METRIC
MIL-D-89029(NAVY)
27 JANUARY 1995

MILITARY SPECIFICATION

DIGITAL BATHYMETRIC DATA BASE 0.1 MINUTE (DBDB-0.1) and DIGITAL BATHYMETRIC DATA BASE 0.5 MINUTE (DBDB-0.5)

This specification is approved for use by the Naval Oceanographic Office, Department of the Navy, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. Conformance to these specifications will ensure uniformity of treatment among all mapping and charting elements engaged in a coordinated production and maintenance program for this product. There is no systematic maintenance program for DBDB products. Maintenance of individual products may be done on as needed basis.

1.2 Purpose. The purpose of this document is to specify the format, content, related product design and details necessary for the production of DBDB-0.1 and DBDB-0.5.

1.3 Security. This Specification is UNCLASSIFIED. DBDB-0.1 and DBDB-0.5 are classified SECRET because of the detailed surveys incorporated into the source material. The delineation of geographic coverage for DBDB-0.1 and DBDB-0.5 is classified SECRET.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Director, Defense Mapping Agency, ATTN: PR (ST A-13), 8613 Lee Highway, Fairfax, VA 22031-2137 by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A **AREA MCGT**

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the current department of defense Index of Specifications and Standards (DODISS) and the supplement thereto, cited in the solicitation (see 6.2).

Military Standards

MIL-STD-129	Marking for Shipping and Storage
MIL-STD-2414	DMA Bar Coding
MIL-STD-600001	MC&G Accuracy Standard

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Standardization Documents Order Desk, Bldg. 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094).

2.1.2 Other Government documents, drawings, and publications. This section is not applicable to this specification.

2.2 Non-Government publications. This section is not applicable to this specification.

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein (except for related associated detail specifications, specification sheets, or standards) the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 First article. When specified (see 6.2), a sample shall be subjected to first article inspection (see 6.3) in accordance with 4.3.

3.2 Accuracy. At the present, there is no formal requirement for absolute or relative accuracy of DBDB-0.1 and DBDB-0.5. The following are included as program objectives only.

3.2.1 DBDB-0.1 absolute horizontal accuracy. The horizontal accuracy in surveyed areas is $\leq$ 91 meters (0.05 nautical miles)

Circular Error (C.E.) 90% with respect to World Geodetic System (WGS).

3.2.2 DBDB-0.1 absolute vertical accuracy. The vertical accuracy in areas surveyed by multibeam sonar is ≤ 9 meters (5 fathoms) Linear Error (L.E.) 90% with respect to Mean Sea Level (MSL), using a standardized sound velocity in sea water of 4800 feet per second.

3.2.3 DBDB-0.5 absolute horizontal accuracy. The horizontal accuracy in surveyed areas is ≤ 457 meters (0.25 nautical miles) Circular Error (C.E.) 90% with respect to World Geodetic System (WGS).

3.2.4 DBDB-0.5 absolute vertical accuracy. The vertical accuracy in surveyed areas is ≤ 18 meters (10 fathoms) Linear Error (L.E.) 90 percent with respect to Mean Sea Level (MSL), using a standardized sound velocity in sea water of 1500 meters per second.

Note: Reference MIL-STD-600001, for accuracy definitions.

3.3 Datum.

3.3.1 Vertical sounding datum. Vertical Datum shall be MSL.

3.3.2 Horizontal datum. Horizontal Datum shall be the World Geodetic System (WGS). DBDB-0.1 and DBDB-0.5 shall be compiled to the current WGS datum or revised to be compatible with the current WGS datum.

3.4 Standard format. This format is intended for the purpose of production, storage and exchange of DBDB-0.1 and DBDB-0.5.

3.4.1 Physical characteristics of distribution media. DBDB shall be written as byte addressable files (Table I).

3.4.2 Type of Input/Output (I/O). The data format contains no system dependent data structures or system dependent generated control words.

3.5 File description. The Data Base for DBDB-0.1 and DBDB-0.5 is divided into six distinct geographic areas (see Table I). There is both an index file and a data file associated with each area. At the present time not all geographic areas have been populated. The depth information for DBDB-0.1 is expressed in fathoms, uncorrected at an assumed sound velocity of 4800 feet per second. The depth information for DBDB-0.5 is expressed in meters, uncorrected at an assumed sound velocity of 1500 meters per second. The depth posts are defined by the intersections of rows and columns within a matrix. The matrix interval (or grid

post spacing), defined in terms of geographic arc minutes is 0.1 minutes for DBDB-0.1, and 0.5 minutes for DBDB-0.5.

