	LAT	**R 10**	Latitude/Northing of HKE	—	A 10	D_TO_S
0	MAG	001	;& MAGNETIC_INFORMATION			
1	*CDP	I	Type of date	*3rd DAT*	A12	DATE_P
2	CDV	A 8	Magnetic rate Date value	*3rd DAT*	A12	DATE_V
3	RAT	R 3	Magnetic rate of change	RAT or RTW	—	—
4	UNIrat	A 3	Units of annual rate of change	UNIrat or UNIrtw	I 3	UNIT
6	UNIgma	A 3	Units of grid magnetic angle	—	I 3	UNIT
7	LON	R 10	Longitude/Easting ref. point			See Note
8	LAT	R 10	Latitude/Northing ref. point			See Note
10	UNIgca	A 3	Units of convergence angle	—	I 3	UNIT

ASRP has separate fields for SOR and MAG, whereas ADRG has all the subfields in SOR.

LON and LAT must be derived from geographic extents defined in the General Information File. The presence of 2 reference points in the ADRG Source Field would lead to the full set of subfields occurring twice.

0	RCI	001		;& BOUNDING_POLYGON_COORDINATES			
1	*LON	**R 10**		Longitude/Easting coordinate	—	A 11	D_TO_S
2	LAT	**R 10**		Latitude/Northing coordinate	—	A 10	D_TO_S
0	PRR	001	;	& PROJECTION			
1	PRN	A		Projection Name	—	A 100	SAME_A
3	PAA	**R 10**		Projection Parameter 1	—	A 11	D_TO_S or A_TO_R
4	PAB	**R 10**		Projection Parameter 2	—	A 11	D_TO_S or A_TO_R
5	PAC	**R 10**		Projection Parameter 3	—	A 11	D_TO_S or A_TO_R
6	PAE	**R 10**		Projection Parameter 4	—	A 11	D_TO_S or A_TO_R
7	XOR	**R 8**		Easting false Origin	XOO	A 11	A_TO_R
8	YOR	**R 8**		Northing false Origin	YOO	A 10	A_TO_R
0	QSR	001		;& SECURITY_AND_RELEASE			
3	CDV10	A 8		Date of downgrading	DAT	A12	DATE_V
4	QLE	A		Releasability	—	A 200	SAME_A
0	INS	001		;& INSET			
3	NAM	A		Name of Inset	—	A 100	SAME_A
4	NTL	**R 10**		Abs. lon. lower left corner	—	A 11	D_TO_S
5	TTL	**R 10**		Abs. lat. lower left corner	—	A 10	D_TO_S
6	NVL	**R 10**		Abs. lon. upper left corner	—	A 11	D_TO_S
7	TVL	**R 10**		Abs. lat. upper left corner	—	A 10	D_TO_S
8	NTR	**R 10**		Abs. lon. upper right corner	—	A 11	D_TO_S
9	TTR	**R 10**		Abs. lat. upper right corner	—	A 10	D_TO_S
10	NVR	**R 10**		Abs. lon. lower right corner	—	A 11	D_TO_S
11	TVR	**R 10**		Abs. lat. lower right corner	—	A 10	D_TO_S
12	NRL	**R 10**		Rel. lon. lower left corner	—	A 11	D_TO_S
13	TRL	**R 10**		Rel. lat. lower left corner	—	A 10	D_TO_S
14	NSL	**R 10**		Rel. lon. upper left corner	—	A 11	D_TO_S
15	TSL	**R 10**		Rel. lat. upper left corner	—	A 10	D_TO_S
16	NRR	**R 10**		Rel. lon. upper right corner	—	A 11	D_TO_S
17	TRR	**R 10**		Rel. lat. upper right corner	—	A 10	D_TO_S
18	NSR	**R 10**		Rel. lon. lower right corner	—	A 11	D_TO_S
19	TSR	**R 10**		Rel. lat. lower right corner`	—	A 10	D_TO_S
0	CPY	001		;& COPYRIGHT			
1	CPZ	**A**	**(L)**	Copyright statement	—	A 200	SAME_A

Record: LEGEND

0	001		;& RECORD_ID			
2	RID	I	Record ID number {RID=1}	—	A 2	A_TO_I
0	LGI	001	;& LEGEND			
1	NAM	A	Legend Name	—	A 8	SAME_A
2	STR	I 1	Data structure code	—	—	See Note

For subfield STR the value 3 is replaced by 4 to reflect the change to colour-coded data.

0	SPR	001	;& DATA_SET_PARAMETERS			
7	PNC	**I 3**	Pixels/Subblock Line	—	I 6	SAME_I
8	PNL	**I 3**	Scan Lines/Subblock	—	I 6	SAME_I

0	TIM	001	;& TILE_INDEX_MAP			
1	*TSI	**I 11**	Tile index map	—	I 5	SAME_I

Record: METRIC SUPPORT

0	001		;& RECORD_ID			
2	RID	I	Record ID number {RID=1}	—	A 2	A_TO_I

Record: SUPPLEMENTARY TEXT

0	001		;& RECORD_ID			
2	RID	I	Record ID number {RID=1}	—	A 2	A_TO_I

A.3.3.5 ASRP 1.2 FROM ADRG: QUALITY FILE.

Record: QUALITY

0	001		;& RECORD_ID			
2	RID	I	Record ID number {RID=1}	—	A 2	A_TO_I
0	QSR	001	;& SECURITY_AND_RELEASE			
3	CDV10	A 8	Date of downgrading	DAT	A12	DATE_V
4	QLE	A	Releasability	—	A 200	SAME_A
0	QUV	001	;& UP_TO_DATENESS			
1	EDN	**I 3**	Edition Number of Dataset	—	A 20	A_TO_I
2	CDV07	A 8	Creation of dataset date value	*1st* DAT	A12	DATE_V
3	CDV24	A 8	Revision or Update date value	*2nd* DAT	A12	DATE_V
6	SRC	A	Specification ID	—	A 100	SAME_A
7	CDV22	A 8	Specification date value	*3rd* DAT	A12	DATE_V
8	SPA	A	Specification amendment	—	A 20	SAME_A
9	CDV20	A 8	Earliest source date value	*4th* DAT	A12	DATE_V
10	CDV21	A 8	Latest source date value	*5th* DAT	A12	DATE_V

Record: HORIZONTAL ACCURACY

0	001		;& RECORD_ID			
2	RID	I	Record ID number	—	A 2	A_TO_I
0	QAP	001	;& HORIZONTAL_ACCURACY			
2	UNIaah	**A 3**	Unit of measure	—	I 3	UNIT
4	UNIaph	**A 3**	Unit of measure	—	I 3	UNIT
0	RCI	001	;& BOUNDING_POLYGON_COORDINATES			
1	*LON	**R 10**	Longitude/Easting coordinate	—	A 11	D_TO_S
2	LAT	**R 10**	Latitude/Northing coordinate	—	A 10	D_TO_S

Record: VERTICAL ACCURACY

0	001		;& RECORD_ID			
2	RID	I	Record ID number	—	A 2	A_TO_I
0	QAP	001	;& VERTICAL_ACCURACY			
2	UNIaav	**A 3**	Unit of measure	—	I 3	UNIT
4	UNIapv	**A 3**	Unit of measure	—	I 3	UNIT
0	RCI	001	;& BOUNDING_POLYGON_COORDINATES			

1	*LON	**R 10**	Longitude/Easting coordinate	—	A 11	D_TO_S
2	LAT	**R 10**	Latitude/Northing coordinate	—	A 10	D_TO_S

A.3.3.6 ASRP 1.2 FROM ADRG: RASTER GEO DATA FILE

(The equivalent ADRG file is called GEO DATA FILE.)

Record: IMAGE

0	001		;& RECORD_ID			
2	RID	**I**	Record ID number	—	A 2	A_TO_I
0	SCN	001	;& PIXEL			
1	*PIX	**B 8**	Pixel Values - edit to B(8)	—	A 1	See Note

Each pixel value is unchanged, but is to be treated as bit-field data.

A.4 EXAMPLES OF ISO 8211 STRUCTURES

Where the contents of a field has been truncated, this is shown by "..." before the semi-colon.

A.4.1 EXAMPLE OF TRANSMITTAL HEADER FILE

DATA_DESCRIPTIVE_RECORD

```
Tag  Descriptive Data

000  0000;&TRANSMITTAL_HEADER_FILE;
001  1600;&RECORD_ID&RTY!RID&(A(3),I);
VDR  1600;&TRANSMITTAL_HEADER&MSD!VOO!ADR!NOV!NOF!URF!EDN!CDV07&
           (A(3),2A,I(1),I(3),A,I(3),A(8));
FDR  1600;&DATA_SET_DESCRIPTION&
     NAM!STR!PRT!SWO!SWA!NEO!NEA&(A(6),I(1),A,4R(10));
QSR  1000;&SECURITY_AND_RELEASE&
     QSS!QOD!CDV10!QLE&(2A(1),A(8),A);
QUV  1000;&UP_TO_DATENESS&
     SRC1!CDV12!SPA1!SRC2!CDV22!SPA2&(A,A(8),2A,A(8),A);
```

TRANSMITTAL_DESCRIPTION_RECORD

```
Tag  User Data

001  THF1;
VDR  003MILITARY SURVEY\ELMWOOD AVENUE\FELTHAM\MIDDLESEX\TW13
     7AH\ENGLAND&CGI\14 RUE SAINT DOMINIQUE\75997 PARIS ARMEES
     FRANCE&1003ASRP_TEST_DATA&00119940830;
FDR  FA29144ASRP,IGN50K&+015539.77+175607.73+016835.71+176255.76;
FDR  FB29144ASRP,IGN50K&+015539.77+175607.73+016835.71+176255.76;
FDR  TPUK014ASRP,TPC&-019801.75+187199.20+007200.87+207000.89;
```

SECURITY_AND_UPDATE_RECORD

Tag User Data

```
001  LCF1;
QSR  UN        ;
QUV  DIGEST 1.2&199401310&ASRP 1.2&199408010;
QUV  DIGEST 1.2&199401310&ASRP 1.2&199408010;
QUV  DIGEST 1.2&199401310&ASRP 1.2&199408010;
```

A.4.2 EXAMPLE OF GENERAL INFORMATION FILE

DATA_DESCRIPTIVE_RECORD

Tag   Descriptive Data

```
000  0000;&GENERAL_INFORMATION_FILE;
001  1600;&RECORD_ID&RTY!RID&(A(3),I);
DSI  1000;&DATA_SET_ID&PRT!NAM&(A,A(6));
GEN  1600;&GENERAL_INFORMATION&
     STR!ZNA!SWO!SWA!NEO!NEA!SCA!PSP!IMR!ARV!BRV!LSO!PSO!TXT&
     (I(1),I(3),4R(10),I(9),R(5),A(1),2I(9),2R(10),A);
SPR  1600;&DATA_SET_PARAMETERS&
     NUL!NUS!NLL!NLS!NFL!NFC!PNC!PNL!COD!ROD!POR!PCB!PVB!BAD!TIF&
     (4I(6),4I(3),5I(1),A(12),A(1));
BDF  2600;&BAND_ID&*BID!WS1!WS2&(A(5),2I(5));
TIM  2100;&TILE_INDEX_MAP&*TSI&(I(11));
DRF  1100;&DATASET_DESCRIPTION&NSH!NSV!NOZ!NOS&(4I(2));
```

