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NAVAL SEA SYSTEMS COMMAND TECHNICAL SPECIFICATION(NTS) NTS-9090-820

PREPARATION AND REVISION OF DAMAGE CONTROL BOOKS AND DIAGRAMS FOR U.S. NAVY SURFACE SHIPS

PREPARED BY
NAVAL SEA SYSTEMS COMMAND
DAMAGE CONTROL AND FIRE PROTECTION GROUP
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Damage Control Books for U.S. NAVY Surface Ships Preparation and Revision of

1. NTS 9090-820 is approved for use by the Naval Seal Systems Command, Department of the Navy, and is available for use by all Departments and Agencies of the Department of Defense.

2. Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Naval Sea Systems Command, 2531 Jefferson Davis Highway, Arlington, VA. 22242-5160 Att: Damage Control / Fire Fighting Division by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

FORWARD

MILITARY STANDARD (MIL-STD) 772 was originally conceived in the 1950's Since then, aside from superficial revisions, the requirements of MIL-STD-772 had remained largely unchanged.

The government recently directed that the number of Military Standards and Specifications be reduced. As a result, MIL-STD 772 and its companion, MIL-STD 784 entitled; DAMAGE CONTROL BOOK FOR SURFACE SHIPS, REVISION OF, have been deleted from the military standards system. MIL-STD 771 which pertained to auxiliary type ships whose damage control diagrams were printed in the halftone black and white process, has also been deleted. All remaining black and white halftone diagrams are being converted to color as funding permits. MIL-STD 772 will now be known as NAVSEA TECHNICAL SPECIFICATION (NTS) 9090-820. Relevant data from MIL-STD 784 has become Appendix B of NTS 9090-820. The requirements of NAVSEA Technical Specification 9090-810, Revision B, entitled; DAMAGE CONTROL DIAGRAMS COMPUTER AIDED DRAFTING REQUIREMENTS, DC CAD of 19 Jan 1990, has been updated, and NTS 9090-810B has been incorporated into NTS 9090-820 to become Appendix C of NTS 9090-820. Final responsibility for the format and requirements of NTS 9090-820 will reside with NAVSEA. However, NAVSEA will consult and coordinate future revisions to NTS 9090-820 with the planning yards.

Within the past eight years, the process of developing damage control books (DCBs)and diagrams (DCDs) has undergone tremendous change. The process of developing DCBs has evolved from a manual typewriting process to computerized desk top publishing. Development and printing of DCDs has evolved from a manual drafting and lithography process to a more efficient and cost effective Computer Aided Design (CAD) and electrostatic printing process. To increase efficiency, responsibility for the life cycle management and quality control of DCB and DCD production and revision has been decentralized from one naval shipyard to six planning yards. Norfolk Naval Shipyard, Puget Sound Naval Shipyard, Puget Sound Naval Shipyard Detachment - Boston, Pearl Harbor Naval Shipyard, Ingalls Shipbuilding and Bath Iron Works are now responsible for the life cycle management of the DCBs and DCDs for the ships over which they have planning yard cognizance. The Naval Surface Warefare Center, Carderock Division, Ships Systems Engineering Station, Philadelphia, may be tasked as required, to periodically provide research and development (R&D) support to assist the planning yards in transitioning to state-of-the-art production methods for DCBs and DCDs.

The requirements contained in this first edition of NTS 9090-820 reflect DCB and DCD production, maintenance and presentation practice as it exists in 1996. However, the rate of advancing computer technology is expected to further revolutionize the development, maintenance and presentation of DCB and DCD data much more rapidly than technologies of the past. As a result, it is anticipated that NTS 9090-820 will need to be updated and revised more frequently than was the superseded MIL-STD 772.

Due to advancing computer technology, the following new concepts are being developed or investigated:

- The feasibility of producing DCDs, utilizing the second generation of CAD, and printing the DCDs using the ink jet printing process.

- Development of an electronic relational database to link the common data contained in DCBs and DCDs and the ship's Compartment Check-off List (CCOL) is imminent. If successful, the planning yards will be able to electronically cross check the related data contained in these documents, and readily identify and adjudicate discrepancies between the documents and the ship.

o Efforts are underway to present the data contained in the DCBs DCDs and CCOL to the ship's damage control organization via electronic computer monitors. When computer monitor screen size and resolution technology can present DCD data at a level considered acceptable by the forces afloat; the development, maintenance and presentation of DCB, DCD and CCOLs data will likely become totally electronic. As a result, the current production and maintenance of printed DCBs DCDs and CCOLs will be reduced.

o Efforts are under way to facilitate development of all shipboard technical documents from a common core of technical data contained in a central electronic data base and utilize three dimensional (3-D) data transmission technology. When implemented, such a process may drastically revise DCD presentation. DCDs may become more efficient by depicting only information vital for immediate ship survivability. DCDs may become less cluttered with the removal of (some currently depicted) data actually more relevant for ship maintenance than damage control. If more detailed data is required, damage control personnel could easily access such data from the central electronic data base.

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APPENDIX B. INSTRUCTIONS FOR THE LIFE CYCLE REVISION OF DAMAGE CONTROL BOOKS AND DIAGRAMS

APPENDIX C. DAMAGE CONTROL DIAGRAMS COMPUTER AIDED DRAFTING REQUIREMENTS DC (CAD)

1. SCOPE.

NTS-9090-820 covers the requirements of preparation, revision and distribution of damage control books and diagrams for all U.S. Navy Ships for which Damage Control Books and Diagrams are produced.

2. REFERENCED PUBLICATIONS

NAVAL SEA SYSTEMS COMMAND (NAVSEA)

S9086-C6-STM-000 (0901-LP-096-0012)	- Weight and stability.
S9086-CN-STM-010/CM 079 VOL 1	- Damage Control Stability and Buoyancy
S9086-CN-STM-020/CH 079 VOL 2 (0901-LP-079-0050)	- Damage Control Practical Damage Control.
80064-804-921794	- Leaf Units, Hinged, Damage Control Sizes A, B & C
S9AAO-AA-SPN-010/GEN-SPEC	- General Specifications for Ships of The U.S. Navy

DEPARTMENT OF DEFENSE (DOD)

DD Form 254	- Contract Security Classification Specification

(Copies of specifications and publications required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer.)

2.1 Order of Precedence. In the event of a conflict between NTS 9090-820 and the references cited herein, the text of NTS 9090-820 shall take precedence. However, if the requirements of NTS 9090-820 have been modified by a specific shipbuilding or overhaul contract or type of contract document; the requirements of the contract document shall take precedence.

3. DEFINITIONS

3.1 Building Yard. Any shipyard building a ship.

3.2 Computer Aided Design (CAD). CAD is a method of generating and revising diagrams using an interactive graphics computer system. The CAD product is plotted using vector or raster plotters.

3.3 Computer Aided Design (CAD) Database. The CAD data base is a collection of CAD entities which are generated by a CAD user on a CAD system to make a diagram. It consists of the text, vector graphics and administrative data used by the CAD computer program to produce the model and drawing. Each CAD system has its own database format, but translators to convert databases to other CAD systems may be available. NAVSEA technical Specification 9010-810 specifies the standard CAD database format, entity, types, layers, colors, file naming standards, etc.

3.4 Front Matter. Generally, front matter consists of the pages preceding the main text of the publication.

3.5 Lead Building Yard (LBY) and Follow Yards. When more than one shipyard is involved in building a class of ships from one set of plans, one of the shipyards is designated the LBY. The other yards are designated the follow yards.

3.6 Master Copy Damage Control Book and Diagrams. When a class of ships is being built by several shipyards, the LBY produces the first damage control book and diagrams. The LBY then furnishes a printed copy and a computer disk copy of this material to the follow yards. The follow yards will modify this material and use it to produce a damage control book for each individual ship they are building.

3.7 Plan Layout A plan layout is a preliminary depiction of the general arrangement and size of the subdivision and damage control systems diagrams.

3.8 Planning Yard A Planning Yard is the designated Navy Department or private industry activity responsible for the planning, supervision, and performance of life-cycle support for designated ships and classes of ships.

3.9 Supervisor of Shipbuilding (SUPSHIP). The term SUPSHIP as used in this standard shall be understood to apply to the Navy Department activity responsible for supervising the building, conversion or repair of a ship, at a commercial shipyard or other naval shipyard.

3.10 Technical Manual Contract Requirement (TMCR). The TMCR is a definitive contract document that provides with the Contract Data Requirements List (DD Form 1423) and associated data item description (DIDs) specific requirements and direction for preparation and delivery of technical manual data items being acquired from a contractor. It identifies all exceptions to the specifications, standard, or DIDs, and provides the means to tailor technical manual requirements to the particular hardware or software being acquired by consolidating such requirements into a single document, resulting in a clearer statement or requirement in the contract.

4. ADMINISTRATIVE REQUIREMENTS

4.1 Responsibility for Preparation of the Damage Control Book and Diagrams. Responsibility for preparation of the damage control book and diagrams shall be as specified in 4.1.1 through 4.8.

4.1.1 Lead Building Yard The LBY shall prepare the master copy damage control book and diagrams for the lead ship and other contracted ships of the ship class, and shall submit the book and diagram components in accordance with the schedule contained in **Appendix A (or as modified by the Contracting Document)**.

4.1.2 Follow Yard The follow yard shall utilize a copy of the lead ship damage control book and diagram components provided by the LBY as base line material to produce damage control books and diagrams for the ships they are building. The follow yard shall submit the damage control book and diagram components in accordance with the schedule specified in **Appendix A (or as modified by the Contracting Document)**.

4.2 Quality Assurance Provisions The ship (or ship class) Planning Yard and or other designated government activities (as required by the CONTRACTING DOCUMENT), shall monitor the development of the damage control book and diagrams as specified in **Appendix (or as modified by the Contracting Document)**.

4.2.1 Plan Layout. A plan layout of the damage control diagrams for the lead ship of the ship class shall be submitted to the government for approval in accordance with **Appendix A (or as modified by the Contracting Document)**.

4.2.2 Ship Stability Data Ship stability data consisting of the damage control book section II(a) and the Flooding Effect diagram and Liquid Loading diagrams shall be submitted to the government for approval in accordance with **Appendix A (or as modified by the Contracting Document)**.

4.2.3 In-Process Reviews When the Damage Control Book and Diagrams reach the 30 percent and 60 percent completion level, they are reviewed by the Government **(or as modified by the Contracting Document)**.

4.2.4 Responsibility for Accuracy. Each building yard shall be responsible for the accuracy of the damage control books and diagrams it submits to the navy in accordance with the contract. Failure to meet the following requirements shall be cause for rejection.

(a) Conform to NTS 9090-820 and Associated Amending Documents. The damage control book and diagrams shall conform to the requirements of NTS 9090-820 and associated amending documents.

(b) Consistency With Shipboard Installation. The labeling, location numbering and damage control classification of fittings and system components contained in the shipboard labels and the labeling and location numbering of fittings and system components depicted on the damage control diagrams, shall be completely consistent. Discrepancies between the diagrams and the ship shall be resolved.

(c) Damage Control Book and Diagram Consistency. The labeling and location numbering of shipboard fittings and system components contained in damage control book, shall be completely consistent with the labeling and location numbering of corresponding fittings and system components depicted on the damage control diagrams.

(d) Damage Control Book and Diagrams Consistency With the Compartment Check-Off List (CCOL). The labeling and location numbering of shipboard fittings and system components contained in damage control book, and depicted on the damage control diagrams, shall be completely consistent with the labeling and location numbering of corresponding fittings and system components listed on the CCOLs.

4.2.5 Certification. When forwarding the damage control books and diagrams for each ship, the shipbuilder shall furnish to the Supervisor of Shipbuilding (with a copy to the ship or ship class planning yard), a forwarding letter containing a statement certifying that the damage control books and diagrams for the subject ship, conform to the requirements of NTS 9090-820 section 4.2.4. (a), (b), (c) and (d).

4.3 Government Furnished Information (GFI). Section 27.2 contains a list of required GFI that is provided to activities developing damage control books and diagrams.

4.4 Security Classification and Marking. Damage Control Books and Diagrams shall be classified in accordance with instructions contained in the Department of Defense Contract Security Classification Specification (DD Form 254) for the subject contract. The classification marking for damage control diagrams shall be applied in accordance with ***Figures 1*** and ***2***. The classification marking damage control book pages shall be applied in accordance with ***Figure 6***. The Classification marking of magnetic tape reels containing damage control diagram data and word processing disks containing damage control book data, shall be marked in accordance with current security regulations.

4.5 CAD File Number All Damage Control Diagrams shall contain a computer aid design (CAD) File Number (**see 5.4.8) (C)** and ***Figure 4***.

4.6. Status of Damage Control Books and Diagrams Report Each planning yard shall fill out and submit a quarterly status report as shown in ***Figure 16*** for ships under their cognizance that are under new construction, in a post shakedown availability or in a overhaul or availability status. Status reports shall be addressed to: Commander, Naval Sea Systems Command, 2531 Jefferson Davis Highway, Arlington, VA. 22242-5160 Att: Damage Control / Fire Fighting Division. A computer copy of this report can be obtained on disk from the above address upon request.

TABLE I

Inventory of Required Damage Control Book and Diagram Components.

Item Number	Item	See Section
1.	Stability and loading text	9.5 and Appendix A
1a.	Heeling effect of beam winds	9.5.2.3 and Appendix A
1b.	Curves of static stability	9.5.2.4 and Appendix A
1c.	Cross curves of stability	9.5.8 and Appendix A
1d.	Draft diagrams and functions of form	9.5.9 and Appendix A
1e.	Subdivision plan views for flooding effect and liquid loading	5.1, 9.3 and 9.4
2.	Flooding effect and liquid loading diagram (computer tape)	Appendix A
3.	Computer disk copy text and tables excluding the stability and loading section	Appendix A
3a.	A printed copy of text and tables, excluding the stability and loading section	Appendix A
4.	Plan layout of damage control diagrams	4.2.1 and
4a.	Subdivision diagram (computer tape)	Appendix A
5.	System base diagram (computer tape)	Appendix A
6.	Main and secondary drainage, and ballasting system diagram (computer tape)	Appendix A
7.	CHT gravity and miscellaneous drainage system diagram (computer tape)	Appendix A
8.	Firemain, sprinkling, and AFFF systems diagram (computer tape)	Appendix A
9.	Washdown system diagram (computer tape)	Appendix A
10.	Fuel, (DFM) filling, transfer, and overflow system diagram (computer tape)	Appendix A
11.	Automotive gasoline filling, transfer and overflow systems diagram (computer tape)	Appendix A
12.	JP-5 filling, transfer, and overflow system diagram (computer tape)	Appendix A
13.	Ventilation supply, air conditioning, Collective Protective System (CPS) diagram (computer tape)	Appendix A
14.	Chilled water system diagram (computer tape)	Appendix A
15.	Compressed air system diagram (computer tape)	Appendix A
16.	Oxygen and nitrogen system diagram (computer tape)	Appendix A
17.	Casualty power supply and casualty communication systems diagram (computer tape)	Appendix A
18.	Damage control book (complete printed copy)	Appendix A
19.	Damage control book text and printed copy of damage control diagrams (marked up to reflect the ship as delivered)	Appendix A

4.7 Inventory of Required Damage Control Book and Diagram Components

Table I presents a list of the deliverable data (Damage Control Book and Diagrams components) a shipbuilder is required to pass to the planning yard following construction of the ship.

4.8 Distribution of PRELIMINARY, & FINAL Damage Control Book and Diagram Components. During new construction PRELIMINARY damage control book and diagram components shall be distributed in accordance with **Appendix A (or as modified by the CONTRACTING DOCUMENT)**. Following new constructio, and during the ship's life cycle, FINAL damage control book and diagrams shall be distributed in accordance with **Appendix B Table IV**.

4.9 Ship Force Revision of Damage Control Books and Diagrams. The instructions that a ship's force shall follow to get the damage control books and diagrams revised is contained in **Naval Ships Technical Manual (NSTM) 079 Volume 2**.

4.10 Responsibility for Life Cycle Revision of Damage Control Books and Diagrams Damage Control Books and Diagrams shall be revised in accordance with **Appendix B**.

4.11 Packaging. Laminated damage control diagrams shall be packaged flat or rolled as necessary, the damage control book and word processing disks shall be packaged flat. Diagrams not laminated shall be folded. Magnetic tape reels shall be packaged in accordance with the **CONTRACTING DOCUMENT**

4.12 Shipping. CONFIDENTIAL damage control book and diagram data shall be packaged and shipped in accordance with the current regulations for shipping classified data. UNCLASSIFIED damage control book and diagram data shall be shipped in accordance with current shipping regulations.

5. DAMAGE CONTROL DIAGRAMS, GENERAL REQUIREMENTS

5.1 Plan View Diagrams. Flooding Effect and Liquid Loading Diagrams shall be drawn in plan view format. Each deck shall be laid out with the bow end of the deck starting from the right side of the diagram.

5.1.1 Plan View Diagram Size. Based upon the length of the ship, the plan view type diagrams shall be one of the sizes listed below:

SHIP LENGTH	BORDER SIZE	DIAGRAM TRIM SIZE (Unlaminated)	LAMINATED TRIM SIZE
Up to approx 650 feet	10-1/2 by 53 inches	11 by 53-1/2 inches	11-1/2 by 54 inches
Approx 700 feet and larger	10-1/2 by 26-1/4 inches	11 by 26-3/4 inches	11-1/2 by 27-1/4 inches

5.2 Isometric Diagrams. All subdivision and system diagrams shall be two-dimensional isometric projections. Diagrams of ships shall be drawn with the bow to the right using a horizontal line to represent the longitudinal base line or other longitudinal line. A transverse line shall be represented by a line at 60 degrees, and a vertical line shall be represented by a line at 120 degrees, measuring counter-clockwise from the horizontal. To simplify drafting, camber and sheer may be neglected. Deck levels views shall be depicted one above the other so that the corresponding frame numbers of each deck are in vertical alignment. Superstructure deck levels spanning only a small portion of the length of the ship shall be positioned on the diagram side by side as space allows.