Note: All values in minutes are in terms of arc measure.

TABLE I. Geographic file limits.

ZONE	LATITUDE	LONGITUDE
I	00° N - 84° N	100° W - 040° E
II	00° N - 84° N	040° E - 120° E
III	00° N - 84° N	120° E - 100° W
IV	80° S - 00° N	070° W - 020° E
V	80° S - 00° N	020° E - 150° E
VI	80° S - 00° N	150° E - 070° W

3.5.1 Logical characteristics. Two file types are associated with each of the six geographic areas. The first file is an index file that contains information and byte addresses to the actual data in the data file. The second, or data file, contains the gridded depth values and their associated attributes. The data are organized into one degree (latitude) by one degree (longitude) areas called cells.

3.5.2 File characteristics.

3.5.2.1 Index file characteristics. The index file contains a 36 byte header indicating the geographic limits covered by the file and its associated data file, grid spacing, cell size, number of rows and columns of data, and endian indicator. Following the header information, the remaining bytes contain the byte addresses to the actual data in the data file, along with the year and julian day when this cell of data was created or updated. The addresses are ordered geographically first by latitude (starting at the southernmost latitude) and then by longitude (starting at the western boundary of the file and moving east). FIGURE 1 applies. Each address is the byte address in the associated data file that contains the gridded depth values for a cell. The index file is byte addressable, sequential data, containing no imbedded format information. An address value equal to minus one indicates no data exists in the data file corresponding to that cell.

3.5.2.2 Data file characteristics. The data file is byte addressable, sequential data, containing no imbedded format information. Each depth value, for DBDB-0.1, is stored as an unsigned short integer (2 bytes), and as the integer part of the real depth value times ten. Each depth value, for DBDB-0.5 is stored as a short integer (2 bytes). The depth values are ordered geographically, over the extent of the specific cell, first by latitude and then by longitude (see FIGURE 2). For grid nodes that are void of data (i.e., have not been fully compiled) or represent land the depth value is replaced by distinct null

values. Land node values are represented as zero or any negative integer value, and void nodes are represented as 65,535 for DBDB-0.1 and 32,767 for DBDB-0.5.

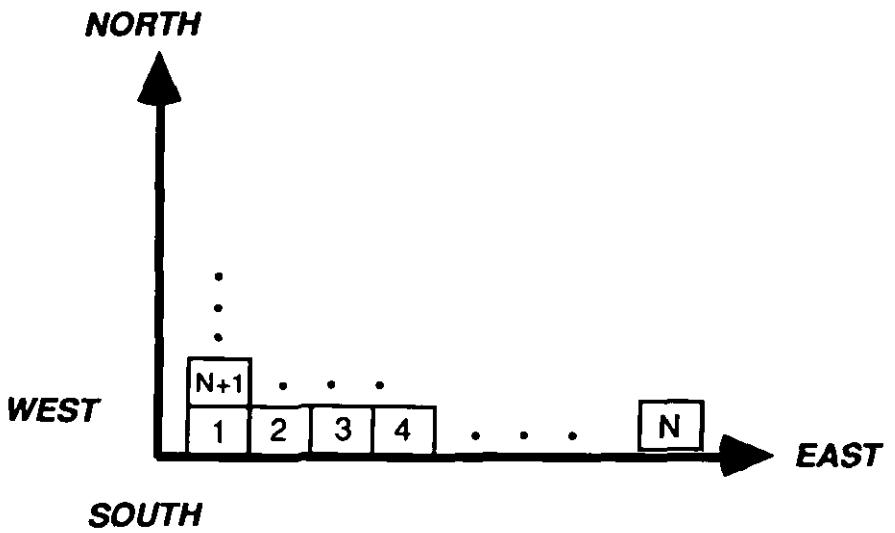


FIGURE 1. Geographic ordering of index pointers.