GENERAL_INFORMATION_RECORD

Tag   User Data

```
001  GIN1;
DSI  ASRP,TPC&TPUK01;
GEN  4003-019801.75+187199.20+007200.87+203257.43000500000100.
     0N000491520000800768-019912.50+203432.22;
SPR  0001080102830100300000420790811281280108 8TPUK0101.IMGY;
BDF  Color          ;
TIM  000000000100000000257000000000513000000000769000000001025000000012810
     000000153700000001793000000002049000000002305000000002561000000028170
     000000307300000003329000000003585000000003841000000004097000000043530
     000000460900000004865000000005121000000005377000000005633000000058890
     000000614500000006401000000006657000000006913000000007169000000074250
     000000768100000007937000000008193000000008449000000008705000000089610
     000000921700000009473000000009729000000009985000000010241000000104970
     000001075300000011009000000011265000000011521000000011777000000120330
     000001228900000012545000000012801000000013057000000013313000000135690
     000001382500000014081000000014337000000014593000000014849000000151050
     000001791500000020895000000023849000000026771000000029795000000327190
     000003569900000038511000000041441000000044443000000047435000000504090
     000005344500000056459000000059507000000062439000000065407000000682910
     000007123100000074183000000076919000000077853000000078109000000783650
     000007862100000078877000000079133000000079389000000079645000000799010
     000008015700000080413000000080669000000080925000000081181000000814370
     000008169300000081949000000082205000000082461000000082717000000829730
     000008322900000083485000000083741000000083997000000084253000000845090
     000008476500000085021000000085277000000085533000000085789000000860450
     000008630100000086557000000086813000000087069000000087325000000875810
     000008783700000088093000000088349000000088605000000088861000000891170
     000008937300000089629 ...;
```

GENERAL_INFORMATION_RECORD

```
Tag  User Data

001  GIN2;
DSI  ASRP,TPC&TPUK01;
GEN  4004-019801.01+201598.52+007200.00+207000.89000500000100.0N00039833
     6000800768-019989.71+207161.12;
SPR  0000990083570034370000580270661281280108 8TPUK0102.IMGY;
BDF  Color           ;
TIM  0000000000100000000257000000000513000000000769000000001025000000001281
     0000000153700000000179300000000204900000000230500000000256100000002817
     0000000307300000000332900000000358500000000384100000000409700000004353
     0000000460900000000486500000000512100000000537700000000563300000005889
     0000000614500000000640100000000665700000000691300000000716900000007425
     0000000768100000000793700000000819300000000844900000000870500000008961
     0000000921700000000947300000000972900000000998500000001024100000010497
     0000001075300000001100900000001126500000001152100000001177700000012033
     0000001231700000001576500000001977700000002335700000002688500000030431
     0000003441100000003794300000004172700000004585500000004980700000053847
     0000005778500000006182300000006581300000006992700000007389900000077833
     0000007923900000007949500000007975100000008000700000008026300000080519
     0000008077500000008103100000008128700000008154300000008179900000082055
     0000008231100000008256700000008282300000008307900000008333500000083591
     0000008384700000008410300000008435900000008461500000008487100000085127
     0000008538300000008563900000008589500000008615100000008640700000086663
     0000008691900000008717500000008743100000008768700000008794300000088199
     0000008845500000008871100000008896700000008922300000008947900000089735
     0000008999100000009024700000009050300000009075900000009101500000091271
     0000009152700000010723900000012319700000013914100000015438500000169935
     0000018476300000020079100000021590300000023191900000024783100000262883
     0000027919100000296269 ...;
```

DATASET_DESCRIPTION_RECORD

```
Tag  User Data

001  DSS1;
DRF  01010201;
```

A.4.3 EXAMPLE OF GEO REFERENCE FILE

This example is the actual Geo Reference File which is always used in ASRP 1.2.

DATA_DESCRIPTIVE_RECORD

```
Tag  Descriptive Data

000  0000;&GEO_REFERENCE_FILE;
001  1600;&RECORD_ID&RTY!RID&(A(3),I);
GEP  1000;&GEO_PARAMETERS&
     TYP!UNI!ELL!ELC!DAG!DCD&(2A(3),A,A(3),A,A(4));
```

GEO_REFERENCE_RECORD

Tag User Data

```
001 GEO1;
GEP GEOSECWorld Geodetic System 1984&WGEWorld Geodetic System 1984&WGE
    ;
```

There is a space after "WGE".

A.4.4 EXAMPLE OF SOURCE FILE

DATA_DESCRIPTIVE_RECORD

Tag Descriptive Data

```
000  0000;&SOURCE_FILE;
001  1600;&RECORD_ID&RTY!RID&(A(3),I);
SGF  1100;&SOURCE_SUMMARY&NST!NLI!NIN&(I(4),2I(2));
SOR  1600;&SOURCE&
     PRT!URF!EDN!NAM!CDP!CDV!COU!CDV27!SCA!GRD!SQU!UNIsqu!PCI!UNIpci
     !WPC!NST!ELL!ELC!DVR!VDCdvr!SDA!VDCsda!DAG!DCD!HKE!UNIhke
     !LON!LAT&(A(10),A(20),A(7),A,I,A(8),A(2),A(8),I(9),A,I,A(3),
     I(4),A(3),2I(3),A,A(3),A,A(4),A,A(4),A,A(4),I(6),A(3),2R(10));
MAG  2600;&MAGNETIC_INFORMATION&
     *CDP!CDV!RAT!UNIrat!GMA!UNIgma!LON!LAT!GCA!UNIgca&
     (I,A(8),R(8),A(3),R(8),A(3),2R(10),R(8),A(3));
RCI  2200;&BOUNDING_POLYGON_COORDINATES&*LON!LAT&(2R(10));
PRR  1600;&PROJECTION&
     PRN!PCO!PAA!PAB!PAC!PAE!XOR!YOR&(A,A(2),4R(10),2R(8));
QSR  1000;&SECURITY_AND_RELEASE&
     QSS!QOD!CDV10!QLE&(2A(1),A(8),A);
INS  2600;&INSET&
     *INT!SCA!NAM!NTL!TTL!NVL!TVL!NTR!TTR!NVR!TVR!NRL!TRL!NSL!TSL!NRR
     !TRR!NSR!TSR&(A(2),I(9),A,16R(10));
CPY  1000;&COPYRIGHT&CPZ&(A);
LGI  1600;&LEGEND&NAM!STR&(A,I(1));
SPR  1600;&DATA_SET_PARAMETERS&
     NUL!NUS!NLL!NLS!NFL!NFC!PNC!PNL!COD!ROD!POR!PCB!PVB!BAD!TIF&
     (4I(6),4I(3),5I(1),A(12),A(1));
TIM  2100;&TILE_INDEX_MAP&*TSI&(I(11));
NCD  1300;&NORMALIZATION_CONSTANTS&
     TSF!GSF!TTT!GTT!NSF!ESF!NTT!ETT&(8S(22));
SDC  1300;&SOURCE_DATUM_COEFFICIENTS_DATA&
     AX1!AX2!AX3!AX4!AX5!AX6!AX7!BX1!BX2!BX3!BX4!BX5!BX6!BX7&
     (14S(22));
MPC  1300;&MAP_PROJECTIONS_COEFFICIENTS_DATA&
     CX1!CX2!CX3!CX4!CX5!CX6!CX7!CX8!CX9!CXA!DX1!DX2!DX3!DX4!DX5!DX6
     !DX7!DX8!DX9!DXA&(20S(22));
SUP  2000;&SUPPLEMENTARY_TEXT&
     *TRY!TRI!TXT&(2A(4),A);
```

SOURCE_RECORD

Tag User Data

```
001  SOU1;
```

```
SGF   00000100;
SOR   TPC        E01B                7-GSGS &
      24&19871111UK19890501000500000ND&0&KM20500FT 050   International&I
      NTMean Sea Level&MSL &    &    000000M                            ;
MAG   026&19880101-0000010MA +0000000SEC-019800.00+194400.00+0000000SEC;
RCI   -019800.00+201600.00+000000.00+201600.00+000000.00+207000.00+007200
      .00+207000.00+007200.00+187200.00-019800.00+187200.00-019800.00+201
      600.00;
PRR   Lambert Conformal Conic&LE-
      006300.00+177600.00+196800.00+194400.00+0000000+0000000;
QSR   UN       ;
CPY   United Kingdom copyright applies. 1987. (c) Crown Copyright, 1987.;
```

LEGEND_RECORD

Tag User Data

```
001   LEG1;
LGI   TPUK01IN&4;
SPR   0000000008360008340000000007007128128010888TPUK01IN.L01Y;
TIM   000000000010000001194100000026969000000417070000005674900000067589
      000000723830000007371500000093389000001148870000013617700000157441
      000001675190000017745900000179893000001993050000022116900000236883
      000002585810000027872300000292137000002945670000031393900000333045
      000003475010000036465900000383307000003964010000040031500000419591
      000004403190000045887100000471621000004837990000049666500000500345
      000005188270000053931300000557997000005633730000057312500000586431
      000005900370000059197700000594215000005964010000059766700000599445
      00000603673;
```

METRIC_SUPPORT_RECORD

Tag User Data

```
001   MSD1;
NCD   +0.330000023357570E+00+0.250000017695129E+00+0.550000000000000E+02
      -0.200000000000000E+01+0.320000003739551E-05+0.399999998990097E-05
      +0.900000000000000E+05+0.500000000000000E+03;
SDC   +0.000000000000000E+00+0.100000000000000E+01+0.000000000000000E+00
      +0.000000000000000E+00+0.000000000000000E+00+0.000000000000000E+00
      +0.000000000000000E+00+0.000000000000000E+00+0.000000000000000E+00
      +0.100000000000000E+01+0.000000000000000E+00+0.000000000000000E+00
      +0.000000000000000E+00+0.000000000000000E+00;
MPC   +0.682509516243106E-01+0.107981355210845E+01-0.281750474661202E-02
      +0.181259916215958E-02+0.204368208685661E-03+0.225400363774999E-01
      +0.536234894115758E-03+0.106186153791464E-15-0.163494555376292E-02
      +0.995135776849017E-16-0.660128391915662E-01+0.464251627182605E-02
      +0.102420129252747E+01+0.722443439259734E-05-0.742802550940754E-01
      +0.974917924014257E-04-0.591196607160828E-16-0.115590942101383E-03
      +0.223050395305016E-12-0.519956205740372E-03;
```