5.2.1 Isometric Diagram Size Based upon length of the ship, the isometric damage control diagrams for a ship shall be one of the sizes listed below. Also **see NAVSEA type Drawing: 80064-804-921794 entitled, Leaf Units, Hinged, Types A, B & C.**

SIZE	SHIP LENGTH	BORDER SIZE	DIAGRAM TRIM SIZE (Unlaminated)	LAMINATED TRIM SIZE
A	Up to approx 350 feet long	15-1/2 by 26-3/4 inches	16 by 27-1/4 inches	16-1/2 by 29 inches
B	400 feet to 650 feet long	24-1/2 by 37-1/2 inches	25 by 38 inches	25-1/2 by 38-1/2 inches
C	700 feet and larger	38 by 52-1/2 inches	38-1/2 by 53 inches	39 by 26-3/4 inches Cut in half to fit hinged leaf unit

5.3 Chart Type Diagrams The Vital Damage Control Electrical Equipment, Power Supply Chart, and Communication Directory shall be in chart format. These diagrams shall be equal in size to the Size B diagrams in paragraph 5.2.1.

5.4 Damage Control Diagram Format The overall format of damage control diagrams is shown in ***Figure 1***.

5.4.1 Security Classification If the diagrams are classified Confidential the word "CONFIDENTIAL" shall appear on all diagrams as shown in ***Figure 1 (item 1) and Figure 2***. If the diagrams are Unclassified no security notation is required.

5.4.2 Overhaul Record Block An overhaul record block shall appear on all diagrams as shown in ***Figure 1 (item 2)*** and ***Figure 2***.

5.4.3 Upper Title Block The upper title block shall appear on all diagrams as shown in ***Figure 1 (item 3)*** and ***Figure 2***. The upper title block shall contain the following:

(a) The diagram number (**see 5.4.4**)
(b) Ship type and hull number
(c) Ship class designation
(d) Title of the diagram.

5.4.4 Diagram Numbering System **Table II** provides a list and the numbering sequence for a typical ship-set of damage control diagrams. A general explanation of the diagram numbering system is as follows:

(a) FLOODING EFFECT and LIQUID LOADING. When these subjects are each shown on separate plan view type diagrams, the former is numbered 1, and the latter is numbered 1B.

(b) SUBDIVISION. These isometric diagrams are numbered sequentially 2, 3, 4... etc. The lowest decks are shown beginning on diagram 2 with higher decks shown on succeeding diagrams 3, 4... etc.

(c) SHIP SYSTEMS. Each ship system is assigned a separate number with a suffix letter A, B, C... etc., added to each isometric diagram in the set. The suffix letter A is assigned to the diagram depicting the extent of the system at the lowest levels in the ship, and succeeding suffixes B, C, D...etc are assigned to each diagram showing the extent of the system at higher levels in the ship.

TABLE II

TYPICAL NUMBERING SEQUENCE FOR A SHIP SET OF DAMAGE CONTROL DIAGRAMS

Assigned Diagram No.	Title
1A	Flooding Effect
1B	Liquid Loading
2	Subdivision - 2nd Platform and Below
3	Subdivision - 1st Platform, Main Deck and 41' Flat
4	Subdivision - 01 Level, 02 Level, 03 Level
5	Subdivision - 04 Level and Above
6A - 6B	Main and Secondary Drainage & Clean Ballasting System
7A - 7C	Plumbing Gravity and Miscellaneous Drains, Sounding Tube Deck Plates and Sewage Disposal System
8A - 8D	Firemain, Sprinkler, Foam @ Washdown Systems
9A - 9C	Ship's Service Fuel Filling, Transfer, Overflow and Tank Stripping System
10A -10C	Aviation (JP-5) Filling, Transfer, Overflow Systems and Tank Stripping System
11A - 11D	Ventilation Systems, Supply & Recalculative
12A - 12D	Ventilation Systems, Exhaust
13A - 13D	Chilled Water System
14A - 14B	Compressed Air Systems
15A - 15D	Casualty Power Supply & Casualty Communication System
16A - 16C	Vital Damage Control Electrical Equipment & Power Supply Chart
17A - 17B	Communication Directory

5.4.5 Key The key shall appear on subdivision and systems diagrams as shown in ***Figures 1*** and ***3***. The key shall describe by line weight and color the type of structural boundary (i.e. oiltight, watertight, etc.). The key shall also depict the colors for the systems shown on the diagram.

5.4.6 Symbols. **Table III**, ***Figure 37*** is a menu of the symbols used on damage control diagrams. The ship's assigned planning yard, will furnish a CAD menu of the symbols upon request. Only the symbols shown in Table III shall be used on the damage control diagrams and appear on the diagrams legend. The symbol legend shall appear on the diagram in the area shown in ***Figure 1 (item 5)***. Each symbols listed in the legend, followed by a description of what it represents shall be listed in the symbol legend in the following sequence:

(a) Valves
(b) Manifolds
(c) Miscellaneous fittings i.e., Sea Chests, Hose Connection, Spray Nozzles, etc.
(d) Pumps
(e) Bulkhead penetration

5.4.7 Notes Notes applicable to the diagram shall be placed on the diagram in the area shown in ***Figure 1 (item 6)***. Notes shall be:

(a) Used to identify end use system components or equipment which cannot be shown on the diagram, but which are connected to the system.
(b) Used to identify the point where a system connects to another system not shown on that diagram. The diagram number for the other system shall be included in the note.

(c) Preceded by uppercase letters ie; A, B, C...etc. The letters preceding each note shall be listed in alphabetical order. When the untidy of notes exceeds the number of letters in the alphabet, the remaining notes shall be preceded by double letters ie; AA, BB, CC... etc., in alphabetical order. When more than one system in shown on the diagram, a letter shall be used once on only one of the systems. When a note letter is used on a diagram for a particular system the note letters shall be the same on all the diagrams that make up the particular system.

5.4.8 Lower Title Block The lower title block shall appear on all diagrams as shown in ***Figure 1 (item 7)***. As shown in ***Figure 4*** the lower title block shall contain:

(a) A NAVSEA Logo and a logo for the ship's Planning Yard. An electronic copy of these logos can be obtained from the ship's Planning Yard upon request.
(b) A notation under the Planning Yard logo that states: "For questions concerning this diagram contact (name of ships Planning Yard).
(c) CAD File No.
(d) A scale (**see 5.4.9**)
(e) The notation (in uppercase letters): SHIP'S FORCE SHALL MAINTAIN RECORD OF SHIP FORCE REVISIONS TO THIS DIAGRAM AND SUBMIT COPY OF REVISIONS TO OVERHAUL ACTIVITY AT START OF OVERHAUL.

5.4.9 Scale. A scale shall be shown on each diagram in the vicinity of the lower title block as shown in ***Figure 1*** **(item 8)** and ***Figure 4***. **(item d)** The scale shall be the same as the scale used in preparing the diagrams.

5.4.10 Cut Line Markings Cut line markings apply to size C diagrams only, (**see 5.2.1**). Size C diagrams shall have cut line markings for guidance in cutting the printed copies of the damage control in two equal parts so that laminated copies may be stowed in damage control cabinets and hinged leaf units. This cutting guide shall consist of an upper line and a lower line 3/8-inch long, extending in from borderline as shown in ***Figure 1*** **(item 9)**. On diagrams that are to be cut in half; fittings, valve numbers, lettering, and vertical lines shall be located clear of the cutting line.

5.4.11 Ship and Diagram Identification Block Size C diagrams (**see 5.2.1**) that are to be cut in half shall have the ship type and hull number and diagram number and title in the upper, left-hand corner of the left half of the diagram as shown in ***Figure 1 (item 10)*** and ***Figure 2***.

5.4.12 Border All isometric diagrams shall have borders as shown in ***Figure 1 (item 11)***. Border sizes shall be in accordance with 5.2.1

5.4.13 Diagram Trim Lines Printed copies of diagrams are trimmed along the trim lines as shown in ***Figure 1*** **(item 12)**. Diagram trim sizes shall be in accordance with 5.2.1.

5.5 Lamination of Damage Control Diagrams. Upon completion of the printing process, a designated quantity (**see Appendix-A**) of the printed diagrams shall be laminated in accordance with the following instructions:

(a) The damage control diagrams shall be laminated on both sides with 0.010-inch thick rigid vinyl plastic by a heat process method that will not adversely affect the colors on the diagram.

(b) The front surface shall be smooth (a non-matte surface), receptive to china-marking crayons and permit easy removal with a dry cloth of such crayon marks without the crayon colors becoming imbedded in the surface. The front surface shall be clean, free of dirt and foreign matter and not reflect images or light from the compartment lighting.

(c) The size C diagrams (**see 5.2.1**) that are cut into two halves shall have a 1/64 inch overlap on the cut edge, outside the cut marks, so that when both halves of the diagram are butted together they form a complete diagram in precise alignment.

(d) The final size of the laminated planview diagrams shall be in accordance with paragraph 5.1.1. The final size of the laminated isometric and chart form diagrams shall be in accordance with paragraph 5.2.1.

6. DAMAGE CONTROL DIAGRAMS DETAIL REQUIREMENTS

6.1 Weight of Lines. Line weights shall be in accordance with **APPENDIX C**.

6.2 Letters, Words and Numbers, Size and Style . The size and style of words, letters and numbers shall be in accordance with **APPENDIX C**.

6.3 Numbering of Damage Control Fittings. Damage control fittings are assigned basic location numbers in accordance with the **GENERAL SPECIFICATIONS FOR SHIPS OF THE UNITED STATES NAVY S9AAO-AA-SPN-010**. The number of each such fittings as shown on the diagrams shall match the assigned location number for the corresponding fitting on the ship.

6.3.1 Placement of Numbers and Notes for Valves and Fittings. Numbers and notes for valves and fittings shall be placed as closely as possible to the component to which they apply, and an indicating line without arrowheads shall connect the number with the component.

6.4 Color Requirements The color requirements for each major system is specified in the requirements section for the specific system. The specific color tones for each color shall be as specified in **Table 22 of APPENDIX C**. Components with special color requirements are specified in 6.4.1 and 6.4.2.

6.4.1 Components Printed Same Color as System When an integral part of a system, the following components shall be printed the same color as that system:

(a) Bulkhead penetration points
(b) Fitting symbols and their numbers
(c) Notes applying to the system.
(d) A stub and its continuation letter designator, the connecting root valve or fitting (and its location number) which signifies the point at which the system is connected to and supplying service to a dependent system component not shown on the diagram (**see 5.4.7**).
(e) Numeric designators that signify continuation of the system on another part of the diagram or continuation of the system on another deck not shown on the diagram.

6.4.2 Components Printed Black The following components are printed black:

(a) A stub and letter designator, the connecting root valve or fitting (and its location number) that are components of another system (shown on another diagram) which supplies service to the system shown on the diagram.
(b) A letter designator signifying the connection point at where the system shown on the diagram in supplying service to another system shown on another diagram.

6.5 Ducts and Piping. Ducts and piping shall be shown as follows:

(a) Ducts and piping shall be shown as close to their true location as diagrammatically as possible. Ducts and piping shall be shown solid where visible and dotted where hidden. A jumper shall be shown where ducts, piping and cables cross one another but are not connected.

(b) Bulkhead penetration symbols (**see Table III**) ***Figure 37*** shall be used to show where piping and ducts pierce bulkheads.

(c) For continuation of A, B, and C systems, continuation notes shall be added above and below; for example, see continuation on diagram and so forth.

6.6 Spurs and Branches. Spurs and branches to components of the system, or equipment served by the system which is not shown on the diagram shall be shown as far as the first cutout valve. Spurs and branches for other services shall be printed in black and shall have a capital letter corresponding to the capital letter assigned to the syste as it is listed in the notes section of the diagram. The note shall indicate the applicable system diagram referred to; for example:

A - See firemain system diagram no. 7A.
B - See fuel system diagram no. 8A

6.7 Fittings to be Omitted. Takeoffs to gauges, petcock drains, bleeders, strainers, and separators shall not be shown.

6.8 Remotely Operated Fittings When remotely operated fittings on one deck have their remote controls located on another deck (which is shown on another diagram), the following requirements apply:

(a) The basic location numbers for the remotely operated fittings and the location number of the compartments where their remote controllers are located, shall be listed in a table.

(b) The basic location number of each remotely operated fitting shall be listed in the left column of the table, and printed in the same system color as its corresponding fitting. The compartment number (and Remote Control Station number if assigned) for the corresponding controllers shall be printed (in black) in the right column of the table.

(c) The table shall be shown on the same diagram as the remotely operated fittings.

6.8.1 Remote Controllers On the decks where the remote controllers are located, the following requirements apply:

(a) Each controller shall be represented by a remote control symbol (**see Table III**) ***Figure 37***.

(b) Each remote control symbol shall be labeled with the basic location number of the remotely operated fitting it controls.

(c) The symbol and number shall be printed the same system color as the remotely controlled fitting to which they are assigned.

(d) If several fittings of the same system are remotely operated from the same location, a single remote control symbol shall be used. The basic location number for each remotely operated fitting shall be listed next to the symbol. If the quantity of basic location numbers is too numerous to list next to the symbol, the location numbers shall be listed in a table on the same diagram. The table shall be assigned a numeric number, and the table number shall be printed next to the remote control symbol.

(e) If a controller (or group of controllers) represent a Remote Control Station which is assigned a number, the remote control symbol and station number shall be printed in black.

(f) The basic location numbers for remotely operated fittings that are listed in a table shall be printed in the same system color as the remotely operated fittings to which each controller is assigned.

6.9 Enlarged Views. The following requirement apply:

(a) The area of a diagram requiring an enlarged view shall be circled and identified by a leader line followed by the words "See Enlarged View (letter designation)"
(b) The enlarged view shall be identified by a uppercase letter designator.
(c) The enlarged view shall duplicate the structural area on the body of the diagram it is enlarging.
(d) Enlarged views shall be shown in the same isometric projection as the body of the diagram (**see 5.2**).
(e) Compartment identification, system numbering, and the size and color of letters, numbers, and system fittings in the enlarged view, shall be the same as those in the body of the diagram.
(f) No scale or shading is required for enlarged views.

7. DAMAGE CONTROL BOOK GENERAL REQUIREMENTS

A unique Damage Control Book shall be prepared for each ship. The damage control book shall be a publication consisting of an appropriate single column text and tables. The text and tables shall explain the damage control features of the ship and explain and supplement the data shown on the damage control diagrams.

7.1 Computer Word Processing Requirement Computer word processing equipment shall be utilized to write the damage control book. Type size shall be 12 Point and the style will be Helvetica or equal. The computer language and specific computer hardware requirements shall be specified in the **Contracting Document**.

7.2 Example Damage Control Book. A example Damage Control Book will be provided by the Government, if requested by the contractor (**see 27.2**) (**item h**).

7.3 General Format Requirements. The damage control book sections shall be laid out and numbered in accordance with the general format shown below.

Page No.

None	Title Page
A-D	Table of contents
E-J	Record of Page Revision Dates
1	Procedure for Revising and Handling Damage Control Diagrams and Text
2	Preface
3-4	References
5-6	Damage Control Diagrams List of

PART I - GENERAL INFORMATION

I(a)	Principal Characteristics
I(b)	Steering Gear
I(c)	Towing
I(d)	Ordinance Handling
I(e)	Medical Department
I(f)	Ship Damage Control Organization
I(g)	Personnel Protection
I(h)	Aircraft Launching and Handling
I(i)	Nuclear Blast Loading Protection
I(j)	Reactor Secondary Containment Boundaries

PART II - DAMAGE CONTROL SYSTEMS

II(a) Stability and Loading
Introduction
Stability Provided
Measures To Safeguard Stability
Minimum Acceptable Stability
Limiting Drafts
Standard Conditions of Loading
Discussion of Diagrams
II(b) Subdivision and Access
II(c) Drainage, Plumbing, Ballasting, and List Control System
Deck Drain Valves
Miscellaneous Drains
Plumbing Drain Valves
Gagged Scupper Valves
Portable Pumps
Sounding Tubes (Voids, Water, & Misc Spaces)
Air Escapes
Plumbing Vent System
Ballasting System
List Control System
Gravity and Miscellaneous Drainage System
Collection, Holding, and Transfer (CHT) System
II(d) Tank Drain System
II(e) Firefighting Systems and Washdown System
Passive Fire Protection
Firemain System
Sprinkling System
Fresh Water Firefighting System
Aqueous Film-Forming Foam (AFFF) System
Washdown System
Carbon Dioxide (CO2) Fire Extinguishing System
Halon System Fire Extinguishing System
II(f) Ships Fuel System
II(g) Aviation Fuel System
II(h) Automotive Gasoline System
II(i) Ventilation System Including The Collective Protection System
II(j) Air Conditioning Chilled Water Systems
II(k) Compressed Air Systems
II(l) Oxygen and Nitrogen Systems

PART III - MISCELLANEOUS SYSTEMS

III(a) Freshwater Systems
III(b) Flushing Systems
III(c) Voice and Pneumatic Tubes and Message Passing Facilities
III(d) Lubricating Oil Systems

PART IV - ELECTRICAL SYSTEMS

IV(a) Power and Lighting
IV(b) Causality Power Supply System
IV(c) Interior Communication Systems

7.4 Front Matter. The front matter shall consist of the pages specified in 7.4.1 through 7.4.6.

7.4.1 Title Page. The title page format shall be in accordance with ***Figure 6*** and shall contain the following data:

(a) CAD File Number (**see 4.5**).
(b) Security Classification (**see 4.4**)
(c) Classification Authority (**see 4.4**)
(d) Declassification Statement (if classified Confidential)
(e) Nomenclature: Damage Control Book
(f) Hull Number
(g) Ship Type
(h) Volume Number of Damage Control Book (when size of book requires several volumes)
(i) Part Number of Damage Control Book
(j) Department of the Navy
Naval Sea Systems Command
Washington, D.C. 20362
(k) Year of Ship Delivery
(L) For questions concerning this document please contact
Name of Ship's Planning Yard
(M) Edition of Book

7.4.2 Table of Contents. The table of contents pages shall be formatted as shown in ***Figure 7.***

7.4.3 Record of Page Revision Dates. The Record of Page Revision Dates pages shall be structured in accordance with ***Figure 8.***
Data shall be entered on the Record of Page Revision Date pages as follows:

(a) TITLE BLOCK-
1. The title block shall contain the title: RECORD OF PAGE REVISION DATES, and define the **"R"**, **"N"** and **"V"** notations.

(b) PAGE NUMBER COLUMN.
1. All damage control book pages shall be listed the blocks within this column.