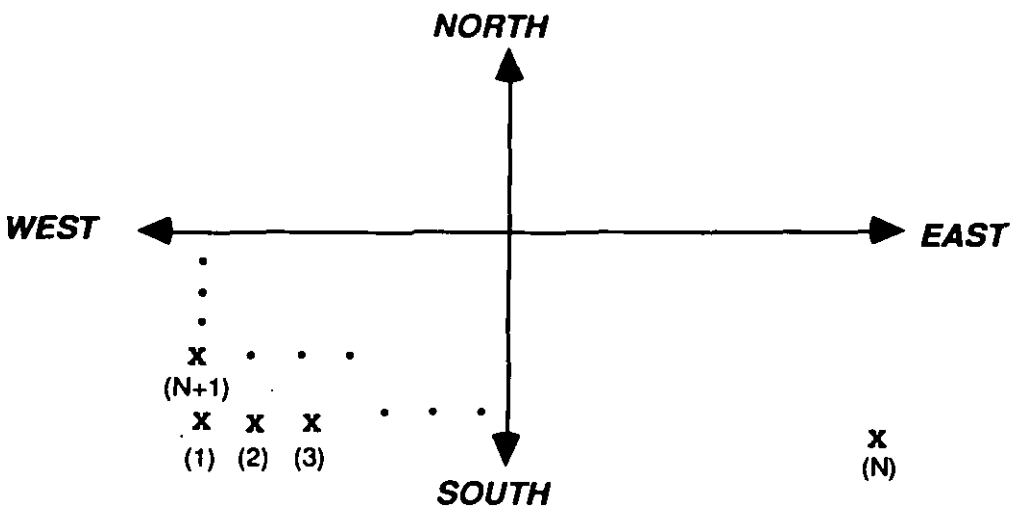


FIGURE 2. Geographic ordering of DBDB depth values.

3.5.2.3 Index file to data file relation. The following equation defines the position within the index file at which the data file address is located for a given cell.

```
index_position = 36 (header size) + (4 (address size)
     + 2 (year size) + 2 (julian_day size))
     * ((((int)lat - index_header.south_lat)*index_header.width)
     + ((int)lon - index_header.west_lon))

     or

index_position = 36 + 8
     * ((((int)lat - index_header.south_lat)*index_header.width)
     + ((int)lon - index_header.west_lon))
```

3.5.3 Description of file contents.

3.5.3.1 Index file contents.

The header structure is:

Variable	Type	Size in Bytes	Description
west_lon	IEEE float	4	represents in decimal degrees the western boundary of the index and associated data file. Hemisphere values are represented as 0 to 359.
east_lon	IEEE float	4	represents in decimal degrees the eastern boundary of the index and associated data file. Hemisphere values are represented as 0 to 359.
south_lat	IEEE float	4	represents in decimal degrees the southern boundary of the index and associated data file. Southern hemisphere values are negative.
north_lat	IEEE float	4	represents in decimal degrees the northern boundary of the index and associated data file. Southern hemisphere values are negative.
grid	IEEE float	4	represents in decimal minutes the grid spacing of the data values (always 0.5 for DBDB-0.5 and 0.1 for DBDB-0.1).

Variable	Type	Size in Bytes	Description
cell	integer	4	represents the cell size in integer degrees in which the data values are organized (always 1).
width	integer	4	represents the width of the index file in terms of cells (i.e. how many cells wide is the index file).
height	integer	4	represents the height of the index file in terms of cells (i.e. how many cells high is the index file).
endian	integer	4	indicates if the data was written little (least significant bit first) or big endian (most significant bit first) binary. This value returns '0x00010203' if you are accessing the data on a machine that has the same endian as it was written on. Otherwise a value of '0x03020100' is returned and byte swapping is required.

The address structure contains (width * height) number of the following:

Variable	Type	Size in Bytes	Description
address	integer	4	byte address in the data file where the depth values for this one degree cell begins.
year	short integer	2	four digit year
julian_day	short integer	2	julian day; indicates, when combined with the year, when this one degree cell was created or updated.

3.5.3.2 Data file contents.

a. DBDB-0.1

Variable	Type	Size in Bytes	Description
depth	unsigned short integer	2	depth value (real value times integer ten).
type	short integer	2	if type = 1, then depth integer is based on survey data; if type = 0, depth is interpolated.

b. DBDB-0.5:

Variable	Type	Size in Bytes	Description
depth	short integer	2	depth value in whole integers.