A.4.5 EXAMPLE OF QUALITY FILE

DATA_DESCRIPTIVE_RECORD

Tag Descriptive Data

```
000  0000;&QUALITY_FILE;
001  1600;&RECORD_ID&RTY!RID&(A(3),I);
QSR  1000;&SECURITY_AND_RELEASE&
     QSS!QOD!CDV10!QLE&(2A(1),A(8),A);
QUV  1600;&UP_TO_DATENESS&
     EDN!CDV07!CDV24!REC!REV!SRC!CDV22!SPA!CDV20!CDV21&(I(3),2A(8),
     2I(3),A,A(8),A,2A(8));
COL  2600;&COLOUR_CODE_ID&
     *CBD!CCD!CR1!CR2!CR3!FRM!NSR!NSG!NSB&(A,I(3),3I(6),A,3I(3));
QOI  1000;&OTHER_QUALITY_INFORMATION&
     OQI&(A);
ASH  1600;&HORIZONTAL_ACCURACY&
     AAH!UNIaah!APH!UNIaph&(I(5),A(3),I(5),A(3));
ASV  1600;&VERTICAL_ACCURACY&
     AAV!UNIaav!APV!UNIapv&(I(5),A(3),I(5),A(3));
RCI  2200;&BOUNDING_POLYGON_COORDINATES&
     *LON!LAT&(2R(10));
```

QUALITY_RECORD

Tag User Data

```
001  QAL1;
QSR  UN        ;
QUV  00019940830        000000ASRP 1.2&199408010&                ;
COL  &000                  &001001001
     &001                  &249244230
     &002                  &045031033
     &003                  &050069183
     &004                  &116058046
     &005                  &108092089
     &006                  &151162047
     &007                  &083044107
     &008                  &146103150
     &009                  &177184217
     &010                  &111130204
     &011                  &250235170
     &012                  &254243132
     &013                  &254231087
     &014 ... ;
```

HORIZONTAL_ACCURACY_RECORD

Tag User Data

```
001   HOR1;
ASH   00850FT 00850FT ;
RCI   -019800.00+201600.00+000000.00+201600.00+000000.00+207000.00+00720
      0.00+207000.00+007200.00+187200.00-019800.00+187200.00-019800.00+2
      01600.00;
```

VERTICAL_ACCURACY_RECORD

```
  Tag   User Data

001   VER1;
ASV   00250FT 00250FT ;
RCI   -019800.00+201600.00+000000.00+201600.00+000000.00+207000.00+00720
      0.00+207000.00+007200.00+187200.00-019800.00+187200.00-019800.00+2
      01600.00;
```

A.4.6 EXAMPLE OF RASTER GEO DATA FILE

DATA_DESCRIPTIVE_RECORD

```
  Tag   Descriptive Data

000   0000;&RASTER_GEO_DATA_FILE;
001   1600;&RECORD_ID&RTY!RID&(A(3),I);
PAD   1000;&PADDING&PAD&(A);
SCN   2500;&PIXEL&*PIX&(B(8));
```

IMAGE_RECORD

```
  Tag   User Data

001   IMG1;
PAD   ^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
      ^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
      ^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
      ^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
      ^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
      ^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
      ^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
      ^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^ ... ;
SCN   80 00 80 00 80 00 80 00 80 00 80 00 80 00 80 00 80 00 80 00 80 00
      80 00 80 00 80 00 80 00 80 00 80 00 80 00 80 00 80 00 80 00 80 00
      80 00 80 00 80 00 80 00 80 00 80 00 80 00 80 00 80 00 80 00 80 00
      80 00 80 00 80 00 80 00 80 00 80 00 80 00 80 00 80 00 80 00 80 00
      80 00 80 00 80 00 80 00 80 00 80 00 80 00 80 00 80 00 80 00 80 00
      80 00 80 00 80 00 80 00 80 00 80 00 80 00 80 00 80 00  ... ;
```

The contents of the SCN field are shown above in their hexidecimal form.

ANNEX B -- ARC COORDINATE TRANSFORMATIONS

SECTION Page

==

B.1 ARC System Parameters Provided in ASRP Support Fields

Parameter	Description	Subfield
(ϕ_0 , λ_0)	WGS 84 coordinates of the Zone Distribution Rectangle (ZDR) (0 , 0) pixel	PSO,LSO
(ϕ_{84} , λ_{84})	WGS 84 coordinates of the geographic point	--
(ϕ_{src} , λ_{src})	Source datum coordinates of the geographic point	--
$\mathbf{A}_{sz}$	East-West pixel spacing at scale 1:S in zone Z	ARV
$\mathbf{B}_s$	North-South pixel spacing at scale 1:S	BRV
a_i	Coefficients of the polynomial for latitude ϕ, i = 1…7	AX1..AX7
b_i	Coefficients of the polynomial for longitude λ, i = 1…7	BX1..BX7
S_ϕ	Latitude normalizing scale factor	TSF
S_λ	Longitude normalizing scale factor	GSF
ϕ_{off}	Latitude normalizing offset	TTT
λ_{off}	Longitude normalizing offset	GTT
c_i	Coefficients of the polynomial for Northing, i = 1…10	CX1..CXA
d_i	Coefficients of the polynomial for Easting, i = 1…10	DX1..DXA
S_N	Northing normalizing scale factor	NSF
S_E	Easting normalizing scale factor	ESF
N_{off}	Northing normalizing offset	NTT
E_{off}	Easting normalizing offset	ETT

where units for latitude and longitude are decimal degrees.

In this annex, *round* () denotes "nearest integer to".

B.2 Latitude and Longitude (ϕ_{84} , λ_{84}) of a Pixel at (r , c)

Parameters Used:

Parameter	Description	Subfield
(ϕ_0 , λ_0)	WGS 84 coordinates of the (0, 0) ZDR pixel	PSO,LSO
$\mathbf{A}_{sz}$	East-West pixel spacing at scale 1:S in zone Z	ARV
$\mathbf{B}_s$	North-South pixel spacing at scale 1:S	BRV

B.2.1 Non-Polar Case

$$\phi_{84} = \phi_0 - (360° r / \mathbf{B}_s)$$
$$\lambda_{84} = \lambda_0 + (360° c / \mathbf{A}_{sz})$$

B.2.2 North Polar Case

(1) ARC System Coordinates (x_0 , y_0) at (ϕ_0 , λ_0)

$$x_0 = (\mathbf{B}_s / 360°) (90° - \phi_0) \sin (\lambda_0)$$
$$y_0 = - (\mathbf{B}_s / 360°) (90° - \phi_0) \cos (\lambda_0)$$

(2) ARC System Coordinates (x , y) at (r , c)

$$x = x_0 + c$$
$$y = y_0 - r$$

(3) WGS 84 Coordinates (ϕ_{84} , λ_{84}) at (x , y)

$$\phi_{84} = 90° - [(x^2 + y^2)^{1/2} / (\mathbf{B}_s / 360°)]$$
$$\lambda_{84} = \arccos [- y / (x^2 + y^2)^{1/2}] \quad \text{if } x > 0 \text{ or } x = 0, y \neq 0$$
$$\lambda_{84} = - \arccos [- y / (x^2 + y^2)^{1/2}] \quad \text{if } x < 0$$
$$\lambda_{84} = 0° \text{ (i.e., undefined)} \quad \text{if } x = y = 0$$

where $0° \leq \arccos [- y / (x^2 + y^2)^{1/2}] \leq 180°$

B.2.3 South Polar Case

(1) ARC System Coordinates (x_0 , y_0) at (ϕ_0 , λ_0)

$$x_0 = (\mathbf{B}_s / 360°) (90° + \phi_0) \sin (\lambda_0)$$
$$y_0 = (\mathbf{B}_s / 360°) (90° + \phi_0) \cos (\lambda_0)$$

(2) ARC System Coordinates (x , y) at (r , c)

$x = x_0 + c$
$y = y_0 - r$

(3) WGS 84 Coordinates $(\phi_{84}, \lambda_{84})$ at (x, y)

$\phi_{84} = -90° + [(x^2 + y^2)^{1/2} / (\mathbf{B}_s / 360°)]$
$\lambda_{84} = \arccos[y / (x^2 + y^2)^{1/2}]$ if $x > 0$ or $x = 0, y \neq 0$
$\lambda_{84} = -\arccos[y / (x^2 + y^2)^{1/2}]$ if $x < 0$
$\lambda_{84} = 0°$ (i.e., undefined) if $x = y = 0$

where $0° \leq \arccos[y / (x^2 + y^2)^{1/2}] \leq 180°$

B.3 ZDR Pixel Coordinates (r , c) of a Geographic Point $(\phi_{84}, \lambda_{84})$

Parameters Used:

Parameter	Description	Subfield
(ϕ_0, λ_0)	WGS 84 coordinates of the (0, 0) ZDR pixel	PSO,LSO
$\mathbf{A}_{sz}$	East-West pixel spacing at scale 1:S in zone Z	ARV
$\mathbf{B}_s$	North-South pixel spacing at scale 1:S	BRV

B.3.1 Non-Polar Case

$r = \mathit{round}\ [(\phi_0 - \phi_{84})(\mathbf{B}_s / 360°)]$
$c = \mathit{round}\ [(\mathrm{abs}(\lambda_{84} - \lambda_0) \bmod 360°)(\mathbf{A}_{sz} / 360°)]$

B.3.2 North Polar Case

(1) ARC System Coordinates (x_0, y_0) at (ϕ_0, λ_0)

$x_0 = (\mathbf{B}_s / 360°)(90° - \phi_0) \sin(\lambda_0)$
$y_0 = -(\mathbf{B}_s / 360°)(90° - \phi_0) \cos(\lambda_0)$

(2) ARC System Coordinates (x, y) at $(\phi_{84}, \lambda_{84})$

$x = (\mathbf{B}_s / 360°)(90° - \phi_{84}) \sin(\lambda_{84})$
$y = -(\mathbf{B}_s / 360°)(90° - \phi_{84}) \cos(\lambda_{84})$

(3) ZDR Pixel Coordinates (r, c) at (x, y)

$r = round\ (y_0 - y)$
$c = round\ (x - x_0)$

B.3.3 South Polar Case

(1) ARC System Coordinates (x_0, y_0) at (ϕ_0, λ_0)

$x_0 = (\mathbf{B}_s / 360°)(90° + \phi_0)\sin(\lambda_0)$
$y_0 = (\mathbf{B}_s / 360°)(90° + \phi_0)\cos(\lambda_0)$