(c) SHIP AVAILABILITY DESIGNATION BLOCKS.
1. During new construction, when the damage control book is printed for the first time, the year of the first printing shall be entered in the first block , for example: **"1996"**. The words **"ORIGINAL PRINTING UNDATED"** shall be entered into the first column of the Page Revision Block section.
2. Following new construction, the year of the ship's next availability shall be entered into the second block, for example **"PSA 1997"**.
3. In future years, as the ship undergoes availabilities; such as Selected Restricted Availability (SRA), Docking Selected Restricted Availability (DSRA), and Regular Overhauls (ROH); etc., the acronym for, and year of these availabilities shall be entered into the succeeding blocks, for example: **SRA 1998, SRA 1999, DSRA 2000 and ROH 2005.**

(d) PAGE NUMBER BLOCKS
1. The front and back number of each damage control book page, shall be entered in a individual block. For example: **A-B, C&D, E-F, G-H,** etc.
2. A Page Number Block is left blank between each listing of a major section of the damage control book.

(e) PAGE REVISION BLOCKS
1. During availabilities, pages that are revised shall get the notation **"R"**. New pages shall get the notation **"N"**. Pages that are voided (deleted), shall get the notation **"V"**. The applicable notation for each page shall be entered into the Page Revisin Blocks.

2. The Page Revision Block is left blank for pages that are not revised or voided during the availability.
3. If only one side of a page is revised or voided, the Page Revision Block is split. Half the block is left blank, the notation "/ R" or "V /" is entered into the first or second half of the block as applicable.
4. If during a regular update, there are major revisions, and the book is completely revised and reprinted, and all coluums are filled, the notation **"COMPLETE REVISION"** is entered into the first coluum, and all prior data in the other coluums is deleted, and the book is considered the same as the ORIGINAL PRINTING.

(F) NOTES BLOCK

1. The size of this block shall be the same as shown in ***Figures* 13, 14, 15, 17, 18** and **19**.

(g) PAGE NUMBER, SHIP NUMBER and REVISION DATE

1. The size of these blocks shall be the same as shown in ***Figures* 13, 14, 15, 17, 18** and **19**.
2. Each Record of Page Revision Dates page is assigned an alphabetical letter designation **see section 7.3** and **7.5.1 (c)**.
3. The ships class designation and hull number is entered in the ship number block, for example: **DDG-66**.
4. After each availability, the type and year of the availability shall be entered into the Revision Date Block, and the notation shall match the notation that was entered into the Ship Availability Designation Block, for example: **ROH 2005**.

7.4.4 Procedure for Revising and Handling Damage Control Diagrams and Text. The following words shall appear on page 1 of the damage control book: "The ship force procedures for revising the Damage Control Books and Diagrams are contained in **Naval Ships Technical Manual (NSTM) Chapter 079, Volume 2 S9086-CN-STM-020/CH 079 VOL 2**.

7.4.5 Preface. The preface as shown in ***Figure 9*** shall appear on the page 2 of the Damage Control Book.

7.4.6 Page of References. Publications pertaining to damage control that are available to the ship, shall be on the reference pages. The title of each publication and its source of supply shall be listed as shown in ***Figure 10A and 10B***.

7.4.7 List of Damage Control Diagrams. The pages shall list each damage control diagram title, diagram number and each diagram's Date of Last Revision as shown in ***Figure 11***.

7.5 Damage Control Book Page Numbering. Page numbering shall be as specified in paragraphs 7.5.1 through 7.5.4.

7.5.1 Front Matter Page Numbering. Front matter pages shall be numbered as follows:

(a) As shown in paragraph 7.3 and ***Figure 6***, the title page shall not be numbered.
(b) As shown in paragraph 7.3 and ***Figure 7***, the table of contents shall have alphabetical page numbering using capital letters.
(c) As shown in paragraph 7.3 and ***Figure 8***, the Record of Page Revision Dates shall also be assigned capital letters as page numbers. The assigned letters shall be a continuation of the last letter assigned to the table of contents page.
(d) Procedure for Revising and Handling Damage Control Diagrams and Text shall be numbered 1.
(e) The Preface page shall be numbered 2.
(f) Reference pages shall be numbered 3 & 4.
(g) List of Damage Control Diagrams shall be numbered 5, 6... as required.

7.5.2 Part I, II, III and IV Cover Page Numbering. The cover pages for the four major parts of the damage control book shall be numbered I-1, II-1, III-1 and IV-1.

7.5.3 Section and Subsection Page Numbering. Page numbering shall consist of three components; for example II(a)5:

(a) First Component: Roman numeral II corresponds to the part number.
(b) Second Component: a letter in parenthesis corresponds to the section within the part.
(c) Third Component: Arabic numbers in sequence for each page within the section.
(d) As shown in ***Figure* 7**, pages within unrelated sections shall be sequentially numbered, 1, 2... etc. Each unrelated section shall begin one page 1 and end on an even numbered page, (**see 7.5.4**).
(e) As shown in ***Figure* 7**, the pages within a group of related subsections (ie; Subdivision and Access) shall be sequentially numbered, beginning with page 1 in the first subsection. The page numbering in each subsequent subsection shall follow in sequence where numbering in the preceding subsection ended. Each unrelated subsection shall begin on an odd numbered page and end on an even numbered page, (**see 7.5.4**).

7.5.4 Intentional Blank Pages. Pages marked with the notation "Intentional Blank" shall be used as follows:

(a) As a spacer page between the text portion and table portion of a section or subsection.
(b) When the text and tables of a section ends on an odd numbered page an "Intentional Blank" page is added and given a even number so that the section ends on an even numbered page as required by paragraph 7.5.3(d).
(c) When the text and tables of a subsection ends on an odd numbered page an "Intentional Blank" page is added and given a even number so that the section ends on an even number and the next related subsection begins on a odd numbered page as required in paragraph 7.5.3(e).

7.6 Sections Which are Not Required. The damage control book format as shown in paragraph 7.3 shall be maintained regardless of whether or not a particular system is applicable to the ship. For example, on ships that do not have a gasoline system, a title page shall be provided and numbered Part III(g)(page number) and titled: Gasoline System (Not applicable to this ship).

7.7 Page Sheet Size. Page sheet size shall be 8-1/2 by 11 inches

7.8 Page Sheet Utilization. The damage control book text and tables shall be printed on the front and back of the page sheets.

7.9 Punching of Page Sheets. Damage control book text pages shall be punched with 3/8-inch holes to fit a standard three-ring binder.

7.10 Print Style. Print style shall be "Helvetica" or equal.

7.11 Print Size. Print size shall be 12 point horizontally.

7.12 Print Lines Per Inch. There shall be 6 lines per inch vertically.

7.13 Requirement for Two or More Volumes. When a damage control book exceeds approximately 300 page sheets, an additional volume shall be created. The full capacity of each subsequent volume shall be approximately 300 page sheets. Each volume of a multiple volume damage control book shall have the following front matter:

(a) Volume I - Front matter items 7.4.1, 7.4.2 (pertaining to all volumes) and 7.4.3 through 7.4.6.
(b) Volume II and additional volumes - Front matter items: 7.4.1 and 7.4.2 (pertaining to specific volume only)

7.14 Format for Text and Tables. The damage control book text data shall be printed on pages formatted in accordance with ***Figures*** *7* through ***12***. Damage control book tables shall be formatted in accordance with ***Figures*** *13* through ***Figure*** *20*. As shown in ***Figures*** ***10A,10B*** and ***Figure*** *20* the text and table pages shall be printed as follows:

(a) The title of the section or subsection shall be printed on each page.
(b) The classification of the page shall be printed at the top and bottom of the page.
(c) The page number and ship's hull number shall be filled in.
(d) The date shall be printed on each page. If the page is part of a new and unrevised book the year of the original printing (ie; 1993) shall be shown. When data on the page is revised as the result of a overhaul or availability the date shall reflect the type of availability and date (ie:PSA 1995).
(e) The appropriate platform deck or level shall be included at the top of the tabulation on each table and at the beginning of tabulation for the next deck. The data in the tables shall be listed beginning with the lowest deck, reading from forward to aft, and ending on the highest deck and shall be listed consecutively.
(f) Data in tables shall have a double space between the description of each item of data.
(g) Where compartments are listed in a connecting space type table ***see*** ***Figure*** *13* and ***Figure*** *20* the compartment number shall be listed first followed by the compartment name. In the other types of tables, when compartments are listed, the compartment name shall be listed below the compartment number. The fitting numbers as listed in the tables shall match the assigned location number for the corresponding fitting on the ship and the fitting if depicted on the corresponding systems diagram (**see 6.3**).
(h) When footnotes are required, the symbol reference to the footnote shall be printed outside the left-hand bind margin immediately adjacent to the vertical line. The footnote shall be typed in the notes section of the table.
(i) The closure classification for each fitting shall be printed in the closure classification column.
(j) The column headed "Division Responsible" shall be left blank. These columns are filled in by the ship's force.

7.15 Binders. Binders shall be as specified in 7.15.1 and 7.15.2.

7.15.1 Temporary Binders. The contractor shall provide a semi-cardboard, loose-leaf, three-ring binder for distribution of preliminary damage control books.

7.15.2 Permanent Binders. Permanent binders will be provided by the ship's planning yard. Such binders shall meet the following requirements:

(a) Style: Loose leaf for 8-1/2 by 11-inch paper.
(b) Front and back cover and spline: P-78 Polymer (75 gauge)
(c) Hinge and Prongs: Mcbee DLG No. 6 Snap lock (or equal) with triangular grommet and reinforced swing hinge, 5/32-inch heavy duty steel split prongs and heavy duty transfer bar angled on two sides.
(d) Label holder: No. 3, 3-inch, left hand type, with clear poly backing, recessed into the spline of the binder.
(e) Color: Avocado for "Confidential" and blue for "Unclassified" damage control books.
(f) Print color: Gold silk-screen
(g) Print requirements: On cover and spline - the words "Damage Control Book" In the upper left and lower right hand corners of both front and back covers, the security classification - "Confidential" or "Unclassified" as applicable.

8. DAMAGE CONTROL BOOK, PART - 1, GENERAL INFORMATION

Part-1 of the damage control book shall address the general information topics specified in 8.1 through 8.8.

8.1 Principle Characteristics. The text shall list the ship's overall characteristics such as:

(a) General characteristics: Length overall, length between perpendiculars extreme beam, molded depth at side to main deck, freeboard, and displacements.
(b) Frame spacing
(c) Propulsion system: Type and number
(d) Propellers: Description and number
(e) List of armament

8.2 Shoring. The text shall list the type of shoring carried on the ship and the shoring stowage locations. Unless there is some unique characteristic about the ship with regards to shoring, no text data is to be provided. This section shall refer the reader to **Naval Ships Technical Manual (NSTM) Chapter 079, Volume 2 S9086-CN-STM-020/CH 079 VOL 2 Damage Control Practical Damage Control.**

8.3 Steering Gear. The text shall contain a brief description of the steering gear and list the locations of steering stations.

8.4 Towing. The text shall contain a brief description of towing equipment on board ship.

8.5 Ammunition and Missile Handling. The text shall contain a brief description of ammunition and missile handling.

8.6 Medical. The text shall contain a brief description of the facilities including number and location of medical storerooms, battle dressing stations, and surgical spaces. The total quantity of first-aid boxes, portable medical lockers, and medical supply lockers shall be stated. Locations are not required.

8.7 Ship Damage Control Organization. The text shall discuss the following:

(a) DAMAGE CONTROL FACILITIES: List the number, location and describe the function of the following facilities as applicable to the ship:

1. Damage Control Central (DCC)
2. Secondary Damage Control Central (SDCC)
3. Damage Control Repair Stations (DCRS)
4. Damage Control Unit Patrol Stations (DCUPS)
5. Damage Control Unit Lockers (DCUL)
6. Rescue and Assistance (R&A) / Reentry Locker
7. Helicopter Crash & Salvage Locker (HCSL)

(b) REPAIR PARTY ORGANIZATION: List the composition and function of the repair party that is assigned to each repair station. Illustrate each repair station's zone of responsibility on the diagram described in 8.7.1.

(c) DAMAGE CONTROL EQUIPMENT STOWAGE: List the general types of equipment stored in the DCRS, DCUPS, DCULs and the R&A locker, List the locations of the following equipment that is functionally grouped and stored in passageways:

1. Firefighting equipment (clothing, OBAs and canisters)
2. Dewatering equipment (educators, subpumps, P-250s, P-125s and associated accessories).
3. Desmoking equipment (water driven fans and associated vent hoses)

4. Shoring equipment (metal and wooden)
5. Casualty power equipment not shown on Casualty Power Diagram
6. Hazardous material spill kit locations

8.7.1 Repair Station Zone of Responsibility Diagram. As part of the discussion of repair party organization, the text shall contain a Repair Station Zone of Responsibility the following: diagram similar to ***Figure 21***. The diagram shall be an inboard profile of the ship depicting

(a) The major watertight bulkheads, firezone bulkheads and decks, appropriately labeled.
(b) The boundaries of each repair party's zone of responsibility. A different cross hatching (or color) pattern shall be used to depict each repair party's zone of responsibility.
(c) The general location of the DCC, SDCC, and DCRS, including the DCUPS, DCULs and HCSL as applicable to the ship.
(d) The diagram can be black and white or color.
(e) For clarity, the diagram shall utilize a minimum of one page as shown in ***Figure 21***. If clarity requires more area than one page, an 11-inch wide fold out page, or an additional page may be utilized.

8.8 Collective Protection System (CPS) and Personnel Protection. As applicable to the ship, the DC book text description of the CPS system shall contain the following:

(a) A description of the theory, operation and features of the CPS system as it relates to the ship. The subject of air locks, pressure locks, CBR zones, decontamination stations and damage control zones of responsibility in a CPS environment shall be discussed.
(b) Reference to the other shipboard systems and damage control diagrams (such as subdivision and ventilation) which the CPS impacts.
(c) A discussion of emergency procedures for maintaining or restoring a CPS zone when a fan malfunction causes a loss of boundary, or a CPS zone is breached in a contaminated environment.
(d) Reference to the appropriate chemical warfare documents and technical manuals pertaining to the ship's CPS system.
(e) A general description and list of personnel protection equipment such as, protective clothing and gas masks that are carried on the ship.

8.8.1 Collective Protection System (CPS) Diagram. As part of the discussion of the CPS system, the text shall contain a Collective Protection System (CPS) diagram similar to ***Figure 22***. The diagram shall be an inboard profile of the ship depicting the following:

(a) The major watertight bulkheads, firezone bulkheads and decks levels, shall be appropriately labeled.
(b) The boundaries of each pressure zone shall be identifies by heavy lines and labeled.
(c) For clarity, the diagram shall utilize a minimum of one page as shown in ***Figure 22***. If clarity requires more area than one page, an 11-inch wide foldout page, or an additional page may be utilized.

8.8.2 CPS Diagram Colors. As shown in Figure 21, the diagram shall use different colors to identify how areas of the ship are affected by the CPS system. The areas to be identified and the required colors are as follows:

TP = Total Protection Zone
LP = Limited Protection Zone both (TP) and (LP) are designed to operate full time.
NPS= Nonprotected Zone.

	Area	Color
(a)	CPS - Part Time (TP) - Space Can be Opened to The Weather	Yellow
(b)	CPS - Full Time (TP) Areas	Green
(C)	CPS - Part Time (TP) - Space Subject To Blowout	Blue
(d)	CPS - Full Time (LP)	Tan
(e)	Outside CPS - Space Not Included In The Collective Protection System	Pink

8.9 Aircraft Launching and Recovery Systems. The text shall contain a brief description of fixed wing and helicopter aircraft launching and recovery systems as they pertain to the ship. The text shall describe how the aircraft launching and landing systems are supported by the ships' compressed air, water, electrical and steam systems, etc. The text shall describe causality control procedures and features built into the systems supporting the aircraft launching and landing systems to facilitate rapid recovery of launching and landing functions when the normal sources of compressed air, water, electrical and steam systems, etc, supply is interrupted as a result of battle damage.

8.10 Reactor Secondary Containment Boundaries. For nuclear powered ships, the text shall contain a brief description of the procedures followed in establishing one or both boundaries, when required by the instructions given in the Reactor Plant Manual. The fittings required to be closed in setting each boundary shall be listed together with their location and classification. This section will be approved by NAVSEA before printing.

9. STABILITY AND LOADING

9.1 Submission and Approval Submission and approval of the Stability and Loading Data shall be in accordance with Appendix A and the CONTRACTING DOCUMENT. The components of the Stability and Loading data are:

(a) Liquid Loading Diagram
(b) Flooding Effect Diagram
(c) Stability and Loading text and associated text diagrams.

9.2 Liquid Loading Diagram and Flooding Effect Diagram Applicability. A Liquid Loading Diagram and Flooding Effect Diagram shall be prepared for all ship types. If space permits, both types of diagrams can be printed on a single sheet.

9.3 FLOODING EFFECT DIAGRAM.

The Flooding Effect diagram shall contain a series of plan views of the ship beginning at one level above the damage control deck. All oil-tight, watertight, airtight, and fume-tight subdivisions shall be shown.

9.3.1 Frame Numbers. Frame numbers shall be shown horizontally at the bottom of all transverse bulkheads.

9.3.2 Deck Labeling. The plan view of each deck shall be labeled at the forward end only.

9.3.3 Key. A key as shown in ***Figure 23*** shall be provided on the diagram. The key shall define the compartment shading colors, the line weights, and illustrate the convention used for showing capacity and transverse moment of unsymmetrical compartments.

9.3.4 Diagram Colors. The coloring of compartments shall be based on the assumption that all compartment boundaries are intact. The colors used on the diagram shall be as follows:

Item		Color
(a)	Lines, lettering and numbers	Black.
(b)	Compartments where flooding results in a decrease in stability because of added high weight, free surface effect, or both.	Pink
(c)	Compartments where flooding will improve stability, even though a free surface exists.	Green
(d)	Compartments where flooding will improve stability if the compartment is completely filled, but impair stability when a free surface exists.	Yellow
(e)	Compartments where flooding will have no appreciable effect on stability.	Uncolored
(f)	In certain cases, stability may be improved by flooding a deep compartment to a low level, but be impaired as flooding continues to a higher level. If the effect in such case is substantial, green shall be used for the lower level and pink for the higher level, or an appropriate note added.	Pink/Green

9.3.5 Unsymmetrical Compartment Line Weights. A menu of line weights representing compartments that are unsymmetrical with respect to the centerline of the ship shall be indicated in the key as shown in ***Figure 23***, and as follows:

(a) A heavy solid line for watertight and oil-tight compartments.
(b) A heavy dot-dash line for airtight and fume-tight compartments.