3.6 Distribution medium.

3.6.1 Magnetic tape. Each finished package will include the magnetic tape(s), and an information booklet. The magnetic tape(s) will contain, in addition to the data files, a C source code program for accessing the data files and a copy of this MIL-SPEC document, as ASCII character README.DOC files.

3.6.2 CD-ROM. Each disc will be labeled indicating the series, item, and edition of the CD-ROM, distribution/user information, national stock number, and producer (see FIGURE 3). The CD-ROM will contain in addition to the data files, a C source code program for accessing the data files and a copy of this MIL-SPEC document, as ASCII character README.DOC files.

3.6.3 CD-ROM labeling.

3.6.3.1 Data Classification. The highest classification of any information contained on the disc shall be placed on the label. The classification shall appear at the top of the CD-ROM disc.

3.6.3.2 Caveats. The handling caveat markings shall appear directly below the data classification marking.

3.6.3.3 Classification colors. A 6.35 mm (.25 inch) thick color coded ring shall be placed along the outside perimeter of the disc label. CD-ROM discs will be color coded as follows to indicate the highest level of classification of the contents of the CD-ROM.

(a) Yellow Sensitive Compartmented Information

(b) Orange Top Secret

(c) Red Secret

(d) Blue Confidential

3.6.3.4 Classification and Declassification labels. Classification and declassification labels shall appear on the CD-ROM disc.

3.6.4 Cardboard sleeve. The highest classification of any information contained on the disc shall be placed on the cardboard sleeve. The cardboard sleeve includes the Location Diagram, which is a graphic depiction of the geographic location of the contents on the CD-ROM. Package product title and artwork can either be printed directly on the sleeve or on a gummed label which can be applied to the sleeve. FIGURE 4. shows the format of the cardboard sleeve.

3.7 Information booklet. The information booklet will provide general information about the contents of the tape(s) or CD-ROM(s), handling instructions, distribution/user information, and DMA points of contact.

4. QUALITY ASSURANCE

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements (examinations and tests) as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in this specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items shall meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements; however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective

material.

4.2 Classification of inspection. The inspection requirements specified herein are classified as follows:

a. First article inspection (see 4.3).

b. Quality conformance inspection (see 4.4).

4.3 First article inspection. When a first article inspection is required (see 3.1 and 6.3), it shall be examined for defects specified in 4.4.1 and tested as specified in 4.4.2.

4.4 Quality conformance inspection. Quality conformance inspection shall include the examination on 4.4.1 and the test on 4.4.2.

4.4.1 Examination. The database shall be examined for compliance with the requirements specified in section 3. Unless a waiver has been granted non compliance with any of the specified requirements shall constitute cause for rejection.

4.4.2 Tests. A sample determined by the contracting officer shall be read back after generation to ensure all files have been properly transferred.

4.5 Government furnished material. The contractor shall not duplicate, copy, or otherwise reproduce the MC&G property for purposes other than those necessary for performance of the contract.

4.6 Government property surplus. At the completion of performance of the contract, the contractor, as directed by the contracting officer, shall either destroy or return to the Government all government-furnished MC&G property not consumed in the performance of the contract.