(2) ARC System Coordinates (x, y) at $(\phi_{84}, \lambda_{84})$

$x = (\mathbf{B}_s / 360°)(90° + \phi_{84})\sin(\lambda_{84})$
$y = (\mathbf{B}_s / 360°)(90° + \phi_{84})\cos(\lambda_{84})$

(3) ZDR Pixel Coordinates (r, c) at (x, y)

$r = round\ (y_0 - y)$
$c = round\ (x - x_0)$

B.4 Source Graphic Datum Coordinates $(\phi_{src}, \lambda_{src})$ from WGS 84 Coordinates $(\phi_{84}, \lambda_{84})$

Parameters Used:

Parameter	Description	Subfield
a_i	Coefficients of the polynomial for latitude ϕ, i = 1…7	AX1..AX7
b_i	Coefficients of the polynomial for longitude λ, i = 1…7	BX1-BX7
$S\phi$	Latitude normalizing scale factor	TSF
$S\lambda$	Longitude normalizing scale factor	GSF
ϕ_{off}	Latitude normalizing offset	TTT
λ_{off}	Longitude normalizing offset	GTT

B.4.1 Normalized WGS 84 Coordinates (ϕ_1, λ_1) at $(\phi_{84}, \lambda_{84})$

$\phi_1 = S\phi(\phi_{84} - \phi_{off})$
$\lambda_1 = S\lambda(\lambda_{84} - \lambda_{off})$

B.4.2 Normalized Source Datum Coordinates (ϕ_2, λ_2) at (ϕ_1, λ_1)

$$\phi_2 = a_1 + a_2\phi_1 + a_3\lambda_1 + a_4\phi_1\lambda_1 + a_5\lambda_1^2 \quad a_6\phi_1\lambda_1^2 + a_7\lambda_1^3$$

$$\lambda_2 = b_1 + b_2\phi_1 + b_3\lambda_1 + b_4\phi_1\lambda_1 + b_5\lambda_1^2 + b_6\phi_1\lambda_1^2 + b_7\lambda_1^3$$

B.4.3 Denormalized Source Datum Coordinates (ϕ_{src} , λ_{src}) at (ϕ_2 , λ_2)

$$\phi_{src} = \phi_2 / S_\phi + \phi_{off}$$
$$\lambda_{src} = \lambda_2 / S_\lambda + \lambda_{off}$$

B.5 Source Graphic Projection Coordinates (N , E) from Source Graphic Datum Coordinates (ϕ_{src} , λ_{src})

Parameters Used:

Parameter	Description	Subfield
c_i	Coefficients of the polynomial for Northing, i = 1…10	CX1..CXA
d_i	Coefficients of the polynomial for Easting, i = 1…10	DX1..DXA
$S\phi$	Latitude normalizing scale factor	TSF
$S\lambda$	Longitude normalizing scale factor	GSF
ϕ_{off}	Latitude normalizing offset	TTT
λ_{off}	Longitude normalizing offset	GTT
S_N	Northing normalizing scale factor	NSF
S_E	Easting normalizing scale factor	ESF
N_{off}	Northing normalizing offset	NTT
E_{off}	Easting normalizing offset	ETT

B.5.1 Normalized Source Datum Coordinates (ϕ_2 , λ_2) at (ϕ_{src} , λ_{src})

NOTE: (ϕ_2 , λ_2) may also be derived from WGS 84 coordinates as indicated in Section B.4 above.

$$\phi_2 = S_\phi (\phi_{src} - \phi_{off})$$
$$\lambda_2 = S_\lambda (\lambda_{src} - \lambda_{off})$$

B.5.2 Normalized Northing and Easting (N_n , E_n) at (ϕ_2 , λ_2)

$$N_n = c_1 + c_2\phi_2 + c_3\lambda_2 + c_4\phi_2^2 + c_5\phi_2\lambda_2 + c_6\lambda_2^2 + c_7\phi_2^3 + c_8\phi_2^2\lambda_2 + c_9\phi_2\lambda_2^2 + c_{10}\lambda_2^3$$

$$E_n = d_1 + d_2\phi_2 + d_3\lambda_2 + d_4\phi_2^2 + d_5\phi_2\lambda_2 + d_6\lambda_2^2 + d_7\phi_2^3 + d_8\phi_2^2\lambda_2 + d_9\phi_2\lambda_2^2 + d_{10}\lambda_2^3$$

B.5.3 Denormalized Northing and Easting (N , E) at (N_n , E_n)

$$N = (N_n / S_N) + N_{off}$$
$$E = (E_n / S_E) + E_{off}$$

based on the identities

$$N_n = S_N(N - N_{off})$$
$$E_n = S_E(E - E_{off})$$

NOTE: Northings and Eastings computed here pertain only to the source graphic's geographic projection graticule, and do not provide values related to any grid which may be printed on the chart.

B.6 Computation of Constants A_{sz} and B_s

Pixel spacing constants and spacing intervals for all zones at the scale 1:1,000,000 are shown in Table B-1 below.

	Zone Limits[1]				Nominal Pixel Spacing[2]	
Zone Number	Equator ward	Pole ward	**A**	**B**	Lon (microns)	Lat (microns)
1,10	0	32	369664	400384	99.9	99.9
2,11	32	48	302592	400384	99.9	99.9
3,12	48	56	245760	400384	100.0	99.9
4,13	56	64	199168	400384	99.9	99.9
5,14	64	68	163328	400384	99.7	99.9
6,15	68	72	137216	400384	99.7	99.9
7,16	72	76	110080	400384	99.8	99.9
8,17	76	80	82432	400384	100.0	99.9
9,18	80	90	400384	400384	99.9	99.9

NOTES:
1. Latitudes are shown unsigned for convenience.
2. Measured at the latitude which gives equal stretch and shrink at zone limits on the WGS 84 ellipsoid.

Table B-1: Pixel Spacing Constants **A** and **B**

To compute the pixel spacing constants for a graphic at scale 1:S in zone Z (i.e., $\mathbf{A}_{sz}$ and $\mathbf{B}_s$), first compute the real scale factor **N** using the following equation:

$$\mathbf{N} = \frac{1{,}000{,}000}{S}.$$

The **A** and **B** values for 1:1,000,000 are multiplied by **N** and the results rounded up to the next multiple of 512 to give the values $\mathbf{A}_{sz}$ and $\mathbf{B}_s$.

NOTE: The **A** and **B** values provided with the ASRP image data are <u>already adjusted</u> for the scale and zone of the image data.

B.7 <u>Computation of Coordinates ϕ_0 and λ_0</u>

Parameters Used:

Parameter	Description	Subfield
$\mathbf{A}_{SZ}$	East-West pixel spacing at scale 1:S in zone Z.	ARV
$\mathbf{B}_S$	North-South pixel spacing at scale 1:S	BRV

The coordinates of the image origin (ϕ_0, λ_0) depend on the pixel spacing constants adjusted for the scale and zone of the image data.

The width of the pixel is 360°/$\mathbf{A}_{SZ}$ in the E-W direction and 360°/$\mathbf{B}_S$ in the N-S direction. For polar zones, $\mathbf{A}_{SZ} = \mathbf{B}_S$.

Let (ϕ_{UL}, λ_{UL}) denote the WGS 84 coordinates of the upper left point of the image. For non-polar zones, ϕ_{UL} is the northernmost latitude and λ_{UL} is the westernmost longitude.

B.7.1 Non-Polar Case.

Let $\triangle\phi$ and $\triangle\lambda$ denote the length of a tile of 128 by 128 pixels.

$\triangle\phi$ = 46080°/$\mathbf{B}_S$

$\triangle\lambda$ = 46080°/$\mathbf{A}_{SZ}$

ϕ_0 is ϕ_{UL} rounded <u>up</u> to the next integral multiple of $\triangle\phi$ (to ensure an exact number of tiles to the Equator). Equivalently, ϕ_0 is n($\triangle\phi$) where n is $\phi_{UL}/\triangle\phi$ rounded up to an integer.

λ_0 is λ_{UL} rounded <u>down</u> to the next integral multiple of $\triangle\lambda$ (to ensure an exact number of tiles to the Prime Meridian). Equivalently, λ_0 is n($\triangle\lambda$) where n is $\lambda_{UL}/\triangle\lambda$ rounded down to an integer.

B.7.2 North Polar Case.

$x_0 = (\mathbf{B}_S/360°)(90°-\phi_{UL}) \sin(\lambda_{UL})$ rounded down to the next multiple of 128.
$y_0 = -(\mathbf{B}_S/360°)(90°-\phi_{UL}) \cos(\lambda_{UL})$ rounded up to the next multiple of 128.
$\phi_0 = 90° - (x_0^2+y_0^2)^{1/2}(360°/\mathbf{B}_S)$
$\lambda_0 = \arccos[-y_0/(x_0^2+y_0^2)^{1/2}]$ if $x_0 > 0$ or $x_0 = 0$, $y \neq 0$
$\lambda_0 = -\arccos[-y_0/(x_0^2+y_0^2)^{1/2}]$ if $x_0 < 0$
$\lambda_0 = 0°$ if $x_0 = y_0 = 0$

where the range of arccos is 0° to 180°.

B.7.3 South Polar Case.

$x_0 = (\mathbf{B}_S/360°)(90°+\phi_{UL}) \sin(\lambda_{UL})$ rounded down to the next multiple of 128.
$y_0 = (\mathbf{B}_S/360°)(90°+\phi_{UL}) \cos(\lambda_{UL})$ rounded up to the next multiple of 128.
$\phi_0 = -90° + (x_0^2+y_0^2)^{1/2}(360°/\mathbf{B}_S)$
$\lambda_0 = \arccos[y_0/(x_0^2+y_0^2)^{1/2}]$ if $x_0 > 0$ or $x_0 = 0$, $y \neq 0$
$\lambda_0 = -\arccos[y_0/(x_0^2+y_0^2)^{1/2}]$ if $x_0 < 0$
$\lambda_0 = 0°$ if $x_0 = y_0 = 0$

where the range of arccos is 0° to 180°.

B.8 Maximum Stretch and Shrink Values for Zones

The maximum stretch at the poleward limit (or shrink at the equatorward limit) for each zone is shown in Table B-2 below. Also indicated is the latitude ("mid") at which nominal pixel spacing is defined. These values apply for all scales of data.

Zone	Latitude (degrees)			Maximum Stretch or Shrink (%)
	Equator ward	mid	Pole ward	
1, 10	0	22.94791772	32	8.54
2, 11	32	41.12682127	48	12.53
3, 12	48	52.28859923	56	9.36
4, 13	56	60.32378942	64	12.92
5, 14	64	66.09421768	68	8.17
6, 15	68	70.10896259	72	10.09
7, 16	72	74.13230145	76	13.01
8, 17	76	78.17283750	80	18.03
9, 18	80	-------	90	-------

Table B-2: Mid-Latitude and Maximum Stretch and/or Shrink (Exclusive of Overlap)

Annex B. ATTRIBUTE AND VALUE CODES

NOTE. The following is ONLY that subset of DIGEST Edition 1.2 Part 4 Annex B attributes which is applicable to the ASRP specification.