9.3.6 Symmetrical Compartment Line Weights. A menu of line weights representing compartments that are symmetrical with respect to the centerline of the ship shall be indicated in ***Figure 23*** and as follows:

(a) A thin solid line for watertight and oil-tight compartments.
(b) A thin dot-dash line for airtight and fume-tight compartments.

9.3.7 Compartment Information. A rectangle as shown in ***Figure 23*** shall be used on the diagram to explain the placement of the compartment number and stability figures within each compartment. Compartment information shall be placed as follows:

(a) Upper Left. For each compartment, the weight of seawater in tons required to fill the compartment.

(b) Center. Compartment numbers shall be indicated in the center of the compartment. If necessary, the number may be placed outside with an indicating line.

(c) Lower Right. For each unsymmetrical compartment, the transverse moment of the seawater in foot-tons about the centerline of the ship. Entries shall be in multiples of 5 foot-tons. If the direction of transverse moment is not readily apparent, the letters P or S shall be added to indicate port and starboard moments.

9.3.7.1 Weight of Seawater. The permeability's of different spaces, tanks and voids to be used in determining the mass of seawater shall be obtained from the Hydrodynamics Division of NAVSEA.

9.3.7.2 Center-of-Gravity. The assumed height of the center-of-gravity of the ship will be as specified by the Hydrodynamics Division of NAVSEA.

9.3.7.3 Flooding. Flooding of a compartment shall be considered to have no appreciable effect on stability when increase or decrease is so slight that time and effort spent in immediately draining or flooding it for stability improvement, even when stability is critical, is not warranted. A compartment shall not be considered to be ineffective only because of its small size since the improvement for each ton of water handled would be the same as for a large compartment of the same width at the same level. For the purpose of this diagram, airtight and fume-tight structure shall be considered to restrict flooding.

9.3.8 Notes. The following notes and other notes that may be appropriate shall appear on the diagram:

(a) Complete flooding of unsymmetrical compartments will produce heeling moments as indicated. An adjustment of this moment shall be made if space is not completely flooded. For tanks having liquid before flooding occurred, adjustment shall also be made.

(b) Dot-dash lines indicate airtight, fume-tight bulkheads 5 pounds per square foot and heavier, fitted with tight doors.

9.4 Liquid Loading Diagram

The Liquid Loading diagram shall consist of a composite plan view of the ship showing all tanks and voids in which liquids are carried or which are fitted for carrying liquids. Upper levels on which only a few minor tanks exist may be omitted. Where the composite view would not indicate clearly the full extent of the boundary of a tank, more than one view shall be necessary. In addition, the tanks that are on upper levels shall be shown off to one side. No subdivision, other than tank boundaries and main transverse bulkheads in way of tanks, is required.

9.4.1 Frame Numbers. Frame numbers shall be shown horizontally at the bottom of all transverse bulkheads.

9.4.2 key. A key as shown in ***Figure 24***, shall be provided on the diagram to define the colors or patterns used, the symbols for tanks having ballasting connections, and illustrate the conventions used for showing capacity, change in list, and change in drafts.

9.4.3 Diagram Colors. The colors shall be as follows:

Item		Color Pattern
(a)	Lines, lettering, and numbers	Black
(b)	JP-5 tanks not required to be ballasted	Pink
(c)	JP-5 tanks to be ballasted	Pink / Blue[2]
(d)	JP-5 service tanks	Pink Stripes
(e)	Fuel oil service tanks and settling tank	Yellow Stripes[1]
(f)	Fuel oil tanks not required to be ballasted	Yellow
(g)	Fuel oil tanks to be ballasted	Yellow / Green
(h)	Fresh water tanks	Blue
(I)	Gasoline tanks	Yellow / Pink
(j)	Reserve feed water tanks	Blue Stripes
(k)	Damage Control Voids	Green
(l)	Voids or other spaces	Uncolored

(Note 1). Stripes shall be 3/32 inch wide with 3/32 inch spacing and shall be at a 60 degree angle from the horizontal.

(Note 2). Where a color/color is specified, the division between colors shall be a diagonal line from lower left corner to upper right corner.

9.4.3.1 Additional Patterns. Additional color patterns may be needed if the liquid loading instructions specify the sequence for draining tanks or ballasting, in which case information on coloring to be used will be furnished by the Government **(see 27.2e)**.

9.4.4 Tank and Void Numbers. Tank or Void numbers shall be indicated in the center of the tank or void. If the inside area is too small, the number may be placed outside the tank or void with an indicating line.

9.4.5 Tank and Void Information. A rectangle as shown in ***Figure 24*** shall be used in the Key to explain the placement of information within the tanks. Information shall be shall be shown in the tanks and voids as follows:

(a) Upper Left.	Capacity of tank in tons. This capacity shall be the 95-percent-full capacity for oil tanks and 100 percent for fresh water tanks. For ballast tanks or voids fitted for ballasting, the weight of seawater, 100 percent full, shall be shown except that where ballasting of voids with fresh water is indicated, the weight of fresh water shall be used. Numerals for lube oil tanks for ship's own use, and day tanks, shall not be shown. Capacity of gravity filled tanks shall be calculated as though the tank were filled to the normal operating water line.
(b) Upper Right.	Change in list, caused by filling tank to above capacity, to nearest 0.1 degree.
(c) Center.	Tank or Void location number. If the tank or void is too small to contain its number, the number may be shown outside.
(d) Lower Left.	Change in draft aft, to nearest inch, caused by filling tank to capacity.
(e) Lower Right.	Change in draft forward, to nearest inch, caused by filling tank to capacity.

9.4.6 Tank Names. Compartment names shall be shown outside the ship's structure for fuel oil and JP-5 overflows, and for contaminated oil and service tanks, in addition to the required colors.

9.4.7 Ballast Connections. A small solid black equilateral triangle as shown in the Key ***Figure 24*** shall be placed within those spaces, tanks and voids that have ballast connections.

9.4.8 List and Trim Figures. Figures for change of list and trim shall be based on figures of moment to trim, moment to heel, tons per inch immersion, and position of longitudinal center of flotation as furnished by the Government **(see 27.2c)**.

9.4.9 Liquid Loading Instructions. Liquid loading instructions as furnished by the Government shall appear on the liquid loading diagram **(see 27.2d)**.

9.5 Stability and Loading Text
The text shall be based on the latest weight estimates or inclining experiment data as furnished by the Government and shall conform to these requirements.

Quick Reference. A quick reference to the major sections or sections of importance within the Stability and Loading text shall be provided. The quick reference will provide a listing of page numbers or sections numbers associated with each section.

9.5.1 Introduction. The introduction shall recommend the study of damage control stability and buoyancy as set forth in **Naval Ships' Technical Manual, S9086-CG-STM-000 Weights Stability and Stability and Buoyancy as set forth in NSTM S908G-CN-STM-010 (VOL 1)**. Information on stability and loading in the damage control book is intended to show the specific application of information in that publication to the particular ship or class of ships. A general discussion of the stability characteristics shall be included and, if possible, broad statements shall be made to define conditions under which stability will not be critical or conditions under which stability will not be adequate. Any outstanding or unusual conditions applicable to the ship shall be noted.

9.5.2 Stability Provided

9.5.2.1 Factors Affecting Required Stability. Under this heading, the considerations upon which "required stability" is based shall be outlined. Only those hazards that are significant for the ship under discussion shall be included. Possible hazards are flooding, wind and rolling, high speed turning, lifting of weights, heel due to passengers, and icing of topsides.

9.5.2.2 Curves of Static Stability (Intact) Diagram. An example of this diagram is contained in ***Figure 25***. The diagram shall be prepared as follows:

(a) The diagram shall be printed on a standard text page ***(see Figure 12)***, and bound in the damage control book text.
(b) Any convenient scale may be used but both horizontal and vertical scales shall have a proportion of 1 unit of KG (Vertical) to 10 degrees of heel (Horizontal).
(c) The diagram shall contain curves depicting the following loading conditions:
   - Light ship
   - Full load
   - Minimum operating or optimum battle condition.
   - Curves for other conditions shall be added if they are of particular importance for the ship under consideration.
(d) The diagram shall be accompanied by text data that provides a discussion of the significance of the curves shown on the diagram.
(e) The point of down flooding for each curve will be marked on the curve.

9.5.2.3 Heeling Effect of Beam Winds Diagram. An example of this diagram is contained in ***Figure 26***. The diagram shall be prepared as follows:

(a) The diagram shall be printed on a standard text page **(see *Figure 12*)**, and bound in the damage control book text.
(b) Any convenient scale may be used but both horizontal and vertical scales shall have a proportion of 1 unit of KG (Vertical) to 10 degrees of heel (Horizontal).

(c) The diagram shall contain curves depicting the following:

   - The static stability curve for the least favorable loaded condition
   - The heeling arms produced by a beam wind as specified by the Government.

(d) The area between the righting arm curve and the heeling arm curve for the specified wind shall be cross-hatched and a statement included to indicate that this area is a measure of the residual dynamic stability for the specified beam wind.

(**NOTE**): If the effect of this beam wind is considered dangerous in the least favorable condition of load, the curve of wind heeling arm shall be drawn for the maximum beam wind velocity which the ship can safely withstand, and the limitations of the ship with respect to beam winds shall be discussed with particular reference to the possibility of higher acceptable beam wind velocity in the more favorable conditions of load.

(e) If there are other influences which might produce a relatively large heeling arm for the ship under consideration, such as high speed turning, lifting weights, ice accumulation or movement of passengers, additional diagrams (similar to the static stability and heeling arm curves)shall be shown as necessary to illustrate the discussion.

(f) Each diagram shall be accompanied by text data that provides a discussion of the significance of the curves shown on the diagram.

(g) The point of down flooding for each curve will be marked on the curve.

9.5.2.4 Curves of Static Stability (After Extensive Damage) Diagram. An example of this diagram is contained in ***Figure 27***. The diagram shall be prepared as follows:

(a) The diagram shall be printed on a standard text page (**see *Figure 12***), and bound in the damage control book text.
(b) Any convenient scale may be used but both horizontal and vertical scales shall have a proportion of 1 unit of KG (vertical) to 10 degrees of heel (horizontal).

(c) Static stability curves shall be provided to illustrate the righting arms after such damage for the following:
- o The critical flooding case in the minimum operating condition or optimum battle condition.
- o The full load condition, together with the corresponding curves for the intact ship.
- o Similar curves for other conditions of loading shall be included if they are of particular significance.

(d) Curves of righting arms in the damaged conditions shall be as realistic as possible, including such factors as probable unsymmetrical flooding. This information will be furnished by NAVSEA as soon as requested by the ship builder. (**see 27.2**)**(item d)**.

(e) The Curves of static stability (after extensive damage) diagram shall be accompanied by appropriate text data indicating the approximate extent of damage and flooding that the ship may be expected to survive provided that instructions regarding ballasting and limiting drafts are followed.

(f) The point of down flooding for each curve will be marked on the curve.

9.5.3 Measures to Safeguard Stability

9.5.3.1 Liquid Loading Instructions. The liquid loading instructions for the ship under consideration shall be given in detail together with the reasons to the specified procedure, or reference shall be made to the liquid loading instructions given on the liquid loading diagram.

9.5.3.2 Precautions to be Taken Against Cross-Connection of Tanks. A warning against cross-connecting tanks on opposite sides of the ship, either by connecting port and starboard tanks to the same system at the same time or through open sluice valves, shall be included. The danger of such cross-connection, that is, the aggravation of any list that may develop, and the difficulty of detecting this condition shall be brought out.

9.5.3.3 Watertight Integrity Diagram. An example of this diagram is contained in ***Figure 28*(a)** and ***Figure 28*(b)** The diagram shall be prepared as follows:

(a The diagram shall be printed on a standard text page (**see *Figure 12***),and bound in the damage control book and bound in the damage control book text.
(b) Any convenient scale may be used both horizontally and vertically.
(c) The diagram shall consist of an inboard profile and include section views and plan views if necessary.
(d) The main transverse subdivision of the ship, shall be indicated by heavy lines with particular attention to stepped bulkheads and the level to which the bulkheads are watertight.
(e) The diagram shall be accompanied by text data that stresses the importance of keeping the major transverse bulkheads tight. The accompanying text shall also explain that the proper maintenance of watertight integrity, as provided in the design of the ship, is essential in developing full resistance to underwater damage. Reference shall be made to **NSTM S9086-C6-STM-000 Weights and Stability** for information on the established procedure for maintenance of watertight integrity.

9.5.3.4 Flooding Water Levels (V-Lines). This section shall include the following:

(a) Definitions and purposes of Flooding Water Levels I (FWL I) on main transverse watertight bulkheads (MTWB) and FWL II on the bulkhead or weather deck.
(b) A brief explanation of the relationship of V-Lines to the watertight integrity diagrams in 9.5.3.3 and to the locations of Non-tight openings in bulkheads and decks.
(c) Guidance on the maintenance of watertight integrity of relevant bulkheads, decks, trunks and closures.
(d) Brief generic description of small penetrations (piping, electrical, etc.) vs. large penetrations (ventilation ducting, access openings), and their potential flooding rates relative to dewatering capacity and potential risk of progressive flooding and downflooding.

This section shall also include a graphical description of a generic FWL I and associated tabular data with the apex and half-breadth dimensions of FWL I on each MTWB as in ***Figure 29***. Plan view(s) of the weather deck (or bulkhead deck, if different) shall be provided in a convenient scale showing MTWBs and FWL Iis between them. Tabular data shall be provided locating the sets of apex and half-breadth values for FWL Iis at each MTWB.

Shading or cross-hatching on deck plans shall be used to indicate areas to be maintained watertight. If an apex is above the reference deck, a negative value shall be assigned (indicating the height above reference deck) in association with the V-Line angle above the horizontal.

9.5.4 Minimum Acceptable Stability. The type of hazard, such as under water amage, wind, and so forth, which governs the minimum acceptable stability in normal operation shall be discussed. Where applicable, a curve shall be included to indicate the maximum allowable height of the ship's center-of-gravity which will be furnished by NAVSEA on request (**see 27.2**)(**item b**) for displacement within the normal operating range, at which the ship will have acceptable stability characteristics with respect to the most critical hazards. This shall be followed by a discussion of limitations in loading imposed by less critical, but more prevalent hazards in order to permit the commanding officer to use sound judgment in exceeding the allowable height of center-of-gravity under conditions where the desirability of carrying unusual loads may justify accepting the risk of the more critical hazards.

9.5.4.1 Procedure After Damage. It shall be pointed out that strict adherence to the liquid loading instructions before damage occurs will be of great value after damage occurs. Reference shall be made to the general instructions on this subject in **NSTM 079 VOL 1 Damage Control Stability and buoyancy 9086-CN-STM-010** and these instructions expanded to apply to the individual ship. Complete and detailed instructions shall be included, covering the action to be taken after damage and methods of evaluating the situation. The following aspects of the problem shall be included in the discussion:

(a) Establishing flooding boundaries.
(b) Preventing progressive flooding through non-tight structures, if possible, by heeling the ship to bring such structures above the waterline.
(c) Evaluating residual stability by observation of nature and extent of flooding, condition of loading at time of damage, nature of roll, and tendency to list to either side.
(d) Available methods of improving stability.
(e) Action to be avoided.
(f) Procedure for reducing list, with particular reference to danger of overcompensating for unsymmetrical weight, when the possibility of negative metacentric height exists.

This material shall be arranged in the most logical manner possible with separate discussions covering critical stability and noncritical stability. Procedures shall be given in the optimum chronological order.

9.5.5 Limiting Drafts

9.5.5.1 Limiting Values Assigned. The limiting draft values and locations shall be quoted and a statement included to the effect that the installation of a distinctive mark (or marks) on the ship has been authorized as a guide against overloading.

9.5.5.2 Basis of Assignment. The factors that entered into the establishment of the limiting draft shall be enumerated.

9.5.5.3 Danger of Overloading. The adverse effects of exceeding the limiting drafts shall be discussed. The effects shall be listed under two headings, (a) those affecting safety and power of survival (reserve buoyancy, stability, and strength), and (b) those affecting performance (speed, radius of action, and dryness), as applicable to the particular ship.

9.5.6 Standard Conditions of Loading

9.5.6.1 Data to Be Included. For each of the standard conditions of loading as defined by the **NSTM 079 VOL 1 Damage Control Stability and Buoyancy S9086-CN-STM-010** which are significant for the particular ship, the following data shall be included:

(a) A brief description of the condition of loading.
(b) A summary of the weight and the vertical, longitudinal and ath wartshipmoments of the light ship displacement and the items of load.
(c) The draft, the vertical positions of the transverse metacenter and center of gravity, metacentric height, trim, free surface correction and drafts forward and aft.
(d) The details of each item of load included under (b) above (that is, its weight, center of gravity, and vertical, longitudinal, and athwartship (moments).

9.5.6.2 Tank Capacity Data. A tabulation shall be shown, listing the ship's tanks and the following information:

(a) Capacity in gallons and tons and height of center of gravity above keel when 95 percent full for each oil tank.

(b) Capacity in gallons and tons and height of center of gravity above keel when 100 percent full for each fresh water tank, ballast tank, and fuel oil tank that is fitted for ballasting.

(c) Longitudinal distance of the center of gravity of each tank from amidships.

(d) Transverse distance of center of gravity of each tank from ship's centerline.

9.5.7 Discussion of Diagrams A discussion of each of the following diagrams shall be included where applicable:

(a) Flooding Effect Diagram
(b) Liquid Loading Diagram
(c) Cross Curves of Stability
(d) Draft Diagrams and Function of Form

9.5.8 Cross Curves of Intact Stability Diagram An example of this type of diagram is contained in ***Figure 30***. The diagram shall be prepared as follows:

(a) The diagram shall be printed on a standard text page (**see *Figure 12***), and bound in the damage control book text. If additional space is necessary, due to variation in scale or righting arm, and the text page is not long enough, the diagram may be prepared on a 11-inch wide fold-out type sheet.

(b) Curves shall be derived from information provided by NAVSEA (**see 27.2**) and shall cover only the range of operating displacements (**see *Figure 30***).
(c) Scale of righting arms shall be 1 inch to the foot.
(d) The axis assumed in preparing the cross curves, and the number of the drawing from which the data was taken, shall appear on the plan.

9.5.9 Draft Diagram and Functions of Form Diagram. An example of this type of diagram is contained in ***Figure 31***. General requirements for the diagram are as follows:

(a) The bound in the damage control book text. If additional space is necessary, and the text page is not long enough, the diagram may be prepared on a 11-inch wide fold-out type sheet.
(b) Any convenient scale may be used both horizontally and vertically.
(c) The number of the drawing from which the data was taken shall appear on the diagram.
(d) The diagram shall be accompanied by text data which explains the application of the diagrams.