5. PACKAGING

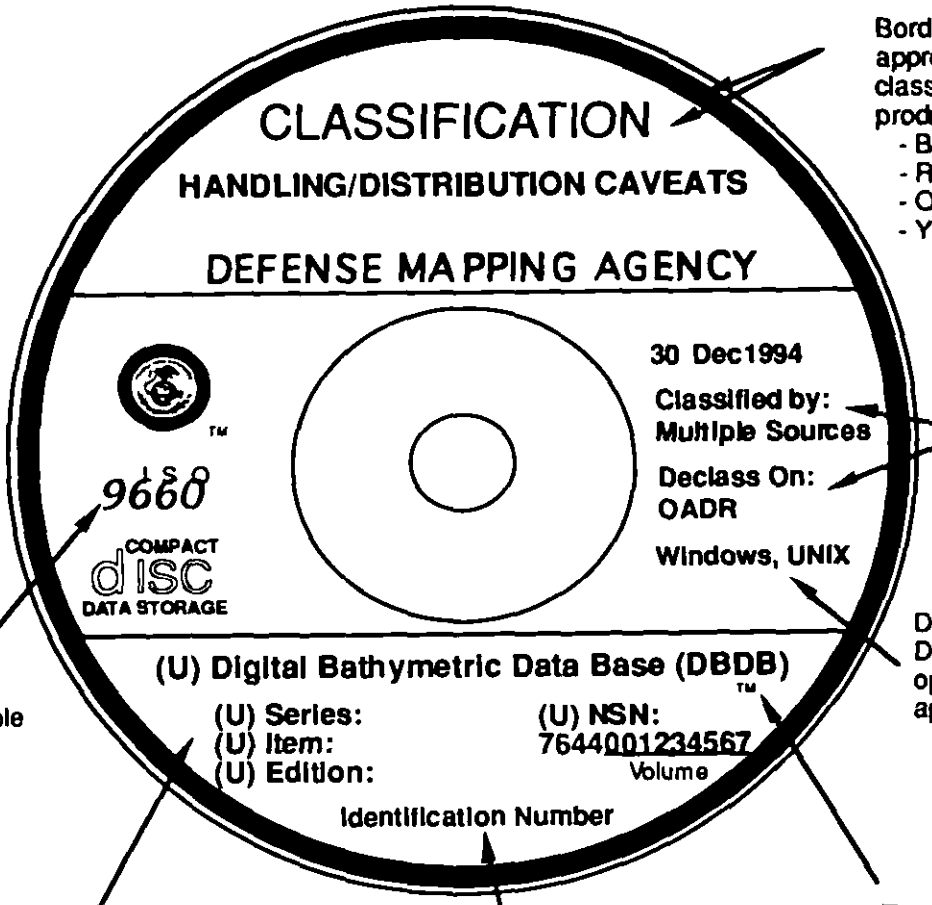
5.1 General. The DBDB files will be distributed on magnetic tape (9-track tape, 8mm EXOBYTE or 4mm DAT) or CD-ROM.

5.2 Packaging.

5.2.1 Magnetic tape. Each finished package will include the magnetic tape(s), and an information booklet.

5.2.2 CD-ROM. Each CD-ROM will be distributed in a cardboard sleeve containing an information booklet.

Except as noted, all logos and type are black on white background. Logos shown are examples, use actual logo in production.



Border and Classification in appropriate color for the classification level of the product contents, e.g.,
- Blue: CONFIDENTIAL
- Red: SECRET
- Orange: Top Secret
- Yellow: SCI

As applicable

DMA Vector Product Logo
DMA Raster Product Logo
operating system as applicable

As applicable

Trademark, as applicable

Classification markings required, Item classification marking will be different for products that are classified by existence

Required for Top Secret or codeword disks

FIGURE 3. DBDB CD ROM label.