CDP — Calendar Date Type

The type of report or activity.

CDP	000	Unknown
	001	Aerial Photography
	002	Air Information
	003	Approximate
	004	Field Classification
	005	Compilation
	006	Copyright
	007	Creation
	008	Digitizing
	009	Distribution/Dispatching
	010	Downgrading
	011	Drafting/Scribing/Drawing
	012	Edition
	013	Field Examination
	014	Intelligence
	015	Date Interpretable
	016	Processing
	017	Print/Publication
	018	Receipt
	019	Source
	020	Earliest Date of Source
	021	Latest Date of Source
	022	Specifications
	023	Survey
	024	Up-to-dateness/revision
	025	Map Edit
	026	Information as of ---
	027	Perishable Information Date
	028	Cycle Date
	029	Significant Date
	030	Date of Magnetic Information
	999	Other

NST — Navigation System Types

Type of equipment or system used in electronic navigation

NST	000	Unknown
	001	Circular Radio Beacon
	002	CONSOL
	003	DECCA
	004	Radio Direction Finding
	005	Directional Radio Beacon
	006	Distance Finding
	007	Long Range Navigation System (LORAN)
	008	OMEGA
	009	VALUE INTENTIONALLY LEFT BLANK
	010	Radar Responder Beacon (RACON)
	011	Radar
	012	Radio
	013	Radio Telephone
	014	VALUE INTENTIONALLY LEFT BLANK
	015	TV
	016	Microwave
	017	Non-Directional Radio Beacon (NDB)
	018	VALUE INTENTIONALLY LEFT BLANK
	019	Radio Range (RNG)
	020	VHF Omni Directional Radio Range (VOR)
	021	VHF Omni Directional (VOR/DME)
	022	VHF Omni Directional (VORTAC)
	023	Tactical Air Navigation Equipment (TACAN)
	024	Instrument Landing System (ILS)
	025	VALUE INTENTIONALLY LEFT BLANK
	026	Localizer (LOC)
	027	VALUE INTENTIONALLY LEFT BLANK
	028	Simplified Directional Facility (SDF)
	029	Landing Distance Available (LDA)
	030	Microwave Landing System (MLS)
	031	Fan Marker
	032	Bone Marker
	033	Radio Telegraph
	034	Ground Controlled Approach (GCA)
	035	Radar Antenna
	037	Precision Approach Radar (PAR)

	038	Aeronautical Radio
	039	VALUE INTENTIONALLY LEFT BLANK
	040	Radio Beacon
	041	Rotating Loop Radio Beacon
	042	Visual Flight Rules (VFR) Test Signal Maker
	043	VALUE INTENTIONALLY LEFT BLANK
	044	Consol Radio Beacon
	045	Aeronautical Radio Range
	046	Radar Station
	047	Hifix
	048	Hyperfix
	049	Tricolor Panel
	999	Other

Code		Sounding Datum
MHHW	1	Mean Higher High Water
MHW	2	Mean High Water
MHWN	3	Mean High Water Neaps
MHWS	4	Mean High Water Springs
MLLW	5	Mean Lower Low Water
MLW	6	Mean Low Water
MLWN	7	Mean Low Water Neaps
MLWS	8	Mean Low Water Springs

Code		Vertical Reference
GEOD	1	Geodetic (All elevations in the data set are referenced to the ellipsoid of the specified datum.)
MSL	2	Mean Sea Level (All elevations in the data set are referenced to the geoid of the specified datum.)

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7 GRID CODES

Table 7-1 provides the allowable grids and their codes for the Grid System field.

Table 7-1 Grid Codes

	Grid Description	Code
1	Aden Zone	AD
2	Afghanistan Gauss-Kruger Grid	AF
3	Air Defense Grid	AG
4	Air Support Grid	AI
5	Alabama Coordinate System	AJ
6	Alaska Coordinate System	AK
7	Algeria Zone	AL
8	Albania Bonne Grid	AM
9	Alpha-Numeric (Atlas) Grid	AN
10	Arbitrary Grid	AO
11	American Samoa Coordinate System	AP
12	Argentine Gauss-Kruger Conformal Grid	AQ
13	Artillery Referencing System	AR
14	Arizona Coordinate System	AS
15	Australia Belt	AU
16	Arkansas Coordinate System	AV
17	Australian Map Grid	AW
18	Azores Gauss Conformal Grid	AX
19	Azores Zone	AZ
20	Baku 1927 Coordinate System	BA
21	Bavaria Solder Coordinate System	BB
22	Belgium Lambert Grid	BC
23	Belgium Bonne Grid	BE
24	Brazil Gauss Conformal Grid	BF
25	Borneo Rectified Skew Orthomorphic Grid	BO
26	British West Indies Grid	BW
27	California Coordinate System	CB
28	Canada British Modified Grid	CD
29	Ceylon Belt (Transverse Mercator)	CE
30	Canary Islands (Spanish~ Lambert Grid)	CF
31	Chile Gauss Conformal Grid	CG
32	China Belt	CH
33	Canary Islands Zone	CI
34	China Lambert Zone	CJ
35	Colorado Coordinate Zone	CK
36	Connecticut Coordinate System	CM
37	Caspian Zone	CN
38	Costa Rica Lambert Grid	CO
39	Crimea Grid	CQ
40	Crete Zone	CR

41	Cuba Lambert Grid	CT
42	Caucasus Zone	CU
43	Cape Verde Islands Zone	CV
44	British Cassini Grid	CW
45	Czechoslovak Uniform Cadastral Coordinate System	CX
46	Cyprus Grid	CY
47	Czechoslovak Military Grid	CZ
48	Danube Zone	DA
49	Dahomey Belt	DB
50	Denmark General Staff Grid	DC
51	Delaware Coordinate System	DD
52	Dominican Lambert Grid	DE
53	Denmark Geodetic Institute System 1924	DJ
54	Cape Verde Peninsula Grid	DK
55	East Africa Belt	EA
56	English Belt	EB
57	Eqypt Gauss Conformal Grid	ED
58	El Salvador Lambert Grid	EE
59	Estonian Grid	EF
60	Egypt Purple Belt	EP
61	Egypt Red Belt	ER
62	Egypt 35 Degree Belt	ET
63	Fernando Poo Gauss Grid	FA
64	Fiji Grid	FB
65	Florida Coordinate System	FC
66	French Bonne Grid	FD
67	French Guiana Gauss Grid	FE
68	French Somaliland Gauss-LaBorde Grid	FF
69	French Indochina Grid	FI
70	Franz Josef Land Zone	FJ
71	French Lambert Grid	FL
72	Formosa (Taiwan) Gauss-Schreiber Coordinate System	FO
73	French Equatorial Africa Grid	FS
74	Gabon Belt	GA
75	Gauss-Boaga Grid (Transverse Mercator)	GB
76	Gabon Gauss Conformal Grid	GC
77	Geodetic	GD
78	Guadeloupe Gauss-LaBorde Grid	GF
79	Colombia Gause Conformal Grid	GG
80	Sweden Gauss-Hannover Grid	GH
81	Georgia Coordinate System	GI
82	Gauss-Kruger Grid (Transverse Mercator)	GK
83	Greece Azimuthal Grid	GL
84	German Army Grid (DHG)	GN
85	Ghana National Grid	GO
86	Greece Bonne Grid	GP

87	Greece Conical Mecklenburg Coordinates	GQ
88	Geographic Reference System (GEOREF)	GR
89	Greece Conical Mecklenburg Coordinate (New Numbering)	GM
90	Greenland Lambert Grid	GT
91	Guinea Zone	GU
92	Guam Coordinate System	GV
93	Guatemala Lambert Grid	GW
94	Guyana Transverse Mercator Grid	GY
95	Haiti Lambert Grid	HB
96	Hawaii Coordinate System	HC
97	Hawaii Grid	HD
98	Honduras Lambert Grid	HE
99	Hong Kong New System Cassini Grid	HF
100	Hungary Stereographic Grid	HG
101	Hong Kong Colony Grid	HR
102	Idaho Coordinate System	IA
103	Illinois Coordinate System	IB
104	Indiana Coordinate System	IC
105	Indonesia Mercator Grid	ID
106	Indonesia Polyhedric Grid	IE
107	Iowa Coordinate System	IF
108	Ivory Coast Azimuthal Grid	IG
109	Irish Cassini Grid	IH
110	Ivory Coast Belt	IJ
111	Irish Transverse Mercator Grid	IK
112	Iceland New Lambert Zone	IL
113	India Zone	IN
114	Iberian Peninsula Zone	IP
115	Iraq Zone	IQ
116	Iraq National Grid	IR
117	Italy Zone	IT
118	Ivy - Found on an HA in Marshall Islands	IY
119	Iceland Zone	IZ
120	Jamaica Foot Grid	JA
121	Japan Plane-Rectangular Coordinate System	JB
122	Japan Gauss-Schreiber Grid	JC
123	Johore Grid	JO
124	Austria Gauss-Kruger Grid	KA
125	Bulgaria Gauss-Kruger Grid	KB
126	Katanga Grid	KC
127	Kansas Coordinate System	KD
128	Kentucky Coordinate System	KE
129	Finland Gauss-Kruger Grid	KF
130	German Gauss-Kruger Grid	KG
131	Kenya Colony Grid	KH

132	Korea Gauss-Schreiber Coordinate System	KJ
133	Louisiana Coordinate System	KK
134	Lithuania Gauss-Kruger Grid	KL
135	Kwantung Province Grid	KN
136	Turkey Gauss-Kruger Grid	KT
137	Kwangsi Province Grid	KW
138	Luxembourg Gauss-Kruger Grid	KX
139	Lambert Conformal Conic Grid	LC
140	Latvia Coordinate System	LD
141	Levant Zone	LE
142	Levant Stereographic Grid	LF
143	Liberia Rectified Skew Orthomorphic Grid	LG
144	Libya Zone	LI
145	Sirte (Libya) Lambert Grid	LL
146	Malaya Grid	MA
147	Malta Belt	MB
148	Maldive-Chagos Belt	MC
149	Madiera Zone	MD
150	Mediterranean Zone	ME
151	Maine Coordinate System	MF
152	Malaya Rectified Skew Orthomorphic Grid	MG
153	Military Grid Referense System	MGRS
154	Martinique Gauss Grid	MH
155	Maryland Coordinate System	MI
156	Mexican Lambert Grid	MK
157	Michigan Coordinate System	ML
158	Mecca-Muscat Zone	MM
159	Minnesota Coordinate System	MN
160	Madagascar Grid (Laborde)	MO
161	Mississippi Coordinate System	MP
162	Morocco Zone	MQ
163	Missouri Coordinate System	MT
164	Mauritius Zone	MU
165	Montana Coordinate System	MV
166	Mozambique Lambert Grid	MW
167	Mozambique Polyconic Grid	MX
168	Massachusetts Coordinate System	MJ
169	Northwest Africa Zone	NA
170	Nigeria Colony Belt	NC
171	National Grid of Great Britain	ND
172	Northern European Zone	NE
173	Nebraska Coordinate System	NF
174	Numeric Grid	NG
175	Niger Zone	NI
176	Netherlands Stereographic Grid (Old Numbering)	NJ
177	North Korea Gauss-Kruger Grid	NK