9.5.9.1 Displacement Scales:. The Draft Diagram and Functions of Form Diagram shall consist of the scales listed in (a) through (g). The placement of the scales on the diagram shall be as shown in ***Figure 31***. Each scale shall be plotted so that values of functions read on a horizontal line at any draft, and will correspond to values shown on the ship's curves of form (or displacement and other curves) for that draft. Scales for all functions shall be plotted for range of operating drafts. The requirements for each of the scales are as follows:

(a) Forward and After Draft Marks:

1. Forward draft marks shall be shown at the right of the diagram, and after draft marks at the left. Midship draft marks may be omitted if they conflict with other scales.
2. Arabic or Roman numerals shall be used for draft marks to correspond to figures on the ship.
3. The draft marks shall be shown for even keel drafts in their proper relative positions on a contracted longitudinal scale.
4. Draft scales shall be subdivided at half-foot intervals.
5. Scales for forward and after drafts shall extend 3 feet above and below scales of the functions to allow for trim.
6. Light horizontal lines shall be drawn connecting forward and after draft marks at each foot of draft within range of the other scales.

(b) Moment to Trim. Shall be plotted along a vertical line between the after draft marks and the Transverse Metacenter above keel scale.

(c) Transverse Metacenter Above Keel Shall be located between the Moment to Trim scale and the Displacement in Seawater scale.

(d) Displacement in Seawater. Shall be located between the Transverse ....metacenter above keel scale and the Longitudinal Center of Floatation scale.

(e) Longitudinal Center of Floatation.

1. Shall be shown for even keel drafts in its proper relative position on a contracted longitudinal scale.

(f) Longitudinal Center of Buoyancy. Shall be plotted to the right of the Longitudinal Center of Floatation scale.

(g) Tons Per Inch Immersion. Shall be plotted along a vertical line to the left of the forward draft marks.

9.5.9.2 Note. The following note shall appear on the diagram:

"Displacement and transverse metacenter are read directly at point where a straight line connecting drafts forward and aft crosses these scales. Other functions are read on a horizontal line through this point".

10. SYSTEMS BASE DIAGRAM

The system base diagram is a modification of the subdivision diagram and shall be used as the subdivision background on all systems diagrams except the Oxygen and Nitrogen systems diagram which has its own unique base. Requirements that make the system base diagram different from the subdivision diagram are noted in 10.1 through 10.9.

10.1 Multi-Level Compartments Without Intermediate Decks. Multi-level compartments that do not have intermediate watertight decks, but extend two or more decks levels in height such as; machinery spaces, access and escape trunks, and elevator trunks, shall be shown on each deck level. The upper and lower boundaries of such compartments and trunks shall be shown with straight lines. At deck levels, (between the upper and lower boundary) a wavy line shall be shown where the bulkhead of the space or trunk continues up or down to the next deck level.

10.2 Gratings and Partial Platforms. Grating and partial platforms within multi-level compartments shall be represented by a dot-dash line. The horizontal level of each grating or platform shall be shown at the deck level to which it is closest.

10.3 Compartment Names and Numbers. Compartment names and numbers shall be placed outside the shell and on a plane parallel with the centerline of the deck. The compartment names shall be listed followed by the compartment number.

10.4 Access Fitting Location Numbers. Access fitting basic location numbers shall not be shown.

10.5 Fire Zone (FZ) Bulkhead Marking. The letters "FZ" shall be printed shall appear horizontally above the frame number at each transverse fire zone bulkhead.

10.6 Collective Protection System (CPS) Bulkhead Marking. The letters "PZ" shall appear horizontally above the frame number at each transverse CPS bulkhead.

10.7 Coinciding "FZ" and "PZ" Bulkhead Marking. When a transverse bulkhead serves as both a Fire Zone and Collective Protection Systems boundary, the letters "FZ" and "PZ" shall appear above the frame number.

10.8 Deck and Bulkhead Shading. Shading shall be as follows:

(a) Doors and arches within transverse bulkheads shall be shaded along with the bulkheads.
(b) Decks shall be not be shaded.

10.9 System Base Colors. Colors shall be as follows:

Item		Color
(a)	Damage control central, secondary damage control, and repair station titles.	Black
(b)	Compartment numbers	Black
(c)	The "FZ" at each transverse fire zone bulkhead.	Black
(d)	The "PZ" at each transverse collective protection system (CPS) bulkhead.	Black
(e)	Subdivision outline	Olive
(f)	Access fittings and ladders	Olive
(g)	Compartment names	Olive
(h)	Transverse bulkheads shading	Gray

11. SUBDIVISION SYSTEM

11.1 General Requirements. Compartments complete from the lowest level of the ship to the uppermost level of the ship (including trunks, hoists, and elevators) shall be shown, labeled and numbered. Intersections of main transverse watertight and oil-tight bulkheads with shell shall be shown by solid lines. Hidden boundaries shall be shown by a dotted line, only to clarify location of access.

11.2 Miscellaneous Features. Prominent topside features, such as smoke pipes, stacks, catapults, and masts shall be shown, but not in detail. Gun mounts, directors, missile launchers, torpedo tubes, and cranes shall be indicated only by a centerline mark. The type and number of the piece of equipment shall be indicated.

11.3 Deck Layouts. Each deck or platform shall be shown and labeled as a separate level. A limit of one depiction per deck is required. All bulkheads and major subdivision on each deck shall be shown..

11.4 Multi-Level Compartments Without Intermediate Decks. Multi-level compartments that do not have intermediate watertight decks, but extend two or more decks levels in height such as; machinery spaces, access and escape trunks, and elevator trunks, shall be shown as one compartment, starting at the lowest deck at which the compartment begins.

11.5 Grating Levels. Grating levels shall be indicated by dot-dash lines.

11.6 Access Fittings. Access fittings such as doors, hatches, scuttles, manholes arches and ladders, etc, shall be shown as near as possible to their true location. They shall be shown solid where visible and dotted where hidden. Doors shall be nominal 30 inches wide by 6 feet high, shown in the same scale as the subdivision diagram

11.7 Access Fitting Location Numbers. Access fittings, except non-tight fittings (such as joiner doors) and bolted plate manholes, shall be numbered on the diagram in accordance with the basic location number assigned to the actual fittings on the ship. Fitting numbers shall appear as close to the fitting as possible. Leader lines are acceptable when congestion or clarity requires distant placement of the fitting number.

11.8 Compartment Numbers. Compartment numbers shall be placed inside the compartment, on the plane of the compartment overhead, at the center, and parallel to the transverse bulkhead. Where the compartment is too narrow, the number shall be placed parallel to the longitudinal bulkhead. If the compartment is too small, the number shall be shown outside. Based upon available spacing, and for the purpose of clarity, the order for the placement of compartment numbers shall be as follows:

(a) Inside of compartment on the center of deck.
(b) Inside compartment on transverse bulkhead.
(c) Inside of compartment on aft bulkhead.
(d) Outside compartment with compartment name listed first and followed by the compartment number.

11.9 Compartment Names. Compartment names shall be placed outside the shell of the ship at the same angle as the transverse bulkheads, with a line and arrow pointing to the outboard bulkhead of the particular compartment. For diagrams to be cut in half, the compartment names shall not be placed on the cut line.

11.10 Frame Numbers. Frame numbers shall be shown horizontally at the upper edge of all transverse watertight and oil-tight bulkheads below the main deck. Frame numbers shall be shown at approximately every 70 feet or closer on and above the main deck as required.

11.11 Tightness Level. The extent of the tightness level for bulkheads shall be noted on the subdivision diagram; for example, watertight 5 feet above deck - airtight over.

11.12 Deck Labeling. Each deck shall be labeled at forward end only. Where a cutting mark is indicated for cutting the diagram in half, both halves of each deck shall be labeled at both the forward and after ends. Each intersection of deck or platform with the shell shall be labeled at the forward and after ends. A line with an arrowhead shall point to the intersection.

11.13 Damage Control Deck. On the applicable subdivision diagram, the fore and aft extent of the damage control deck shall be noted below the deck title of deck that is the ship's designated damage control deck. .

11.14 Compartment Titles That are Underlined. The following compartment titles shall be underlined.

(a) Damage Control Central / Central Control Station
(b) Secondary Damage Control Central
(c) Damage Control Repair Stations

11.15 Fire Zone (FZ) Bulkhead Marking. The letters "FZ" and shall appear horizontally above the frame number at each transverse fire zone bulkhead as noted at frame "135" in the example shown in ***Figure 32***.

11.16 Collective Protection System (CPS) Bulkhead Marking. The letters "PZ" shall appear horizontally above the frame number at each transverse CPS bulkhead as noted in the example shown in ***Figure 32***.

11.17 Coinciding "FZ" and "PZ" Bulkhead Marking. When a transverse bulkhead serves as both a Fire Zone and Collective Protection Systems boundary, the letters "FZ" and "PZ" shall appear above the frame number as noted at transverse bulkhead "140" in the example shown in ***Figure 32***.

11.18 Collective Protective System Fan Rooms. Show all accesses, the clean air and contaminated air plenum, and the chemical, biological and the radiological (CBR) filter bulkhead as shown forward of Frame "160" in ***Figure 32***.

11.19 Deck and Bulkhead Shading. Shading shall be as follows:

(a) Transverse Bulkheads shall be shaded. The shading shall be omitted from doors and arches.
(b) Longitudinal bulkheads shall not be shaded.
(c) Decks shall be shaded.

11.20 Subdivision Diagram Colors. Colors shall be as follows:

Item		Color
(a)	Subdivision outline	Black
(b)	Access fitting and ladders	Black
(c)	Compartment names and numbers	Black
(d)	Frame numbers,	Black
(e)	Large deck titles	Black
(f)	Underlining of Damage control central, secondary damage control, and repair station titles.	Black
(g)	Transverse bulkhead shading	Gray
(h)	Deck Shading	Tan
(I)	The "FZ" marking and top edge of fire zone bulkheads (**see *Figure 32***)	Red
(j)	The "PZ" marking, and top edge of longitudinal and transverse Collective protection system (CPS) bulkheads (**see *Figure 32***)	Blue

Item		Color
(k)	The top edge of coinciding transverse Fire zone (FZ)and collective protection System (CPS) Bulkheads (**see *Figure 32***)	Red and Blue (intermittently)

11.21 Compartment Color Code Shading. The overhead area of certain compartments shall be color code shaded. A Compartment Color Code menu shall appear on Subdivision diagrams in accordance with ***Figure 3***. Compartments shall be color code shaded as follows:

Compartment Type		Color Pattern
(a)	Flammable liquid storage tanks	Pink
(b)	Flammable liquid storage lockers	Pink
(c)	Flammable liquid pump rooms	Pink
(d)	Ammunition Magazines and Pyrotechnic Lockers	Pink striped
(e)	Damage Control Repair Stations	Yellow
(f)	Damage Control Central	Yellow
(g)	Radiation hazard areas	Yellow
(h)	Decontamination stations	Light Blue
(I)	CBR-D storerooms	Light blue striped
(j)	Medical/Dental	Light green striped
(k)	Battle dressing	Light Green

Note 1. Stripes shall be 3/32 inch wide with 3/32 inch spacing and shall be at a 120 degree angle from the horizontal. (**See Appendix C**) for details.

11.22 Subdivision and Access System Text.
The text in the damage control book shall explain the subdivision diagrams. The discussion shall focus upon the particular features of the ship, how they contribute to effective casualty control, and where some weaknesses exist, if any. Alternate routes of access to various compartments in the event of fire shall be mentioned, and the fire zone boundaries shall be discussed.

11.22.1 Access Fittings Tables. The following watertight, airtight, oil- tight, and fume-tight fittings shall be listed in the tables:

(a) Doors.
(b) Hatches
(c) Manholes
(d) Scuttles, dog type.
(e) Scuttles, passing.
(f) Scuttles, quick acting.
(g) Miscellaneous (such as windows, and airport lens frames and covers)

12. DRAINAGE, BALLASTING AND LIST CONTROL SYSTEMS.

12.1 Ships Without Well Decks For ships without decks, the drainage, ballasting and list control systems shall be depicted on two series of diagrams as follows:

(a) Main and Secondary Drainage, Ballasting and List Control Systems.
(b) Gravity and Miscellaneous Drains, Oily Waste Transfer System, Sewage Collection, Holding and Transfer (CHT) System, and Vacuum CHT System (VCHT).

12.2 Ships With Well Decks For amphibious type ships with well decks, the drainage, ballasting and list control systems shall be shown on three series of diagrams as follows:

(a) Main and Secondary Drainage System
(b) Gravity and Miscellaneous Drains, Oily Waste Transfer System, and Sewage Collection, Holding and Transfer (CHT) System.
(c) Ballasting and Deballasting Systems.

12.3 Main and Secondary Drainage System - Diagram. The following components of these systems shall be depicted on the diagrams in the colors specified.

	Components	Main Drainage	Secondary Drainage
(a)	Piping, pumps, eductors and attached piping, valves and fittings.	Green	Orange
(b)	Piping, valves and fittings to which portable pumps or hose may be connected.	Green	Orange
(c)	Semi-permanently installed pumps, piping, and valves	Green	Orange
(d)	Firemain cutout valves to eductors (shall be shown as other services)	Black	Black
(e)	Air escape piping shall be shown only if fitted with operable valves.	Red	Red

12.3.1 Main and Secondary Drainage System - DCB Text. The DC book text description of the main and secondary drainage systems shall contain the following:

(a) Description of the system.
(b) Reference to applicable damage control diagram.
(c) Segregation of the system under battle conditions
(d) Size of main line or loop piping.
(e) Table indicating pump number, type, capacity and location of each pump and their associated suction and discharge valves.
(f) Additional table indicating individual pumping capacities (Including capacity for each pump and eductor) and capacity of main circulating pumps available for damage control. (This table shall not include portable pumps).
(g) Discussion of the hazards of clogged pump suctions.
(h) List of system valves.

12.4 Ballasting and List Control System - Diagram. Ballasting and list control systems that are installed for stability control ballasting, or torpedo protection shall be shown from the sea chest or firemain where flooding supply is taken to the overboard discharge connection. The following components of these systems shall be depicted on the diagrams in the colors specified.

	Components	Color
(a)	All piping, valves, fittings and pumps	Blue
(b)	Vent and overflow piping and fittings. (Only if fitted with cutout valves)	Red
(c)	Other services	Black
(d)	Air escape piping	Black

12.4.1 Ballasting System - DCB Text. The DC book text description of the ballasting system shall contain the following:

(a) Reference to applicable damage control diagram.
(b) Description of arrangements for ballasting voids and fuel tanks
(c) Discussion of ballast system control.
(d) Table showing time required to ballast the damage control voids.
(e) List of fuel oil ballasting valves.
(f) List of void tank ballasting valves.

12.4.2 List Control System - DCB Text. The DC book text description of the list control system shall contain the following:

(a) Reference to applicable damage control diagram.
(b) Description of the system.
(c) Table showing time required to ballast the list control tanks.
(d) List of valves.

12.5 Gravity and Miscellaneous Drainage System - Diagram. The following components of these systems shall be depicted on the diagrams in the colors specified.

	Components	Color
(a)	Drainage systems to which a hose may be attached for connection to main drainage system.	Green
(b)	Miscellaneous drains connected to pumps which are not part of the Main or Secondary Drainage System.	Red
(c)	Scuppers (not fitted with cutout control valves) shall have a marginal next to the scupper listing the spaces served by the scupper. Associated piping shall not be shown.	Same as System
(d)	Deck drains and scuppers (fitted with a cutout control valve) which discharge into collecting tanks, bilge's, or drain wells, that are in turn drained by a pumping system shall be shown with their associated piping.	Green
(e)	Drains with valves from handling rooms, ammunition spaces, trunks, overboard discharge connections and miscellaneous drains connected to pumps that are not part of main or secondary drainage.	Same as System
(f)	Sounding tube deck plates and sounding tubes (with closure valves) serving voids, water tanks, and miscellaneous spaces. Sounding tube deck plates without cutout valves shall be shown with their location number and the location number of the compartment they sound.	Same as System
(g)	Vent and overflow piping (only if fitted with a cutout valve)	Black
(h)	Plumbing vent valves shall not be shown on the diagram, but shall be listed in the damage control book text. The following note shall appear on the diagram: "For Plumbing Vent Closure, See Text."	None

12.5.1 Gravity and Miscellaneous Drainage System - DCB Text. The DC book text description of the gravity and miscellaneous drain system shall contain the following:

(a) Reference to applicable damage control diagram.
(b) Description of piping.
(c) Description of scuppers.
(d) Description of cofferdam drainage.
(e) List of deck drain valves (except plumbing).
(f) Plumbing drain valves (at the scuppers, in the decks and in piping lines).
(g) Miscellaneous drain valves including scupper valves not listed with plumbing.
(h) List of valves which are fitted in plumbing vents that terminate on or below the damage control deck.
(I) List of valves which are fitted in air escapes.
(j) List of valves fitted in sounding tubes and sounding tube deck plates.

12.6 Oily Waste Transfer System. The following components of this system shall be depicted on the diagrams in the colors specified.

Components		Color
(a)	Piping, valves, pumps and tie-in to drainage main/tank stripping manifolds and shore connections.	Blue
(b)	Piping from drain wells and bilge sump tanks, oily waste holding tanks (OWHT) and waste oil tank (WOT).	Blue
(c)	All dedicated overboard discharge connections	Blue
(d)	Outlets to salt water contaminated drains shall be noted.	None
(e)	Piping to oil-water separator (OWS) shall not be shown; show only:	None
	(1) Check valves and cutout valve from OWS to waste oil tank with note "From oil-water separator".	
	(2) Cutout valve from transfer system to OWS with note: To oil-water separator.	
	(3) Check valve and cutout valve from OWS to effluent overboard discharge connection.	

12.6.1 Oily Waste Transfer System - DCB Text. The DC book text description of the oily waste transfer system shall contain the following:

(a) Reference to applicable damage control diagram.
(b) Description of piping.
(c) Description of how the system can be used in a damage control situation, accompanied by a table listing the system valve alignment (open/close settings) required to allign the system to facilitate drainage or flooding control of critical compartments during damage control operations.
(d) Tables indicating the following:
  1. Pump number, type, capacity, location and remote operation.
  2. Suction and discharge valves (including oil-water separator syste that is not shown on the diagrams. List the valves under a oily waste transfer system heading and include damage control valves to oil-water separator which are not shown on the DC diagrams.