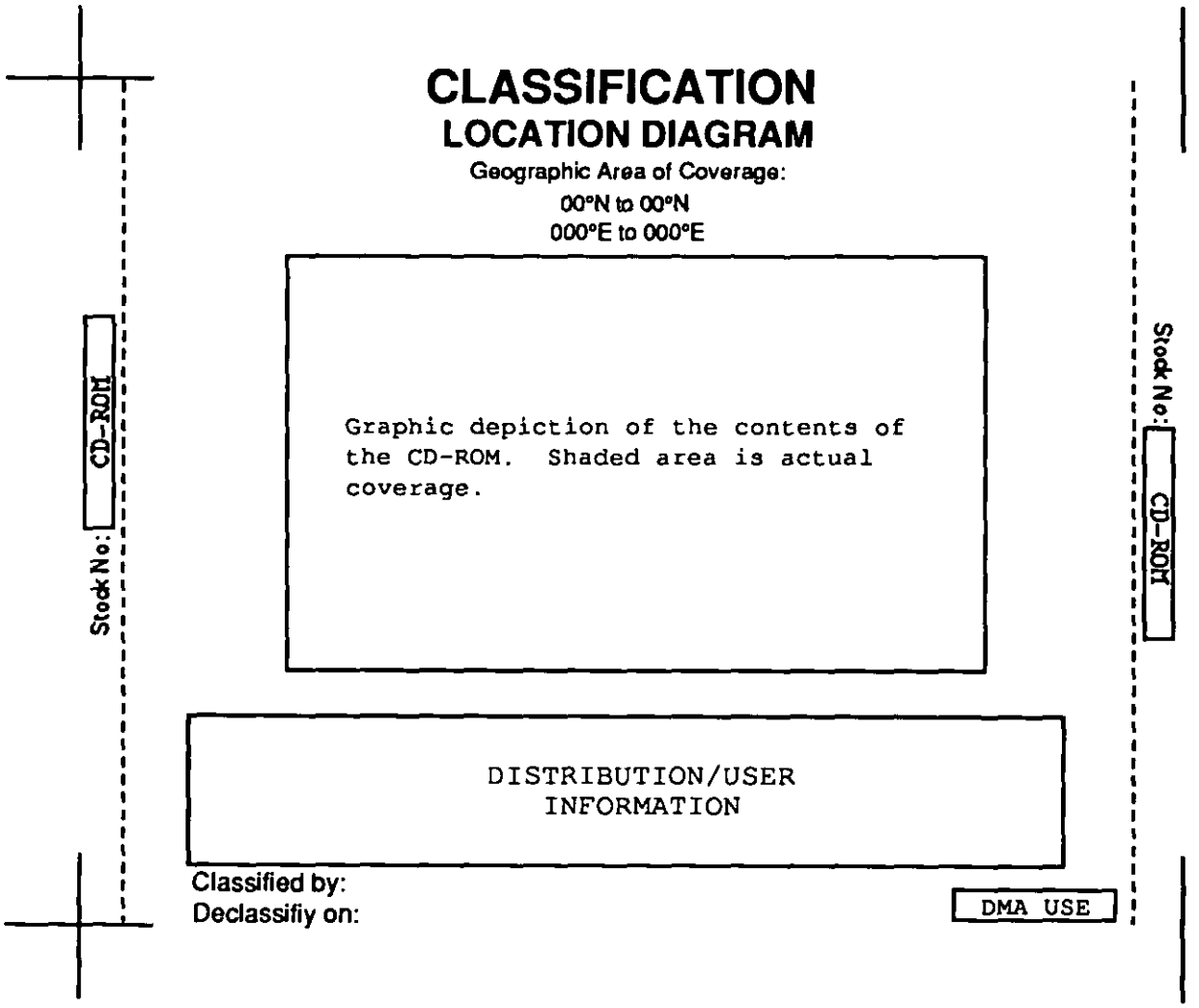


FIGURE 4. Cardboard sleeve.

5.3 Commercial packaging. Packaging shall be level C (see 6.2) unless otherwise specified. This packaging provides minimum protection, and it is needed to protect materiel under known favorable conditions. The following criteria determine the requirements for this degree of protection:

a. Use or consumption of the item at the first destination.

b. Shock, vibration, and static loading during the limited transportation cycle.

c. Favorable warehouse environment for a maximum of 18 months.

d. Effects of environmental exposure during shipment and intransit delays.

e. Stacking and supporting superimposed loads during shipment and temporary storage.

5.4 Marking. In addition to any special markings required by the contract or order, markings shall be in accordance with requirements of MIL-STD-129 for military levels of protection.

5.5 Bar code markings. Bar code markings are required and shall be applied in accordance to MIL-STD-2414.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. DBDB-0.1 and DBDB-0.5 are developed by the Naval Oceanographic Office. The data bases are classified due to the detailed nature of the surveys incorporated into the source material. The designed use of DBDB-0.1 and DBDB-0.5 is to support the generation of bathymetric chart products, and to provide bathymetric data to be integrated with other geophysical and environmental parameters for ocean modeling.

6.1.1 DBDB-0.1 generation. DBDB-0.1 is generated by inputting the digital source data or digitized contours through a gridding routine developed by the Naval Oceanographic Office. This routine takes the values that fall within a grid node area of influence and, utilizing a multi-stage minimum-curvature spline algorithm, interpolates the values to derive a single representative depth value for each grid node.