178	Netherlands Stereographic Grid (New Numbering)	NL
179	Netherlands East Indies Equatorial Zone British Metric Grid (Lambert)	NM
180	Nord de Guerre Zone	NO
181	Nevada Coordinate System	NP
182	New Sierra Leone Colony Grid	NQ
183	New York Coordinate System	NR
184	Netherlands East Indies Southern Zone	NS
185	New Zealand National Grid	NT
186	Nicaragua Lambert Grid	NU
187	Niger Belt	NV
188	North Carolina Coordinate System	NW
189	North Dakota Coordinate System	NX
190	Netherlands East Indies Equatorial Zone U.S. Yard Grid	NY
191	New Zealand Belt	NZ
192	Northern Malaya Grid	OA
193	Norway Gauss-Kruger Grid	OB
194	Ohio Coordinate System	OD
195	Oklahoma Coordinate System	OE
196	Orange Report Net	OR
197	Oregon Coordinate System	OS
198	Palestine Belt	PA
199	Panama Lambert Grid	PB
200	Palestine Civil Grid (Cassini)	PC
201	Paraguay Gauss-Kruger Grid	PD
202	Peiping Coordinate System of 1954	PE
203	Pennsylvania Coordinate System	PF
204	Peru Polyconic Grid	PI
205	Philippine Plane Coordinate System	PJ
206	Poland Gauss-Kruger Grid	PK
207	Poland Quasi-Stereographic Grid	PL
208	Philippine Polyconic Grid	PP
209	Portugal Bonne Grid, Old	PQ
210	Portugal Bonne Grid, New	PR
211	Portugal Gauss Grid	PS
212	Puerto Rico Coordinate System	PT
213	Puerto Rico Lambert Grid	PU
214	Qatar Grid	QA
215	Qatar Peninsula Grid	QU
216	Russian Belt	RB
217	Reunion Gauss Grid	RC
218	Rhode Island Coordinate System	RD
219	Rumania Bonne Grid	RE
220	Soviet Coordinate System of 1942	RF
221	Rumania Lambert-Cholesky Grid	RH

222	Rumania Stereographic Grid	RI
223	Pulkovo Coordinate System of 1932	RT
224	South Africa Belt	SA
225	Senegal Gauss Conformal Grid (Belt)	SB
226	South Africa Coordinate System (Republic of South Africa)	SD
227	Senegal Belt	SE
228	South Carolina Coordinate System	SF
229	Sahara Zone	SH
230	South Dakota Coordinate System	SI
231	South Libya Zone	SJ
232	Sarawak Grid	SK
233	Spain Lambert Grid	SL
234	Southern New Guinea Grid	SN
235	South Georgia Lambert Grid	SQ
236	South Syria Lambert Grid	SR
237	Spanish North-Morocco Lambert Grid	SS
238	Svalbard Gauss-Kruger Grid	SV
239	Svobodny 1935 Coordinate System	SX
240	Seychelles Belt	SY
241	Spitzbergen Zone	SZ
242	Tanganyika Territorial Grid	TA
243	Tashkent 1875 Coordinate System	TB
244	Tennessee Coordinate System	TC
245	Texas Coordinate System	TD
246	Tobago Grid	TE
247	Trinidad Grid	TF
248	Trucial Coast Cassini Grid	TG
249	Trucial Coast Transverse Mercator Grid	TH
250	Turkey Bonne Grid	TI
251	Tunisia Zone	TN
252	Uganda Cassini Coordinate System	UA
253	Unidentified Grid	UB
254	Uruguay Gauss-Kruger Grid	UC
255	Utah Coordinate System	UD
256	Universal Polar Stereographic System	UP
257	U.S. Polyconic Grid System	US
258	Universal Transverse Mercator	UT
259	Vermont Coordinate System	VA
260	Virginia Coordinate System	VB
261	Venezuela Modified Lambert Grid	VE
262	Viet Nam Azimuthal Grid	VI
263	West Malaysia Rectified Skew Orthomorphic(Metric)Grid	WA
264	Switzerland Bonne Grid	WB
265	Switzerland Conformal Oblique Cylindrical Grid	WC
266	West Virginia Coordinate System	WD
267	Wisconsin Coordinate System	WE

268	Wyoming Coordinate System	WF
269	World Polyconic System	WP
270	Yugoslavia Gauss-Kruger Grid (Not Reduced)	YA
271	Yugoslavia Reduced Gauss-Kruger Grid	YG
272	Yunnan Province Grid	YU

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8 ELLIPSOID CODES

Table 8-1 provides the allowable ellipsoids and their codes for the Ellipsoid field.

Table 8-1 Ellipsoid Codes

	Ellipsoid	Code
1	Modified Airy	AAM
2	Airy	AAY
3	Australian National	AUN
4	Bessel 1841	BES
5	Clarke 1858	CLE
6	Clarke 1880	CLJ
7	Clarke 1866	CLK
8	Everest	EVE
9	Modified Everest	EVM
10	Modified Fischer 1960	FAM
11	Fischer	FIS
12	Geodetic Reference System 1967	GRE
13	Geodetic Reference System 1980	GRS
14	Helmert 1906	HEL
15	Hough	HOU
16	Indonesian 1974	IDN
17	International	INT
18	Krassovsky	KRA
19	South American 1969	SAM
20	Walbeck	WAL
21	World Geodetic System 1960	WGA
22	World Geodetic System 1966	WGB
23	World Geodetic System 1972	WGC
24	World Geodetic System 1984	WGE

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9 DATUM CODES

Table 9-1 provides the allowable datums and their codes for the Geodetic Datum fields. Sounding Datum and the Vertical Reference System field usage are also covered in the Feature and Attribute Coding Catalogue (Part 4).

Table 9-1 Datum Codes

	Geodetic Datums	Code
1	Adindan	ADI
2	Adindan (Ethiopia)	ADIA
3	Adindan (Sudan)	ADIB
4	Adindan (Mali)	ADIC
5	Adindan (Senegal)	ADID
6	Adindan (Mean value: Ethiopia and Sudan)	ADIM
7	Afgooye (Somalia)	AFG
8	Ain el Abd 1970 (Bahrain Island)	AIN
9	Anna 1 Astro (Cocos Islands)	ANO
10	Arc 1950	ARF
11	Arc 1950 (Botswana)	ARFA
12	Arc 1950 (Lesotho)	ARFB
13	Arc 1950 (Malawi)	ARFC
14	Arc 1950 (Swaziland)	ARFD
15	Arc 1950 (Zaire)	ARFE
16	Arc 1950 (Zambia)	ARFF
17	Arc 1950 (Zimbabwe)	ARFG
18	Arc 1950 (Mean value: Botswana, Lesotho, Malawi, Swaziland, Zaire, Zambia, and Zimbabwe)	ARFM
19	Arc 1960 (Kenya)	ARSA
20	Arc 1960 (Tanzania)	ARSB
21	Arc 1960 (Mean value: Kenya, Tanzania)	ARSM
22	Ascension Island 1958 (Ascension Island)	ASC
23	Astro Station 1952 (Marcus Island)	ASQ
24	Astro Beacon "E" (Iwo Jima Island)	ATF
25	Average Terrestrial System (Atlantic Datum) 1997	ATS
26	Australian Geod. 1966 (Australia and Tasmania Is.)	AUA
27	Australian Geod. 1984 (Australia and Tasmania Is.)	AUG
28	Djakarta (Batavia) (Sumatra Island, Indonesia)	BAT
29	Bermuda 1957 (Bermuda Islands)	BER
30	Bogota Observatory (Colombia)	BOO
31	Bukit Rimpah (Bangka & Belitum Islands, Indonesia)	BOR
32	Bukit Rimpah	BUR
33	Canton Astro 1966 (Phoenix Islands)	CA0

34	Cape Canaveral (Mean value: Florida and Bahama Islands)	CAC
35	Campo Inchauspe (Argentina)	CAI
36	Cape (South Africa)	CAP
37	Camp Area Astro (Camp McMurdo Area, Antartica)	CAZ
38	Carthage (Tunisia)	CGE
39	Chua Astro (Paraguay)	CHG
40	Chatham 1971 (Chatham Island, New Zealand)	CHI
41	Chua Astro	CHU
42	Corrego Alegre (Brazil)	COA
43	Guyana CSG67	CSG
44	GUX 1 Astro (Guadacanal Island)	DOB
45	Easter Island 1967 (Easter Island)	EAS
46	European 79	ENB
47	Wake-Eniwetok 1960 (Marshall Islands)	ENW
48	European 1979 (Mean value: Austria, Finland, Netherlands, Norway, Spain, Sweden, and Switzerland)	EUQ
49	European 1950 (Mean value)	EUR
50	European 1950 (Western Europe: Austria, Denmark, France, Federal Republic of Germany , Netherlands, and Switzerland)	EURA
51	European 1950 (Greece)	EURB
52	European 1950 (Norway and Finland)	EURC
53	European 1950 (Portugal and Spain)	EURD
54	European 1950 (Cyprus)	EURE
55	European 1950 (Egypt)	EURF
56	European 1950 (Iran)	EURH
57	European 1950 (Sardinia)	EURI
58	European 1950 (Sicily)	EURJ
59	European 1950 (England, Channel Islands, Ireland, Northern Ireland, Scotland, Shetland Islands, and Wales)	EURK
60	European 1950 (Mean value: Austria, Belgium, Denmark, Finland, France, Federal Republic of Germany, Gibraltar, Greece, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, & Switzerland)	EURM
61	Oman (Oman)	FAH
62	Observatorio 1966 (Corvo and Flores Islands, Azores)	FLO
63	GAN Datum (Addu Atoll, Republic of Maldives)	GAA
64	German	GDA
65	Geodetic Datum 1949 (New Zealand)	GEO
66	Ghana	GHA