12.7 Sewage CHT and Vacuum CHT (VCHT) System- Diagram. The following components of these systems shall be depicted on the diagrams in the colors specified.

Components		Color
(1)	Bulkhead stops and overboard discharges.	Orange
(2)	Collecting and holding tanks.	Orange
(3)	Associated pumps.	Orange
(4)	Shore connections.	Orange
(5)	Major cutout valves.	Orange

12.7.1 Sewage CHT System and Vacuum CHT (VCHT) System - DCB Text. The DC book text description of the sewage CHT system and Vacuum CHT (VCHT) system shall contain the following:

(a) Reference to applicable damage control diagram.
(b) Description of piping, tanks pumps and overboard discharges
(c) Description of how the system can be used in a damage control situation, accompanied by a table listing the system valve settings required to allign the system for damage control operations.
(d) List of associated valves.

12.8 Ballast and Deballast System - Diagram. For amphibious type ships with well decks, this series of diagrams shall depict these systems from the sea chest or firemain where flooding supply is taken to the overboard discharge connection. The following components of the ballast, deballast and associated vent and overflow systems shall be depicted in the colors specified.

Components		Ballast Color	Deballast Color	Vent/Overflow Color
(1)	Piping, pumps, valves and attached fittings.	Blue	Green	Red
(2)	Piping, valves and fittings to which portable pumps or hose may be connected.	Blue	Green	None
(3)	Firemain cutout valves to eductors (shall be shown as other services)	Black	Black	None
(4)	Sounding tube deck plates and sounding tubes (with closure valves) serving the ballast tanks. Sounding tube deck plates without cutout valves shall be shown with their location number and the location number of the ballast tank they sound.	Blue	None	None

12.8.1 Ballast and Deballast System - DCB Text. The DC book text description of the ballast and deballast system shall contain the following:

(a) Reference to applicable damage control diagram.
(b) Description of the system's piping, pumps, and tanks.
(c) Description of how the ballast and deballist system is used to support ship stability during damage control operations.
(c) List of control station locations, and description of controls.
(d) Table showing time required to ballast the damage control voids.
(e) Table showing the time required to ballast tanks that can be used to control the ships list in a damage control situation.
(e) List of fuel oil ballasting valves.
(f) List of void tank ballasting valves.

12.9 Portable Pumps - DCB Text. The DC book text discussion of portable pumps shall contain the following:

(a) Description of the portable engine driven, firefighting/dewatering pumps and portable electric driven submersible pumps and their application in augmenting the installed drainage systems under damage control conditions.
(b) List of each type of pump and its storage location.
(c) List of overboard discharge connection intended for use with portable pumps.

12.10 Sounding Tube Deck Plates and Sounding Tubes With Valves - DCB Text. The DC book text discussion of sounding tubes shall contain the following:

(a) Description of sounding tubes and their relevance to the ship's drainage system.
(b) List of valves and fittings.

12.11 Air Escape Piping and Valve System - DCB Text.

(a) Description of air escape piping and valve system and its functional and damage control relevance to the ship's drainage system.
(b) List of valves and fittings.

12.12 Plumbing Vent Piping and Valve System - DCB Text.

(a) Description of the plumbing vent piping and valve system and its functional and damage control relevance to the ship's drainage system.
(b) List of plumbing vents that terminate on or below the damage control deck, that are fitted with gate valves and a note that the valves are not shown on the D.C. diagrams.

13. FIREMAIN, SPRINKLING, AFFF, AND WASHDOWN SYSTEMS.

13.1 Firemain System - Diagram. The following components of the firemain system shall be depicted on the diagrams in the colors specified.

Components	Color
(a) Firemain piping, valves, fittings, and pumps used for supplying water to sprinkler, AFFF, and wash down systems.	Red
(b) Branches from firemain system for miscellaneous services, such as flushing system and machinery cooling, shall be shown as far as cutout valves. The diagram shall specify the exact use of these branches.	Red
(c) The points where the firemain system is connected to the salt water cooling, fuel oil compensating, and drainage systems.	Black

13.1.1 Firemain System - DCB Text. The DC book text description of the firemain system shall contain the following:

(a) Reference to applicable damage control diagram.
(b) Description of the system.
(c) Segregation of the system under battle conditions, including the firemain segregation diagrams **(see 13.1.2)**.
(d) Size of main line or loop piping.
(e) Table indicating pump number, type, capacity and location of each pump, suction and discharge valve.
(f) Location of remote and automatic controls for pump.
(g) Description of normal and emergency saltwater supplies for the decontamination stations.
(h) List of firemain system valves (including cutout to ammunition spaces, sprinkling, eductor, flushing and miscellaneous seawater service).
(i) List of fireplugs including size and type of valve.

13.1.2 Firemain Segregation Diagrams. Firemain segregation diagrams for conditions X-ray, Yoke and Zebra shall be prepared.

13.1.2.1 Firemain Segregation Diagram Format. The segregation diagrams shall

(a) Be plan view type diagrams.
(b) Use the same symbols, letters, and numbers as the firemain diagrams
(c) Have a number 3 line width (**see Appendix C Table 21**).
(d) Be the same size as the DC book text pages and shall be assigned text page numbers.
(e) Have a title, key, list of pumps on each segregation, and list of X-RAY, YOKE, and ZEBRA valves.
(f) Have a 1-1/2 inch space left clear so the diagrams can be bound in the D.C. book.

13.1.2.2 Firemain Segregation Required Information. Each segregation diagram shall be a composite view showing the following:

(a) Main line or loop.
(b) Cross connections.
(c) Take-offs for hangar sprinkling control valves.
(d) Branches from two or more sections of the segregated main for sprinkling.
(e) Pump (type, operation, and the pump number).
(f) Take-offs for ammunition/weapons magazines sprinkling and deluge.

13.1.2.3 Firemain Segregation: Single Line Type (No Loop). Single line (no loop) type firemains shall be depicted as follows in the colors specified.

Components	Color
(a) Firemains with two (2) section segregation	
(1) Forward section: a dotted line	Black
(2) Aft section: a solid line.	Black
(b) Firemains with three (3) section segregation	
(1) Forward section: a dotted line	Black
(2) Mid section: a solid line	Black
(3) Aft section: a dot-dash line	Black

13.1.2.4 Firemain Segregation (Loop Type)

Material Condition	Color
(1) X-RAY - port and starboard side	Red
- Bypass - section of firemain (not under pressure)	Black
(2) YOKE - port side	Red
- starboard side	Blue
- Bypass - section of firemain (not under pressure)	Black
(3) YOKE - no segregation	Red
(4) ZEBRA (Firemains with two (2) section segregation)	
- port side	Red
- starboard side	Blue
(5) ZEBRA (Firemains with four (4) section segregation)	
- forward section, port side	Red
- forward section, starboard side	Blue
- aft section, port side	Orange
- aft section, starboard side	Green
- Bypass - section of firemain (not under pressure)	Black

Material Condition	Color
(6) ZEBRA (Firemains with six (6) section segregation)	
- forward section, port side	Green
- forward section, starboard side	Blue
- mid section, port side	Red
- mid section, starboard side	Orange
- aft section, port side (dot-dash line)	Green
- aft section, starboard side (dot-dash line)	Blue
- Bypass - section of firemain (not under pressure)	Black

13.2 Salt Water Sprinkling System - Diagram. The following components of the salt water sprinkling system shall be depicted on the diagrams in the colors specified.

Components	Color
(a) The sprinkling systems shall be shown as far as the cutout valve within the compartment. Where large spaces, such as hangar spaces, are served by several controls, the piping for the areas sprinkled by each valve shall be shown.	Blue

13.2.1 Salt Water Sprinkling System - DCB Text. The DC book text description of the salt water sprinkling system shall contain the following:

(a) Reference to the applicable damage control diagram.
(b) Description of the systems for ammunition spaces, hangar, and miscellaneous spaces (including drain cocks)
(c) Table of firemain cutout indicating grouping of ammunition spaces, the identifying numbers of firemain cutout valves, group control valves, and ammunition spaces cutout valves.
(d) List of valves.

13.3 Aqueous Film Forming Foam (AFFF) System - Diagram. The following components of the AFFF system shall be depicted on the diagrams in the colors specified.

Components	Color
(a) The depiction of the AFFF system, shall show the firemain service piping, and valves to the AFFF, stations, and the AFFF service outlets. The AFFF proportioners shall be represented by a box indicating the AFFF station number of the proportioner.	Green

13.3.1 Aqueous Film Forming Foam (AFFF) System - DCB Text. The DC book text description of the AFFF system shall contain the following:

(a) Reference to applicable damage control diagram.
(b) Description of the system, including station, pump, and proportioners.
(c) Description of system for helicopter hangar.
(d) List of AFFF valves.
(e) List of AFFF service outlets.
(f) Total number of portable AFFF fire extinguishers without listing their location.

13.4 Washdown Countermeasure System - Diagram. The following components of the washdown countermeasure system shall be depicted on the diagrams in the colors specified.

Components	Color
(a) The wash down countermeasure system shall show the fixed and portable piping, wash down spray nozzles, valves and hose connections. The fixed piping shall be indicated by straight line, the portable piping by wavy line.	Orange

13.4.1 Wash down Countermeasure System - DCB Text. The DC book text description of the washdown countermeasure system shall contain the following:

(a) Reference to applicable damage control diagram.
(b) Description of system.
(c) List of group control valves and the area washed down.
(d) List of valves.

13.5 Fresh Water Firefighting System - Diagram . The following components of the fresh water firefighting system shall be depicted on the diagrams in the colors specified.

Components	Color
(a) The Fresh water service to vital electronic spaces shall show the piping from the potable water system source to the sprinkler heads or hose reels.	Black

13.5.1 Fresh Water Firefighting System - DCB Text The DC book text description of the fresh water firefighting system shall contain the following:

(a) Reference to applicable damage control diagram.
(b) Description of that portion of the freshwater system that supports the firefighting function.
(c) List of valves.

13.6 Chemical Firefighting Systems-DCB Text The firefighting systems listed below are not depicted on the diagrams.. If a particular system is not applicable to the ship, a heading for it shall be provided, followed by the words: "Not applicable to this ship" Each system (applicable to the ship) shall be addressed in the DCB text as follows:

1. Carbon Dioxide (CO-2) Fire Extinguishing System
   (a) Description of the system
   (b) Total number of fixed extinguishers and their location
   (c) Total number of portable extinguishers without listing their location
2. Halon Fire Extinguishing System
   (a) Description of the systems.
   (b). Description of the Halon system as it applies to the deep fat fryer extinguishing system.
   (c) A table shall be provided listing each of the installed systems and the service or space each is designed to protect. It shall be stated whether it is a manifold bank distributive configuration or a modular distributive configuration. The location of the actuation station or stations for each system shall be indicated. The designed time delay setting for each installation and whether or not it is fitted with a time delay bypass shall be indicated. The stowage location of spare, charged Halon cylinders and the quantity that are stored there shall be stated.
   (d) List of classified valves.

3. Portable Dry Chemical Fire Extinguishing System.
   (a) Description of the system
   (b) Total number of portable extinguishers without listing their location

4. Deep Fat Fryer Fire Extinguishing System.
   (a) Description of the system (if not a Halon type system).
   (b) A table shall be provided listing each of the installed systems and the service or space each is designed to protect. It shall be stated whether it is a manifold bank distributive configuration or a modular distributive configuration. The location of the actuation station or stations for each system shall be indicated. The designed time delay setting for each installation and whether or not it is fitted with a time delay bypass shall be indicated. The stowage location of spare, charged Halon cylinders and the quantity that are stored there shall be stated.

13.7 Seawater Cooling System - DCB Text The seawater cooling system is not shown on the DC diagrams. The DCB text description of the Seawater Cooling System shall contain the following: NOTE (If applicable to the ship)

(a) Description of the system.
(b) Table indicating pump number, type, capacity, location of each pump, suction and discharge valve.
(c) Location of remote and automatic controls for pumps.
(d) Description of segregation of the system under battle conditions.
(e) List of valves.

14. FUEL, FILLING, TRANSFER, OVERFLOW, VENTING, AND TANK STRIPPING SYSTEMS

14.1 General Requirements. The fuel system diagrams shall depict in a different color, each of the fuel systems a ship may have such as: the ship's service fuel, (primary propulsion fuel), cargo fuel, aircraft fuel/defueling (ie: JP-5), landing craft fuel/defueling and gasoline system. To minimize diagram congestion, the ship's fuel systems shall be depicted on separate diagrams as follows:

(1) Ship's Service Fuel Filling, Transfer, Overflow and Tank Stripping System (**see Note 1**)
(2) Aircraft (JP-5) AND LCAC Filling, Transfer and Overflow System
(3) Gasoline System
(4) Tank Stripping (see note 1)

(**NOTE 1**): If a fuel system has a dedicated tank stripping system, the tank stripping system can be included on the fuel system diagram. Or to minimize diagram congestion, a fuel system's tank stripping system can be depicted on a separate diagram (**see 14.5**).

14.2 Ship's Service Fuel Filling, Transfer, and Overflow System - Diagram. The following components of this system shall be depicted on the diagrams in the colors specified.

Components		Color
(a)	Fuel filling, transfer, piping, valves, fittings and pumps.	Blue
(b)	Vent and overflow piping and valves (**see note 2**):	Orange
(c)	Tank stripping (**see 14.5**)	Red
(d)	Sounding tube deck plates and sounding tubes with valves.	Blue
(d)	Seawater compensation, piping and valves	Green
(e)	Other services	Black

(**NOTE 2**): If the ship's service fuel system is supported by a tank stripping system and the stripping system is shown on a separate diagram, the vent and overflow piping for the ship's service fuel system shall be red.

14.2.1. Ship's Service Fuel Filling, and Transfer, Systems - DCB Text. The DC book text description of this system shall contain the following:

(a) Reference to applicable damage control diagram.
(b) Define the type of fuel(s) handled by the ship's service fuel system, ie:Diesel Marine Fuel (DFM), Navy Distillate Fuel (NDF), Navy Special Fuel Oil (NSFO) etc.
(b) Description of all arrangements and valves for filling and transfer.
(c) Segregation of the system under battle conditions.
(d) Size of main line or loop piping.
(e) Methods of operation of the systems.
(f) Table indicating pump number, type, capacity and location of each pump; also suction and discharge valves.
(g) List of valves.

14.2.2 Ship's Service Fuel, Overflow System - DCB Text The DC book text description of the overflows shall contain the following:

(a) Reference to applicable damage control diagram.
(b) Description of overflows.
(c) List of valves.

14.2.3 Ship's Service Fuel, Vent System - DCB Text. The DC book text description of the vent system shall contain the following:

(a) Description of the vent system.
(b) List of valves.

14.2.4 Ship's Service Fuel, Sounding Tube Deck Plates and Sounding Tubes With Valves - DCB Text. The DC book text description of the sounding tube system shall contain the following:

(a) Description of the piping.
(b) List of sounding tube valves and fittings.

14.3 Aviation (JP-5) Fueling, Defueling, Transfer, and Overflow Systems - Diagram. The following components of this system shall be depicted on the diagrams in the colors specified.

Components		Color
(a)	Aviation (JP-5) fueling, defueling transfer, piping, valves, fittings, pumps, including fueling/defueling stations and auxiliary service. (**See Note 1**)	Green
(b)	Sounding tube deck plates and sounding tubes with valves.	Green
(c)	Vent and overflow piping and valves (**see Note 2**)	Orange
(d)	Tank stripping if a component of the Aviation JP-5 fuel system, (**see 14.5**)	Red
(e)	Seawater compensation, LCAC piping and valves	Blue
(f)	Other services	Black.

(**Note 1**): If the ship carries landing craft (ie: LCACs) their fueling/defueling system shall be included on the diagram and "LCAC" included in the diagram title.

(**Note 2**): If the tank stripping system is shown on a separate diagram, the vent and overflow piping of the Aviation (JP-5) diagram shall be red.

14.3.1 Aviation (JP-5) Filling and Transfer Systems - DCB Text. The DC book text description of this system shall contain the following:

(a) Reference to applicable damage control diagram.
(b) Description of all arrangements and valves for fueling and defueling, transfer, and auxiliary service.
(c) Segregation of the system under battle conditions.
(d) Size of main line or loop piping.
(e) Methods of operation of the systems.
(f) Table indicating pump number, type, capacity, location of each pump, suction, and discharge valve.
(g) List of valves.

14.3.2 Aviation (JP-5) Overflow System - DCB Text. The DC book text description of this system shall contain the following:

(a) Reference to applicable damage control diagram.
(b) Description of overflows.
(c) List of valves.

14.3.3 Aviation (JP-5) Vent System - DCB Text. The DC book text description of this system shall contain the following:

(a) Reference to applicable damage control diagram.
(b) Description of air escapes.
(c) List of valves.

14.3.4 Aviation (JP-5) Sounding Tube Deck Plates and Sounding Tubes With Valves - DCB Text. The DC book text description of this system shall contain the following:

(a) Description of the piping.
(b) List of sounding tube valves and fittings.

14.4 Gasoline Systems Diagram. The following components of this system shall be depicted on the diagrams in the colors specified.

Components		Color
(a)	Stowage tank piping, valves, gauge cutout valves, fittings, pumps, overflows and sounding tube deck plates used for fueling and defueling.	Red
(b)	Vent and overflow piping and valves	Orange
(c)	The complete seawater system and sources of compensating water (firemain or special pumps and valves). Firemain valves, and fire plugs shall be identified.	Blue
(d)	Seawater hose connections and the location numbers of the nearest fire plugs to which they may connect.	Black
(e)	The inert gas system shall be shown from the cofferdam, pipe casing, and purging to the first cutoff valve from producer	Green

(**NOTE**): In the event that the inert gas system is not extensive, it can be described in the D.C. book text and not included on the Gasoline system diagram.

14.4.1 Gasoline System - DCB Text. The DC book text description of this system shall contain the following:

(a) Reference to applicable damage control diagram.
(b) Description of fueling, defueling, system.
(c) Segregation of the system under battle conditions.
(d) Size of main line piping.
(e) Table indicating pump number, type, capacity and location of each pump, suction and charge valve.
(f) List of gasoline system valves.
(g) Description of seawater compensation system.
(f) List of seawater compensation system valves.
(g) Description of gas inerting system
(h) List of valves

14.4.2 Gasoline System Vent and Overflow System - DCB Text. The DC book text description of this system shall contain the following:

(a) Reference to applicable damage control diagram.
(b) Description of overflows.
(c) List of valves.