6.1.2 DBDB-0.5 generation. DBDB-0.5 is generated in two distinct manners:

a. It can be derived directly from the higher resolution DBDB-0.1 by application of computer algorithms, or

b. When source data is primarily hard copy chart information, bathymetric contours are digitized at a rate of 21 measurements per inch of contour and at a nominal chart scale of 1:500000. These digitally-rendered contours are then put through a gridding routine developed by the Naval Oceanographic Office. This routine takes the values that fall within a grid node area of influence and, utilizing a multi-stage minimum-curvature spline algorithm, interpolates the values to derive a single representative depth value for each grid node.

6.2 Acquisition requirements. Acquisition documents must specify the following:

a. Title, number, and date of this specification.

b. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1.1 and 2.2).

c. When a first article is required (see 3.1, 4.3, and 6.3).

d. Levels of packaging (see 5.3).

6.3 First article. When a first article is required, it shall be inspected and approved under appropriate provisions of FAR 52.209. The first article shall be a preproduction sample. The contracting officer shall specify the appropriate type of first article and the number of units to be furnished. The contracting officer shall also include specific instructions in acquisition documents regarding arrangements for selection, inspection, and approval of the first article.

6.4 Definitions.

6.4.1 Accuracy. The degree of conformity with which horizontal position and vertical values are represented on a map, chart, or related product in relation to an established standard.

a. Horizontal accuracy, absolute. The uncertainty in horizontal position of a point with respect to the World Geodetic System caused by random and uncorrected systematic errors. The value expressed as a circular error at the 90% confidence level.

b. Vertical accuracy, absolute. The uncertainty in the height of a point with respect to Mean Sea Level caused by random and systematic errors. The value expressed as a linear error at the 90% confidence level.

6.4.2 Cell. One degree latitude by one degree longitude area of coverage.

6.4.3 Circular error. An accuracy figure representing the stated percentage of probability that any point expressed as a function of two linear components (for example, latitude and longitude or northing and easting) will be within the given figure.

6.4.4 Digital Bathymetric Data Base (DBDB). A geographic matrix of depth values converted into a numerical format for computer storage and analysis at precise increments of latitude and longitude.

6.4.5 Depth matrix. A rectangular array of depth values.

6.4.6 Endian. Describes the byte ordering used by different computers. Little endian indicates the data was written with least significant bit first (bit 0 is the rightmost bit). Big endian indicates the data was written with most significant bit first (bit 0 is the leftmost bit).

6.4.7 Linear error. The difference between the true or known value and the measured or derived value, and is normally expressed in terms of a percentage probability level. LE 90% is the term used to express the linear error at 90% probability, the Map Accuracy Standard. This refers to the vertical accuracy of depth data in the digital data base.

6.4.8 Mean sea level. The average height of the surface of the sea for all stages of the tide, used as a reference for elevations.

6.4.9 Nautical mile. 6076 feet; 1852 meters (international value).

6.4.10 World Geodetic System (WGS). A consistent set of parameters describing the size and shape of the Earth, the positions of a network with respect to the center of mass of the Earth, transformations from major geodetic datums, and the potential of the earth (usually in terms of harmonic coefficients).

6.5 International Standardization Agreements. This section is not applicable to this specification.

6.6 Subject term (key word) listing.

36 byte header
bathymetric data
database
gridding
magnetic tape

INDEX

INDEX

CONCLUDING MATERIAL

Custodian : DMA - MP
NAVY - NO

Preparing Activity:
DMA - MP

Review Activity: Navy - MC

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER MIL-P-89029(NAVY)	2. DOCUMENT DATE *(YYMMDD)* 950127

3. DOCUMENT TITLE: Military Specification for DBDB-0.1 and DBDB-0.5

4. NATURE OF CHANGE *(Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed)*

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME *(Last, First, Middle Initial)*	b. ORGANIZATION	
c. ADDRESS *(Include Zip Code)*	d. TELEPHONE *(Include Area Code)* (1) Commercial (2) AUTOVON *(if applicable)*	7. DATE SUBMITTED *(YYMMDD)*

8. PREPARING ACTIVITY

a. NAME Defense Mapping Agency ATTN: PR, ST A-13	b. TELEPHONE *(Include Area Code)* (1) Commercial (703) 285-9333	(2) AUTOVON 356-9333
c. ADDRESS *(Include Zip Code)* 8613 Lee Highway Fairfax, VA 22031-2137	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA. 22041-3466 Telephone (703) 756-2340 AUTOVON 289-2340	