67	DOS 1968 0230 (Gizo Island, New Georgia Islands)	GIZ
68	SW Base (Faial, Graciosa, Pico, Sao Jorge, and Terceira Island, Azores)	GRA
69	Genung Segara (Kalimantan Island, Indonesia)	GSE
70	G. Serindung	GSF
71	Guam 1963	GUA
72	Guadeloupe Ste. Anne	GUD
73	Herat North (Afganistan)	HEN
74	Hermannskogel	HER
75	Prov. S. Chilea.i (S. Chile, 53 S.)	HIT
76	Hjorsey 1955 (Iceland)	HJO
77	Hong Kong 1963 (Hong Kong)	HKD
78	Hu-tzu-shan	HTN
79	Bellevue (IGN) (Efate and Erromango Islands)	IBE
80	Italian	IDA
81	Indian	IND
82	Indian (Thailand and Vietnam)	INDA
83	Indian (Bangladesh, India, and Nepal)	INDB
84	Ireland 1965	IRE
85	Ireland 1965 (Ireland and Northern Ireland)	IRL
86	ISTS 073 Astro 1969 (Diego Garcia)	IST
87	Johnston Island 1961 (Johnston Island)	JOH
88	Kandawala (Sri Lanka)	KAN
89	Kertau 1948 (West Malaysia and Singapore)	KEA
90	Kerguelen Island 1949 (Kerguelen Island)	KEG
91	L.C. 5 Astro 1961 (Cayman Brac Island)	LCF
92	Liberia 1964 (Liberia)	LIB
93	Local Astro.	LOC
94	Luzon	LUZ
95	Luzon (Philipines except Mindanao Island)	LUZA
96	Luzon (Mindanao Island)	LUZB
97	Martinique Fort-Desaix	MAR
98	Marco Astro (Salvage Islands)	MAA
99	Massawa (Eritrea, Ethiopia)	MAS
100	Mayotte Combani	MAY
101	Merchich	MER
102	Merchich (Morocco)	MER
103	Midway Astro 1961 (Midway Island)	MID
104	Mahe 1971 (Mahe Island)	MIK
105	Minna (Nigeria)	MIN
106	Rome 1940 (Sardinia Island)	MOD
107	Montjong Lowe	MOL

108	Viti Levu 1916 (Viti Levu Island, Fiji Islands)	MVS
109	Nahrwan (Masirah Island, Oman)	NAHA
110	Nahrwan (United Arab Emirates)	NAHB
111	Nahrwan (Saudi Arabia)	NAHC
112	Naparima (BWI Trinidad and Tobago)	NAP
113	North American 1983 (Mean Value: Alaska, Canada, CONUS, Mexico, and Central America)	NAR
114	North American 1927 (Mean value)	NAS
115	North American 1927 (Eastern US)	NASA
116	North American 1927 (Western US)	NASB
117	North American 1927 (Mean value: CONUS)	NASC
118	North American 1927 (Alaska)	NASD
119	North American 1927 (Mean value: Canada)	NASE
120	North American 1927 (Alberta and British Columbia)	NASF
121	North American 1927 (Newfoundland, New Brunswick, Nova Scotia and Quebec)	NASG
122	North American 1927 (Manitoba and Ontario)	NASH
123	North American 1927 (Northwest Territories and Saskatchewan)	NASI
124	North American 1927 (Yukon)	NASJ
125	North American 1927 (Mexico)	NASL
126	North American 1927 (Central America - Belize, Costa Rica, El Salvador, Guatemala, Honduras, and Nicaragua)	NASN
127	North American 1927 (Canal Zone)	NASO
128	North American 1927 (Caribbean, Barbados, Caicos Islands, Cuba, Dominican Republic, Grand Cayman, Jamaica, Leeward Islands, and Turks Islands)	NASP
129	North American 1927 (Bahamas, except San Salvador Island)	NASQ
130	North American 1927 (San Salvador Island)	NASR
131	North American 1927 (Cuba)	NAST
132	North American 1927 (Hayes Peninsula, Greenland)	NASU
133	North American 1983	NAX
134	Nigeria	NIG
135	Old Egyptian (Egypt)	OEG
136	Ordnance Survey of Great Britain	OGB
137	Ord. Survey G.B. 1936 (England)	OGBA
138	Ord. Survey G.B. 1936 (England, Isle of Man, and Wales)	OGBB
139	Ord. Survey G.B. 1936 (Scotland and Shetland Islands)	OGBC
140	Ord. Survey G.B. 1936 (Wales)	OGBD
141	Ord. Survey G.B. 1936 (Mean value: England, Isle of Man, Scotland, Shetland, and Wales)	OGBM

142	Old Hawaiian	OHA
143	Old Hawaiian (Hawaii)	OHAA
144	Old Hawaiian (Kauai)	OHAB
145	Old Hawaiian (Maui)	OHAC
146	Old Hawaiian (Oahu)	OHAD
147	Old Hawaiian (Mean value)	OHAM
148	Pitcairn Astro 1967 (Pitcairn Island)	PIT
149	Pico de las Nieves (Canary Islands)	PLN
150	SE Base (Porto Santo) (Porto Santo & Madeira Islands)	POS
151	Provisional South American 1956	PRP
152	Prov. S. Amer. 1956 (Northern Chile near 19 degrees south)	PRPA
153	Prov. S. Amer. 1956 (Southern Chile near 43 degrees south)	PRPC
154	Prov. S. Amer. 1956 (Columbia)	PRPD
155	Prov. S. Amer. 1956 (Ecuador)	PRPE
156	Prov. S. Amer. 1956 (Guyana)	PRPF
157	Prov. S. Amer. 1956 (Peru)	PRPG
158	Prov. S. Amer. 1956 (Venezuela)	PRPH
159	Prov. S. Amer. 1956 (Mean value: Bolivia, Chile, Colombia, Ecuador, Guyana, Peru, & Venezuela)	PRPM
160	Puerto Rico (Puerto Rico and Virgin Islands)	PUR
161	Qatar National (Qatar)	QAT
162	Qornoq (South Greenland)	QUO
163	Reunion 1947	REU
164	Santo (DOS) 1965 (Espirito Santo Island)	SAE
165	South American 1969 (Argentina)	SANA
166	South American 1969 (Bolivia)	SANB
167	South American 1969 (Brazil)	SANC
168	South American 1969 (Chile)	SAND
169	South American 1969 (Columbia)	SANE
170	South American 1969 (Ecuador)	SANF
171	South American 1969 (Guyana)	SANG
172	South American 1969 (Paraguay)	SANH
173	South American 1969 (Peru)	SANI
174	South American 1969 (Trinidad and Tobago)	SANK
175	South American 1969 (Venezuela)	SANL
176	South American 1969 (Mean value: Argentina, Bolivia, Brazil, Chile, Columbia, Ecuador, Guyana, Paraguay, Peru, Trinidad and Tobago, and Venezuela)	SANM
177	Sao Braz (Sao Miguel, Santa Maria Islands, Azores)	SAO
178	Sapper Hill 1943 (East Falkland Islands)	SAP
179	Schwarzeck (Namibia)	SCK

180	Astro Dos 71/4 (St. Helena Island)	SHB
181	Sierra Leone 1960	SIB
182	South Asia (Southeast Asia, Singapore)	SOA
183	St. Pierre et Miquelon 50	STP
184	Tananarive Obsv. 1925	TAN
185	Tristan Astro 1968 (Tristan da Cunha)	TDC
186	Timbali 1948 (Brunei and East Malaysia - Sarawak and Sabah)	TIL
187	Tokyo (Mean value)	TOK
188	Tokyo (Japan)	TOYA
189	Tokyo (Korea)	TOYB
190	Tokyo (Okinawa)	TOYC
191	Tokyo (Mean value: Japan, Korea, and Okinawa)	TOYM
192	Astro Tern Is. 1961 (Tern Island, Hawaii)	TRN
193	Undetermined (processed as if WGS 84)	UND
194	Voirol	VOI
195	World Geodetic System 1960	WGA
196	World Geodetic System 1966	WGB
197	World Geodetic System 1972	WGC
198	World Geodetic System 1984	WGE
199	Yacare (Uruguay)	YAC
200	Zanderij (Surinam)	ZAN

Table 9-1 lists the datums which may be used, and the codes (abbreviations) which may appear in the Geodetic Datum fields. Sounding Datum and the Vertical Reference System field usage are covered in the Feature and Attribute Coding Catalogue (Part 4).

Note: This list is not all-inclusive.

6 PROJECTION CODES AND PARAMETERS

Table 6-1 provides the allowable projections and their codes and parameters for the Dataset Map Projection Group. These codes and parameters are necessary for conversion of digitized map coordinates to geographic coordinates.

Table 6-1 Projection Codes and Parameters

NAME	CODE	PARAMETERS			
		1	2	3	4
Albers Equal Area	AC	Central Meridian	Std. Parallel Nearer to Equator	Std. Parallel Farther from Equator	Parallel of Origin
Azimuthal Equal Area	AK	Longitude of Tangency	Latitude of Tangency	-	-
Azimuthal Equal Distant	AL	Longitude of Tangency	Latitude of Tangency	-	-
Gnomonic	GN	Longitude of Tangency	Latitude of Tangency	-	-
Hotine Oblique Mercator (Rectified Skew Orthomorphic)	RB	Longitude of Proj. Origin	Latitude of Proj. Origin	Azimuth of Skew X-Axis at Proj. Origin	ScaleFactor at Proj. Origin
Lambert Conformal Conic	LE	Central Meridian	Std. Parallel Nearer to Equator	Std Parallel Farther from Equator	Parallel of Origin
Lambert Equal Area	LJ	Central Meridian	-	-	-
Mercator	MC	Central Meridian	Latitude of True Scale	Parallel of Origin	-
Oblique Mercator	OC	Longitude of Reference Point on Great Circle	Latitude of Reference Point on Great Circle	Azimuth of Great Circle at Reference Point	-
Orthographic	OD	Longitude of Tangency	Latitude of Tangency	-	-
Polar Stereo-graphic	PG	Central Meridian	Latitude of True Scale	-	-
Polyconic	PH	Central Meridian	-	-	-
Transverse Mercator	TC	Central Meridian	Central Scale Factor	Parallel of Origin	-
Oblique Stereographic	SD	Longitude of Origin	Latitude of Origin	Scale factor at Origin	-
Relative Coordinates	RC	X-Scale Factor	Y-Scale Factor		

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13 USE OF CIE VALUES

CIE is an international colour system for defining colour produced by the "Commission Internationale de l'Eclairage". A number of systems for identifying colours, and the difference between colours, have been promulgated by the CIE. These are all based on measuring the Tristimulous values (Red, Green and Blue intensities) of a colour relative to a standard white. The method chosen by the DGIWG is to use the coordinates to the CIE cromacity chart (see Figure 13-1). This is also the method used in the DoD Standard Printing Color Catalog (Reference 27). Of the other two systems, the CIELUV system is more applicable to the TV industry, and the CIELAB system, while providing finer discrimination between similar colours, is unnecessarily complex for the requirements of raster images. It is only necessary to uniquely identify what a colour should be; any difference in hue from the colour printed or captured by the scanner is irrelevant.