14.4.3 Gasoline System, Sounding Tube Deck Plates and Sounding Tubes With Valves - DCB Text. The DC book text description of this system shall contain the following:

(a) Description of the piping.
(b) List of sounding tube valves and fittings.

14.4.4 Gasoline System, Gas Inert System - DCB Text.
The DC book text description of this system shall contain the following:

(a) Reference to applicable damage control diagram.
(b) Size of piping.
(c) Source of supply.
(d) List of valves.

14.5 Tank Stripping System Diagram If this system is shown on a separate diagram, the diagram title shall denote the system the tank stripping system supports, ie: Ship's service fuel, Aviation (JP-5) or Gasoline system. The following components of this syste shall be depicted on either the fuel system diagram the tank stripping supports or the separate tank stripping system diagram in the colors specified.

Components		Color
(a)	Pumps, piping and valves	Red
(b)	Other services	Black

14.5.1 Tank Stripping System - DCB Text. The DC book text description of this syste shall be included in the DC book text description of the fuel system(s) the tank stripping system supports. The description of this system shall contain the following:

(a) Reference to applicable damage control diagram.
(b) Description of system and definition of the fuel system(s) the tank stripping system supports.
(c) List of valves.

15. VENTILATION SYSTEM

15.1 Ventilation System Diagrams. The ventilation system should be shown on two separate series of D.C. diagrams in situations where the ventilation system complexity results in diagram congestion which degrades the clarity of the D.C. diagram. One series shall depict the supply, air conditioning and recirculating system, and the other series shall show the exhaust system. For ship types where the ventilation system is not overly complex, and where diagram clarity is not degraded due to congestion; the supply, air conditioning, recirculating system, and the exhaust system can be depicted on one series of diagrams. The diagrams shall depict the following components.

(a) Ducts within the ship through which water, gas, smoke, or fire may enter the ship and pass from one compartment to another. This includes all ducts installed between weather and water-tight compartments and all ducts of the recirculating system that pierce bulkheads. Only one spur shall be shown in a compartment, even if more terminals are actually present.
(b) Ventilation and recirculating closure fittings, fans, and remote operating stations.
(c) Mechanically operated fire zone dampers.
(d) Remote operations of ventilation closures and fan controllers.
(e) Fans without duct work piercing bulkheads shall not be shown.
(f) CPS System pressure regulating valves and air lock and decontamination station air sweep fittings.

15.1.1 Ventilation System Diagram Colors. The following colors shall be required for the ventilation and CPS system diagrams:

	Component	Color
(a)	Mechanical supply fans, closures and ducts,	Blue.
(b)	Mechanical exhaust fans, closures and ducts,	Green.
(c)	Natural supply and exhaust closures,	Orange.
(d)	Recirculating system,	Red.

15.2 Ventilation Systems - DCB Text. The text for the ventilation system shall contain the following:

(a) Reference to and general explanation of the damage control diagrams depicting the ventilation system.
(b) Reference to the section of the damage control book which discusses the Collective Protection System (CPS), (**see section 8.8**). A discussion of how the CPS system inter-reacts with the ventilation system, such as; how CPS subzones can be included or excluded from the pressure zone by manipulation of closures.
(c) Description of all arrangements, including number and type of supply, exhaust, recirculating, and CPS fans.
(d) Description of ventilation arrangement for spaces fitting with CO_2 or Halon systems.
(e) Discussion of recirculating systems that pierce bulkheads.
(f) Discussion of ventilation in relation to watertight integrity, stressing hazard to watertight integrity and spread on noxious gases, smoke, and flame.
(g) Discussion of proper setting in material conditions, remote control operations of system, including location of power panels and their sources of power.

(h) Discussion of the importance of maintenance and keeping systems free of dirt and debris.

(I) Tables listing the following:
  (1) Fans
  (2) Fans (without any duct work piercing bulkheads or decks).
  (3) Closure fittings of ventilation and recirculating systems including mechanical fire zone dampers.
  (4) Pressure control (Iris) valves
  (5) Air Lock (Types I, II, and III) air sweep fittings.

16. CHILLED WATER SYSTEM

16.1 General Requirements. Ships shall have their Chilled Water System depicted on two sets of diagrams. The first set of diagrams shall depict the system, showing all spaces served by the chilled water system. The second diagram shall provide an isometric depiction of service to only ship mission critical spaces and systems, and depict segregation of the chilled water system under damage control conditions. The diagrams shall be titled as follows:

(a) Chilled Water System
(b) Chilled Water System, Damage Control Segregation

16.2 Chilled Water System Diagram The following components of the system shall be depicted on the diagrams.

(a) Piping in the chilled water main, and piping branches running from the main, which supply chilled water to cooling coils, unit coolers, gravity coils, fan coil assemblies, electronic or other cooling water systems.

(b) Chilled water supply and return piping shall be shown as one line, except in enlarged views showing A/C plant details, or in cases where the supply and return valves affecting system line up are located in different spaces. In single line depiction's the fitting numbers shall be annotated with supply valve number first followed with the return number in parenthesis, i.e. 3-24-1 (3-24-3). A note shall be added to the diagram indicating supply and return nomenclature.

(c) Only the stop valves and root cutout valves within the chilled water main and branch pipe lines shall be shown and numbered. Vent valves, low point drain valves, and coil(s) control valves downstream of root valves shall not be shown. If a root valve is shown on one diagram and the coil served is shown on another diagram, then a table listing root valves and their location shall be added to the diagram showing the coils.

(d) Branches to all services shall terminate at a triangular symbol, representing the component being served. The triangular symbol shall be accompanied by a letter designator, denoting the type of component being served, ie; cooling coil, unit cooler, fan coil, gravity coil, heat exchanger or sample cooler, etc. Such letter designators shall be listed in the notes section of the diagram.

(e) Systems or components that are supplied with chilled water from more than one zone shall have both sources shown.

16.2.1 Chilled Water System Diagram Colors and Line Weights Each segregatable zone within the chilled water main (or loop) piping shall be denoted by a separate color. Branch and riser piping and valves connected to a particular zone of the chilled water main (or loop) piping shall be the same color as the loop to which they are connected. The following chilled water components shall be depicted in the colors and line weights specified. For specific line weight data refer to (**Appendix C, Table 21**)

	Components	Color	Line Weight
(a)	Main (or loop), piping, forward end, port side, including connecting riser and branch piping and in-line stop/root cuttout valves within the zone	Red	Heavy
(b)	Main (or loop), piping, forward end, starboard side, including connecting riser and branch piping and in-line stop/root cuttout valves within the zone	Blue	Heavy
(c)	Main (or loop), piping, after end, port side, including connecting riser and branch piping and in-line stop/root cuttout valves within the zone	Orange	Heavy
(d)	Main (or loop), piping, after end, starboard side including connecting riser and branch piping and in-line stop/root cuttout valves within the zone	Green	Heavy
(e)	Chilled water piping and valves on branches leading from loop piping and risers to non-combat systems	Green	Thin
(f)	Loop isolation valves and cross-connect piping between loops.	Black	Medium
(g)	A common riser from an A/C plant, which serves two segregatable chilled water system zones. Risers beyond the root cutout valve shall be color coded the same color as the loop they serve.	Black	Medium
(h)	Connections from other services,	Black.	Thin

16.3 Chilled Water System, Damage Control Segregation Diagram

16.3.1 Segregation Diagram Layout

(a) The segregation diagram shall be depicted on a single diagram if possible. The diagram shall be eleven inches high by the same width as the Chilled Water System diagrams. The diagram shall include a one and a half inch (1-1/2) border on the left side (to facilitate binding in the D.C. book) and a one quarter (1/4) inch border on the other three sides.

(b) The diagram shall contain an upper title block (in the upper corner at each end of the diagram), and a key, notes and lower title block at the right end of the diagram as typically required for damage control systems diagrams. However, the upper title blocks, the key, notes and lower title block shall be printed at a reduced scale without compromising their legibility.

(c) The diagram shall contain an isometric systems base similar to other damage control systems diagrams, but modified as follows:

1. The upper decks of the subdivision base are depicted on the left side of the diagram, and the lower decks on the right side of the diagram.
2. The scale and line weight of the systems base shall be reduced to allow for the depiction all decks levels onto a single diagram (if possible) or on the minimum number of diagrams.

3. Sufficient space between decks shall be provided for the placement of valve numbers.
4. Compartment names and location numbers shall not be shown.
5. Bulkhead shading shall not be shown
6. Deck levels shall be vertically aligned according to their frame number and labeled.
7. Frame numbers, Fire Zone (FZ) frame numbers and Pressure Zone (PZ) frame numbers shall be shown.

16.3.2 Ship Mission Critical Spaces and Systems,.and A/C Plant Space Titles and Location Numbers. The compartment name and location number of ship mission critical spaces (which are dependent upon continuous chilled water service), and the A/C plants spaces, shall be printed outside the isometric system base adjacent to the actual location of each space. Each compartment name and location number shall be blocked and shaded in purple to denote the criticality of the space. A leader line and arrow head shall connect each compartment title and location number block to the location of the space within the isometric system base.

16.3.3 A/C Plant Enlarged Views. Enlarged views of these spaces shall not be shown on the segregation diagram. However each A/C plant shall be color coded the same color as the zone of the chilled water system the A/C plant serves when the chilled water system is fully segregated under damage control conditions.

16.3.4 Chilled Water Service Piping to Ship Mission Critical Spaces and Systems. Chilled water piping serving such spaces shall be depicted as follows:

1 Piping in the chilled water main (chilled water loop), and piping branches running from the main, which supply chilled water to ship mission critical spaces shall be shown. These spaces and systems that are supplied with chilled water from more than one zone of the chilled water system shall have both sources shown.

2. Chilled water supply and return piping branches running from the main shall be shown as one line. The piping branches shall terminate at the root cutout valve in the branch pipe line closest to the component being served. A short stub of pipe (printed in the designated color for the loop of the chilled water main to which it belongs) shall extend from the valve and shall be accompanied with a letter designator denoting the ship mission critical spaces being served by the chilled water system. The letter designators shall be listed in the notes section of the diagram.

3 Only the stop valves and root cutout valves within the chilled water main and branch pipe lines shall be shown and numbered. Vent valves, low point drain valves, and coil(s) control valves downstream of stop valve/root cutout valves shall not be shown.

4. Each stop valve/root cuttout valve shall be identified by the chilled water supply valve's location number and its damage control classification. The chilled water return valve location number and its damage control classification shall be shown in parenthesis and listed beneath the supply valve location number. The valve numbers and damage control classifications shall be printed outside the system base and be connected to the designed valve by a leader line and arrow head. A note shall be added to the diagram indicating supply and return nomenclature

5. Isolation valves in the chilled water main shall be highlighted by printing the valve's symbol, DC numbers and damage control classification in bold at 1.25 scale, and slanting the numbers and letters fifteen (15)degrees.

16.3.5 Chilled Water Service Piping to Other Spaces. Chilled water system service branch lines to non-ship mission critical spaces and components shall not be depicted beyond the root (supply and return) cutout valves serving the branch lines on the chilled water main.

16.3.6 Segregation Diagram Colors and Line Weights The colors and line weight shall be the same as those on the Chilled Water System diagram. **(see 16.2.1)**.

16.4 Chilled Water System - DCB Text. The text for the chilled water system shall contain the following:

(a) Reference to the Chilled Water System Diagram, the segregation diagram and the operational diagram (as applicable to the ship type). The DC book text shall describe each of the diagrams and explain their function and how to utilize them.
(b) Description of the Chilled Water system, including:
   1. Size and configuration of the main or loop piping
   2. Description of zone isolation and cross connection piping and valves
   3. Table listing pumps and chillers, type, capacity, location, and vital and non-vital load.
(c) Identify alternate supply to vital components.
(d) List of chilled water system valves that are numbered and assigned closure classification in the damage control text.

17. COMPRESSED AIR SYSTEMS

17.1 Compressed Air Diagram. The compressed air system diagram shall show the following: compressors, air cylinders, piping, valves, and fittings.

17.1.1 Branches (Off Main). Branches shall be shown up to the service outlet and properly labeled. Strainers, separators, and gauges shall not be shown.

17.1.2 Branches (Starting Air). Branches that are used for starting air on diesel-electric or diesel driven ships shall be shown up to the engines.

17.1.3 Colors. The following compressed air systems shall be depicted in the colors specified:

Compressed Air System	Color
(a) High pressure (over 600 pounds per square inch (lb/in^2)),	Red
(b) Medium pressure (150 to 600 lb/in^2)	Orange
(c) Low pressure (below 150 lb/in^2), non-vital	Green
(d) Low pressure (below 150 lb/in^2), vital	Blue
(e) Other services	Black

17.2 Compressed Air Systems - DCB Text. The text for compressed air systems shall contain the following:

(a) Reference to applicable damage control diagram.
(b) Description of high, medium, low, and ship service systems.
(c) Number, location, and capacity of compressors.
(d) Methods of operation and segregation of systems under battle conditions.
(e) List of valves.
   (1) High pressure.
   (2) Medium pressure.
   (3) Low pressure.
(f) List of breathing air locations.

18. OXYGEN AND NITROGEN SYSTEMS

18.1 Oxygen and Nitrogen Diagram. The oxygen and nitrogen systems diagram shall show the oxygen and nitrogen stowage tanks, piping, valves, fittings, compressors, and pumps used for producing and supplying oxygen and nitrogen.

18.1.1 Colors. The following colors shall be required for the oxygen and nitrogen systems diagram:

Service		Color
(a)	Oxygen	Red.
(b)	Nitrogen	Blue.
(c)	Other services	Black.

18.2 Oxygen and Nitrogen - DCB Text. The text for oxygen and nitrogen requirements shall contain the following:

(a) Reference to applicable damage control diagram.
(b) Description of the systems.
(c) Number, location, and capacity of compressors.
(d) Methods of operation and segregation of system under battle conditions.
(e) List of valves.

(1) Oxygen.
(2) Nitrogen.

19. FRESHWATER SYSTEM.

19.1 Freshwater System Diagram. A diagram for the freshwater system is not required.

19.2 Freshwater System - DCB Text. The text for freshwater systems shall contain the following:

(a) Brief description of the system, including freshwater fire fighting systems and freshwater to decontamination stations.
(b) Method of operation of the system.
(c) Number, location and capacity of pumps, decontamination stations, fire hose reels and tanks.
(d) List of root valves.

20. FLUSHING SYSTEM.

20.1 Flushing System Diagram. A diagram for the flushing system shall not be required.

20.2 Flushing System - DCB Text. The text for flushing systems shall contain the following:

(a) Brief description of the system.
(b) Brief description of method of operation of the system.
(c) List of firemain flushing cutout valves.

21. LUBRICATING OIL SYSTEMS.

21.1 Lubricating Oil System Diagram. A diagram for the lubricating oil system shall not be required.

21.2 Lubricating Oil System - DCB Text. The text for lubricating oil systems shall contain the following:

(a) Description of system
(b) Method of operation
(c) Number, location, and capacity of pumps
(d) Location of filling station
(e) List of damage control valves, only where the system penetrates watertight bulkheads or deck.

22. CASUALTY POWER SUPPLY AND CASUALTY COMMUNICATION SYSTEMS.

22.1 Casualty Power Supply and Casualty Communication Systems Diagram. The casualty power supply and casualty communication systems diagram shall show the following:

(a) Location of switchboards and load centers.
(b) Each power panel equipped with casualty power terminals
(c) Riser and bulkhead terminals
(d) Cable racks, including location marking, permanently installed risers and cables
(e) Portable casualty power cable runs, including cable rack and length
(f) Multipurpose outlets, including location numbers used for submersible pumps, welding outfits, and sterilizes. (Wiring between multipurpose outlets shall not be shown.)
(g) Casualty communication circuit (X40J) permanent cable runs, and permanently installed sound-powered telephone jack boxes and their location numbers
(h) A note concerning the type and length of casualty communication portable cables and stowage locations

22.1.1 Colors. The following components of these systems shall be depicted on the diagrams in the colors specified.

	Components	Color
(a)	Permanent casualty power system	Green
(b)	Switchboard, power panel, and controllers	Green
(c)	Terminal	Green
(d)	Portable casualty power supply system	Red
(e)	Cable rack for casualty power supply system	Red
(f)	Permanent casualty communication circuit (X40J)	Blue
(g)	Jack boxes	Blue
(h)	Multipurpose outlets	Orange

22.2 Casualty Power Supply and Casualty Communication Systems Diagram - DCB Text. The diagram shall be discussed as required in various sections of the Power and Lighting section of the damage control book, (**see section 25**).

23. VITAL DAMAGE CONTROL ELECTRICAL EQUIPMENT AND POWER SUPPLY CHART

23.1 General Requirements. An example layout of the chart is shown in ***Figure 33***. The chart shall be a tabulation using 1/2 inch high but not more than 11/16 inch wide grid format of the vital damage control equipment and systems, with their identification numbers, power supplies and controls. The line numbers along the left margin can be increased as warranted to list the equipment on the ship. Provisions for future entries may be made by leaving blank spaces which are uniformly spread throughout the chart if it does not generate any additional charts.

23.1.1 Equipment/Systems Headings and Subheadings. The required equipment/system headings and subheadings that shall appear at the top and bottom of the chart are shown in ***Figure 33***.

23.1.2 Information to Be Listed. Equipment, systems, circuits, location numbers, etc, shall be listed in the grids. An example of equipment abbreviations and a list of the integrated circuit (IC) systems that are typically represented on the chart, are shown in ***Figure 34***. A list of abbreviations for the equipment represented on the chart, and a list of the integrated circuit (IC) system designations represented on the chart, shall appear in the key area of the chart. Equipment and IC circuit designations may vary according to the type of ship for which the chart is being prepared.

23.1.3 Color. The numbers, letters and grid shall be printed in black.

23.2 Vital Damage Control Electrical Equipment and Power Supply Chart - DCB Text. The chart shall be discussed as required in various sections of the Power and Lighting section of the damage control book, (**see section 25**).

24. COMMUNICATION DIRECTORY

24.1 General Requirements. The directory shall be a tabulation on a grid format of the circuits used in the control of damage, with their location and identification numbers. An example of the communication directory grid layout is contained in ***FIGURE 35***. Stations shall be listed in alphabetical sequence. Spaces shall be left after each alphabetical group for future additions. A note shall be included on the chart, referring to the casualty power supply diagram, for information pertaining to the casualty communication circuit (X40J).