Defining accurately and consistently the colours that should appear in the raster image of a map, irrespective of any changes in colour introduced by both the printing and scanning processes, should not be difficult. In most cases the map specification defines what the various colours used in its production should be by reference to a standard colour chart or catalogue. An example of this is Reference 27, which as well as printing sample colours also gives the CIE Values for that colour. Where the standard colour catalogue referenced by a map specification does not give the CIE Values, then these may be obtained by:

- identifying the CIE Values for the catalogue in accordance with Reference 28 which defines the standard white to be used and the method to be adopted; or

- identifying the closest approximation to each colour in Reference 27 and assigning those CIE Values to the local standard colour catalogue. This method should only be used where the precise definition of a colour is not critical (i.e. the map series is only produced and/or scanned by one agency).

Defining what a map colour should be according to a recognized standard will ensure that:

- the colour can be readily identified by the receiving agency or user

- precise consistency of colour can be achieved between samples of the same raster product produced not only by the same agency, but by different agencies; and

- users of applications will not be distracted by changes in colour and luminosity (which is worse) when traversing map boundaries.

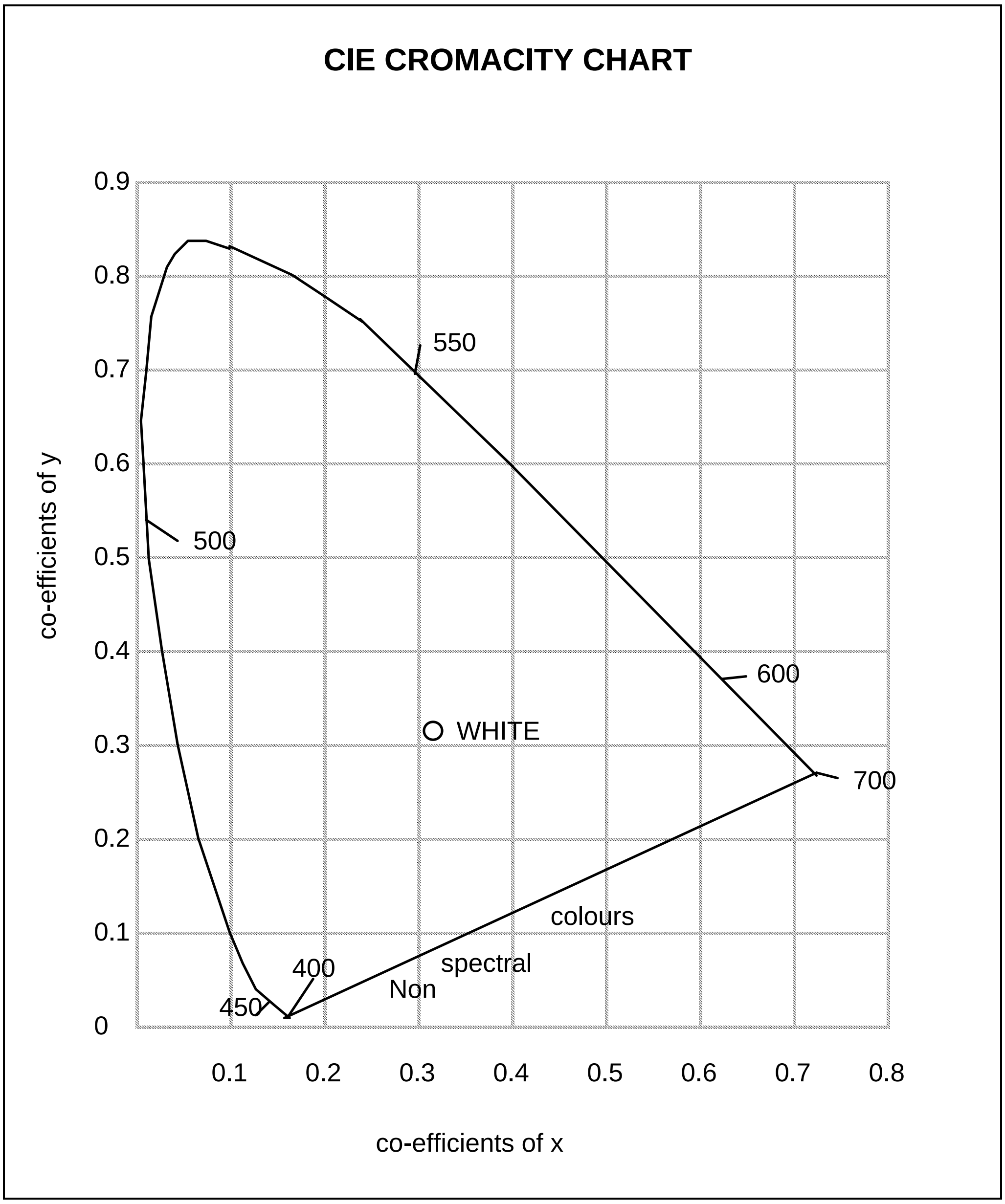

Figure 13-1 CIE Cromacity Chart

Notes: 1. The colour coordinates are given as x,y,Y where Y is the reflectance.
2. The numbers round the rim of the graph are the dominant wavelength n nanometres.

11 COUNTRY CODES

Use US FIPS PUB 10-3 for country codes.

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12 CODES FOR MEDIA RECORDING STANDARDS

Table 12-1 lists the codes for the various media recording standards.

Table 12-1 Codes for Media Recording Standards

Media Recording Standard	**Code**
Non-standard bilateral agreement	0
Magnetic Tape	
• ISO 3788 (1600 PE)	1
• ISO 5652 (6250 GCR)	2
• ANSI X3.202 (8mm tape)	4
CD-ROM	
• ISO 9660	3

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10 UNITS OF MEASURE CODES

DIGEST defines units of measurement as referenced by ISO 1000 "SI units and recommendations for the use of their multiples and of certain other units." However, there are certain units outside the SI (Système internationale), some of which are recognized by International Committee for Weights and Measures (CIPM), which need to be included in DIGEST because of their practical importance, i.e. occurrence in DGI datasets. These units have their codes enclosed by parentheses ( ).

When a compound unit is formed by multiplication of two or more units, it can be indicated in one of the following ways:

N · m or N m

DIGEST preference is "N · m" to avoid misinterpretation of the blank space.

When a compound unit is formed by dividing one unit by another, it can be indicated in one of the following ways:

$\frac{m}{s}$ or m/s or $m\ s^{-1}$

DIGEST preference is "m/s".

Table 10-1 lists the SI, and commonly recognized (shown in parentheses), units of measure which are most likely to occur within a DIGEST dataset, and their codes (abbreviations) for the various Units of Measure fields of the Data Set Parameter Group. They also are referenced in Part 4 — Annex B (Attribute and Value Codes).

Table 10-1 Units of Measure Codes

	Unit	Code
	LENGTH	
1.	Micrometres	UM
2.	Millimetres	MM
3.	Centimetres	CM
4.	Decimetres	DM
5.	Metres	M
6.	Kilometres	KM
7.	Inches	(IN)
8.	Feet	(FT)
9.	Yards	(YD)
10.	Fathoms	(FM)
11.	Fathoms and Feet	(FF)
12.	Statute Miles	(MI)
13.	Nautical miles	(NM)
	TIME	
14.	Seconds	S
15.	Minutes	MIN
16.	Hours	H
17.	Days	D
	SPEED	
18.	Metres per Second	M/S
19.	Kilometres per Hour	KM/H
20.	Miles per Hour	(MPH)
21.	Knots	(KNOT)
	AREA	
22.	Square metres	(M2)
23.	Square kilometres	(KM2)
24.	Hectares	(HA)
	ANGULAR MEASUREMENT	
25.	Mils	ML
26.	Seconds (of arc)	(SEC)
27.	Minutes (of arc)	(MA)
28.	Degrees (of arc)	(DEG)

	WEIGHT (MASS)	
29.	Kilograms	KG
30.	Kips	(KIP)
	PRESSURE	
31.	Millibars	MBAR
32.	Hectopascals	HPA
	ELECTRICITY	
33.	Volts	V
34.	Kilovolts	KV
35.	Watts	W
36.	Megawatts	MW
37.	Gigawatts	GW
38.	Amperes	A
39.	Hertz	HZ
40.	Kilohertz	KHZ
41.	Megahertz	MHZ
	MISCELLANEOUS	
42.	Beds	(BED)
43.	Features	(FEATURE)
44.	Lanes/Tracks	(LANE/TRACK)
45.	Levels	(LEVEL)
46	Lines	(LINE)
47.	Occults	(OCCULT)
48.	Percent	(%)
49.	Persons	(PERSON)
50.	Qualifiers	(QUALIFIER)
51.	Structures	(STRUCTURE)
52.	Vehicles	(VEHICLE)

Note: Codes enclosed in parentheses indicate non-ISO 1000 units. The parentheses themselves do not form part of the code.

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D. DIGITAL GEOGRAPHIC DATA VOLUME TRANSMITTAL FORM

DATA EXCHANGE FORM

Part 1. — National Organizations

1. SENDER: ______________________ 2. ADDRESSEE: ______________________

______________________ ______________________

______________________ ______________________

______________________ ______________________

______________________ ______________________

3. SECURITY CLASSIFICATION: T S C R U

4. SPECIAL HANDLING:

Date & Level of Downgrading: ______________________

Bi or Multilateral agreement(s): ______________________

____

Agreement between Country(s): ______________________

____

Name / Signature: ______________________

Creation Date: ______________________

Part 2. — Data Exchange Specifications

5.a. EXCHANGE MEDIA:

Type:	Mag. Tape: ____________	**Spec:**	Density: ____________
	CD-ROM: ____________		1.4 MB: ____________
	3.5" Floppy: ____________		1.2 MB: ____________
	5.25" Floppy: ____________		720 K: ____________
			Other: ____________
			4 mm: ____________
			8 mm: ____________
	Cartridge ____________		Other: ____________

5.b. FORMATTING / COMPRESSION:

Number of Cylinders: ______________________

Number of Sectors: ______________________

Compression: Yes: __________ No: __________

Technique Used: ______________________

6. EXCHANGE SPECIFICATION:

DIGEST Edition: __________ Date: ______________________

Annex A ISO 8211:________________

Annex B ISO 8824:________________

Annex C VRF:____________________

Comments: ____

7. OPERATING SYSTEM:

Unix: ____ System: ____ Version: ___________________

PC / MS - DOS Version: ___________________

VAX / VMS Version: ___________________

Mac O/S Version: ___________________

Other:___________________ Version: ___________________

8. READ / WRITE STATEMENT: ____

Load ____

9. VOLUME CONTENTS:

File No.	File Size Name	Area of Coverage	Data Structure	Product Type	Remarks	

Part 3. - Additional Information

10. REMARKS: ____

11. ADDITIONAL INFORMATION: ____