24.1.1 Headings and Circuits. An example of the headings and circuits typically represented at the top and bottom column headings on a communication directory are shown in ***Figure 35***. The headings and circuit designations may vary according to the type of ship for which the communication directory is being prepared.

24.1.2 Automated Interior Voice Communication System. For ships equipped with an automated interior voice communication system (IVCS) the nets comparable to the headings and circuits shown in ***Figure 36*** shall be placed in the vertical column headings at the top and bottom of the communication directory

24.1.3 Information to Be Listed. Station location of outlets and selective switches shall be listed for all sound powered telephone circuits listed under the vertical column headings. Stations and locations of intercommunication units, reproducers, transmitters, and the directory number of dial telephone sets (except for staterooms), shall be listed.

24.1.4 Color. The numbers, letters and grid shall be printed in black.

24.2 Communication Directory - DCB Text. The Communication Directory shall be discussed as required in the Power and Lighting Section of the damage control book, (**see section 25**).

25. POWER AND LIGHTING SYSTEM

25.1 Power and Lighting DCB Text. The D.C book text shall contain information that provides a general knowledge of the ship's electrical systems. It shall contain the following:

(a) Reference to vital damage control electrical equipment and power supply chart.
(b) Reference to ship's information book for description of systems.
(c) A brief description of systems to indicate that they have been constructed with a high degree of flexibility, reliability, and inherent damage control features to obtain a continuity of power supply under casualty conditions.

25.2 Design Arrangements. The text for design arrangements shall contain a discussion of design features of electric system that provided inherent damage control features, such as provisions made in distribution system to cope with derangement's and casualty conditions. Typical examples are: steering gear, which is provided with at least two sources of electric power arranged through different parts of the ship and in some cases with emergency electrohydraulic pumps, power supply to ordnance equipment, bus ties provided to interconnect switchboards, and separation between generator plants.

25.3 Generating Plant (Including Ship Service and Emergency Switch Gear). The text for the generating plant shall contain data on plant, number, rating, location of generators and associated switch gear.

25.4 Power Distribution System. The text for power distribution system shall contain the following:

(a) Description of specific design features of system provided for inherent damage control functions, such as selective tripping of protective devices.
(b) Table giving a list of auxiliaries that have more than one power supply feeder and indicate the source of the normal, alternate, and emergency supplies
(c) Outline of switch gear bus tie arrangements, sources of power supply, method of transferring load from one power supply to another, and general location of various cable runs
(d) Schematic wiring diagrams illustrating typical methods used for transferring loads from one power source to another, and switch gear interconnection biscuits, and power sources)
(e) Information on the following power circuits:
    (1) Catapult machinery.
    (2) Damage control valves.
    (3) Electronic systems.
    (4) Elevators (all electric operated ones).
    (5) Generator and bus ties.
    (6) Guns and launchers.
    (7) Hoists.
    (8) Pumps (all electric operated ones).
    (9) Multipurpose outlets.
    (10) Steering gear.

25.5 Lighting Distribution System. The text for the lighting distribution system shall contain the following:

(a) Design arrangement features that provide for instantaneous emergency supply to lights in vital areas. Generally, circuit arrangement for such normal, alternate, and emergency supplies shall be indicated.
(b) Function of relay operated and manually operated hand lanterns.
(c) Information in regard to low level (red light) and Neal lighting illumination.

25.6 Cableway Arrangements. The text for cableway arrangements shall contain the following:

(a) Brief description of main cableway runs throughout the ship
(b) Brief description of selection of runs to provide maximum separation between normal, alternate, and emergency supplies both horizontally and vertically.

25.7 Cable Marking and Identification. The text for cable marking and identification shall contain reference to the chapter in **NAVSEA 0901-LP-079-0020 CH 079 VOL 2 Damage Control Practical Damage Control**, where cable marking and identification are discussed.

25.8 Electrical Equipment. The text for electrical equipment shall contain reference to the ship's coordinated allowance list and damage control allowance equipage lists.

25.9 Casualty Power Supply System - DCB Text. The text for the casualty power supply system shall contain the following:

(a) Reference to casualty power supply control diagram, if one is required.
(b) Reference to vital damage control electrical equipment and power supply chart, if one is required.
(c) Description of system, including specific arrangements.
(d) List of portable cable (by cable rack number) and the lengths of cable stowed thereon. This listing shall be in sequence starting with the lower deck, reading forward to aft, and ending at the highest deck.
(e) List of casualty power supply panels including basic location number.
(f) List of casualty power supply bulkhead and deck terminals, including basic location number.
(g) List of casualty power, portable cable racks, including basic location number.
(h) List of multipurpose outlets, including basic location number, and power source.

25.10 Interior Communication Circuits - DCB Text. The DCB text discussion for the ship's interior communication circuits shall contain the following:

(a) Reference to the vital damage control electrical equipment and power supply chart.
(b) Reference to the communication directory.
(c) Essential information regarding the function, operation, and use of interior communication circuits that are used for damage control.

25.11 Automated Interior Voice Communications System. Ships equipped with an automatic IVCS shall be given the same text coverage as required for sound powered telephone circuits.

26 VOICE AND PNEUMATIC TUBES MESSAGE PASSING SYSTEMS

The text for voice and pneumatic tubes message passing system shall describe the following:

(a) Method of operation.
(b) Size of Tubing.
(c) Restrictions on operation resulting from a Chemical, Biological, or Radiological(CBR) thread, or from operation of the CPS System.

27. NOTES

27.1 Data Requirements. When this standard is used in an acquisition which incorporates a DD Form 1423, Contract Data Requirements List (CDRL), the data requirements identified below shall be developed as specified by an approved Data Item Description (DD Form 1664) and delivered in accordance with the approved CDRL incorporated into the contract. When the provisions of DoD FAR Supplement, Part 27, Sub-Part 27.475-1 (DD Form 1423) are invoked and the DD Form 1423 is not used, the data specified below shall be delivered by the contractor in accordance with the contract or purchase order requirements. Deliverable data required by this standard are cited in the following paragraphs.

Paragraph No.	Data Requirement Title	Applicable DID No.	Option
4.18	Damage control books and diagrams for U.S. Navy surface ships	DI-TMSS-8XXXX	----

(Data item descriptions related to this standard, and identified in section 6 will be approved and listed as such in DoD 5010.12-L., AMSDL. Copies of data item descriptions required by the contractors in connection with specific acquisition functions should be obtained from the Naval Publications and Forms Center or as directed by the contracting officer.)

27.2 Government-Furnished Material and Information. The contracting officer shall provide the following material and information:

(a) The height of the center-of-gravity to be assumed by the ship builder in the course of preparing the flooding effect diagram.

(b) The maximum allowable height of the center-of-gravity to be used by the shipbuilder in his discussion of minimum acceptable stability in the text.

(c) The moment to trim 1 inch, moment to heel, tons per inch immersion, and longitudinal center of flotation for use in preparing the liquid loading diagram.

(d) Curves of righting arm (in the damage conditions) data.

(e) Curves of intact stability diagram data

(f) Liquid loading instructions for use by the shipbuilder in preparing the liquid loading diagram.

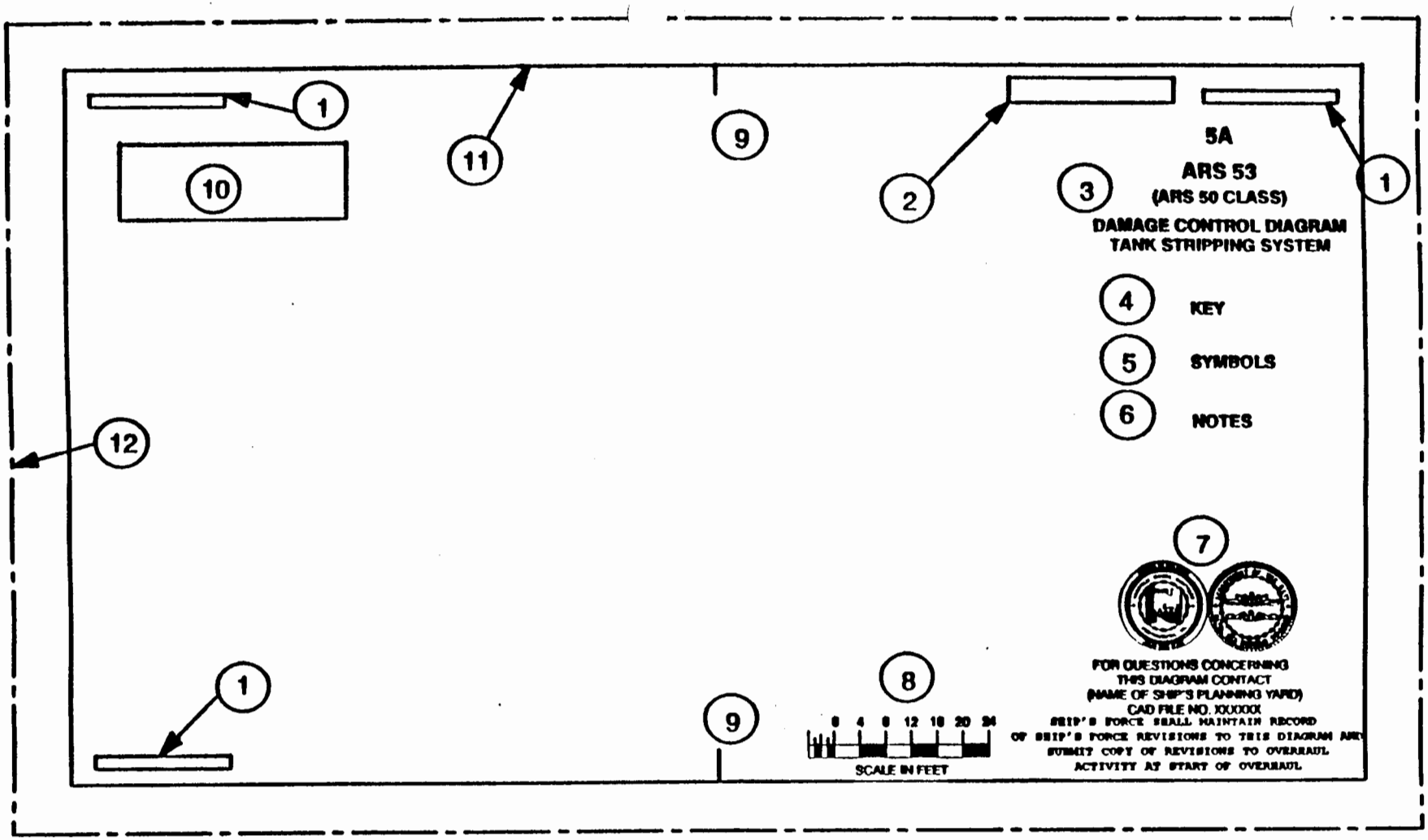
(g) Additional coloring patterns, if required, for use on the liquid loading diagram

(h) A damage control book and set of diagrams, to provide an example of damage control book text and diagram content and format, if requested by the shipbuilder

(i) A Computer Aid Drafting (CAD) software containing CAD system menu and symbol library of system fitting symbols used on damage control diagrams (**see Table III**) ***Figure 37***.

27.3 Changes From Previous Issue. Asterisks are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes. Activities using this document should refer to the overview which describes the differences between MIL-772(C) and this document.

Preparing activity: Department of the Navy
Naval Sea Systems Command
Damage Control / Fire Fighting Division
2531 Jefferson Davis Highway
Arlington, Virginia 22242-5160



1. SECURITY CLASSIFICATION
2. OVERHAUL RECORD BLOCK
3. UPPER TITLE BLOCK (FIG 2)
4. KEY (FIG 3)
5. SYMBOLS
6. NOTES
7. LOWER TITLE BLOCK (FIG 4)
8. SCALE
9. CUT LINE (SIZE C DIAG ONLY)
10. SHIP & DIAGRAM (FIG 5)
11. BORDER
12. DIAGRAM TRIM LINE

FIG 1 D.C. DIAGRAM FORMAT

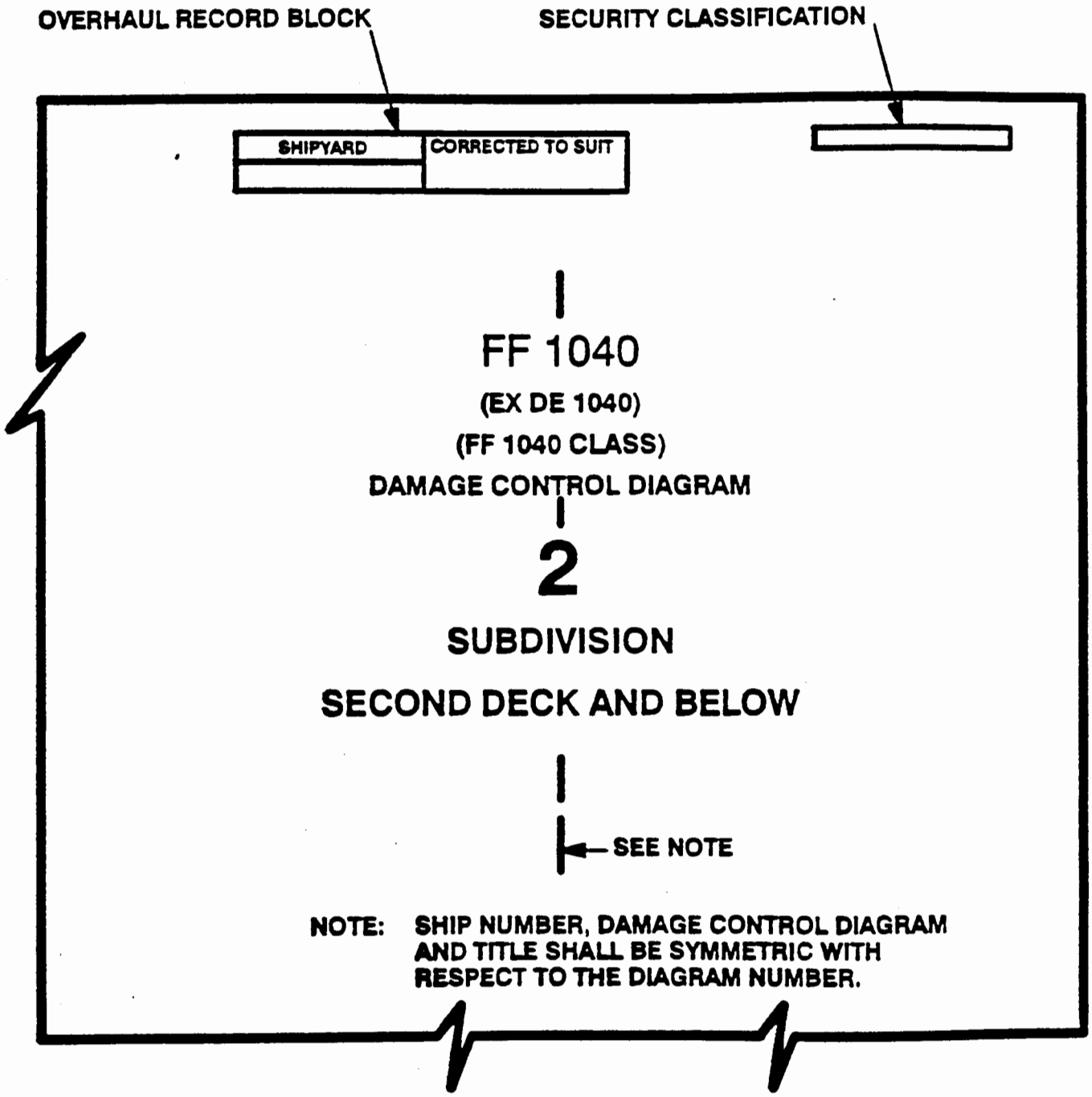


FIG 2 – UPPER TITLE BLOCK
(UPPER RIGHT HAND CORNER – ALL DIAGRAMS)

KEY

DOTTED LINES AND CROSS HATCHING INDICATE BOUNDARIES, DUCTS AND FITTINGS HIDDEN FROM VIEW

DOT DASH LINE INDICATES INTERSECTION OF HORIZONTAL LEVEL WITH VERTICAL BULKHEAD AND GRATING LEVEL

HEAVY BLACK LINES INDICATE WATERTIGHT OR OILTIGHT BOUNDARIES

THIN BLACK LINES INDICATE AIRTIGHT, FIRE RETARDING FUMETIGHT OR NON-TIGHT BOUNDARIES

RED LINE INDICATES FIRE ZONE BULKHEAD

BLUE LINE INDICATES COLLECTIVE PROTECTION SYSTEM (CPS) BOUNDARY

RED-BLUE LINE INDICATES A COMBINED FIRE AND CPS ZONE BULKHEAD

COMPARTMENT COLOR CODE

PINK = HAZARDOUS AREAS (JP5 STORAGE TKS FLAMMABLE LIQUID STORAGE)

PINK STRIPPED = MAGAZINES

YELLOW = DC REPAIR LKRS/DCC AND RADIATION HAZARD AREA

BLUE = DECONTAMINATION STATIONS

BLUE STRIPPED = CBR DEFENSE STRM

GREEN = BATTLE DRESSING STATION

GREEN STRIPPED = MEDICAL/DENTAL SPACES

TYPICAL KEY FOR SUBDIVISION DIAGRAMS

KEY

DOTTED LINES AND CROSS HATCHING INDICATE BOUNDARIES, DUCTS AND FITTINGS HIDDEN FROM VIEW

HEAVY BULKHEAD LINES INDICATE WATERTIGHT OR OILTIGHT BOUNDARIES

THIN BULKHEAD LINES INDICATE AIRTIGHT FIRE RETARDING FUMETIGHT OR NON-TIGHT BOUNDARIES

DOT-DASH LINES INDICATE INTERSECTION OF HORIZONTAL LEVEL WITH VERTICAL BULKHEAD AND GRATING LEVEL

FZ – FIREZONE BULKHEAD

MECHANICAL SUPPLY NON-TIGHT

MECHANICAL SUPPLY WATERTIGHT

MECHANICAL RECIRCULATING NON-TIGHT

NATURAL SUPPLY NON-TIGHT

NATURAL SUPPLY WATERTIGHT

TYPICAL KEY FOR SYSTEM DIAGRAMS

FIG 3 – KEYS

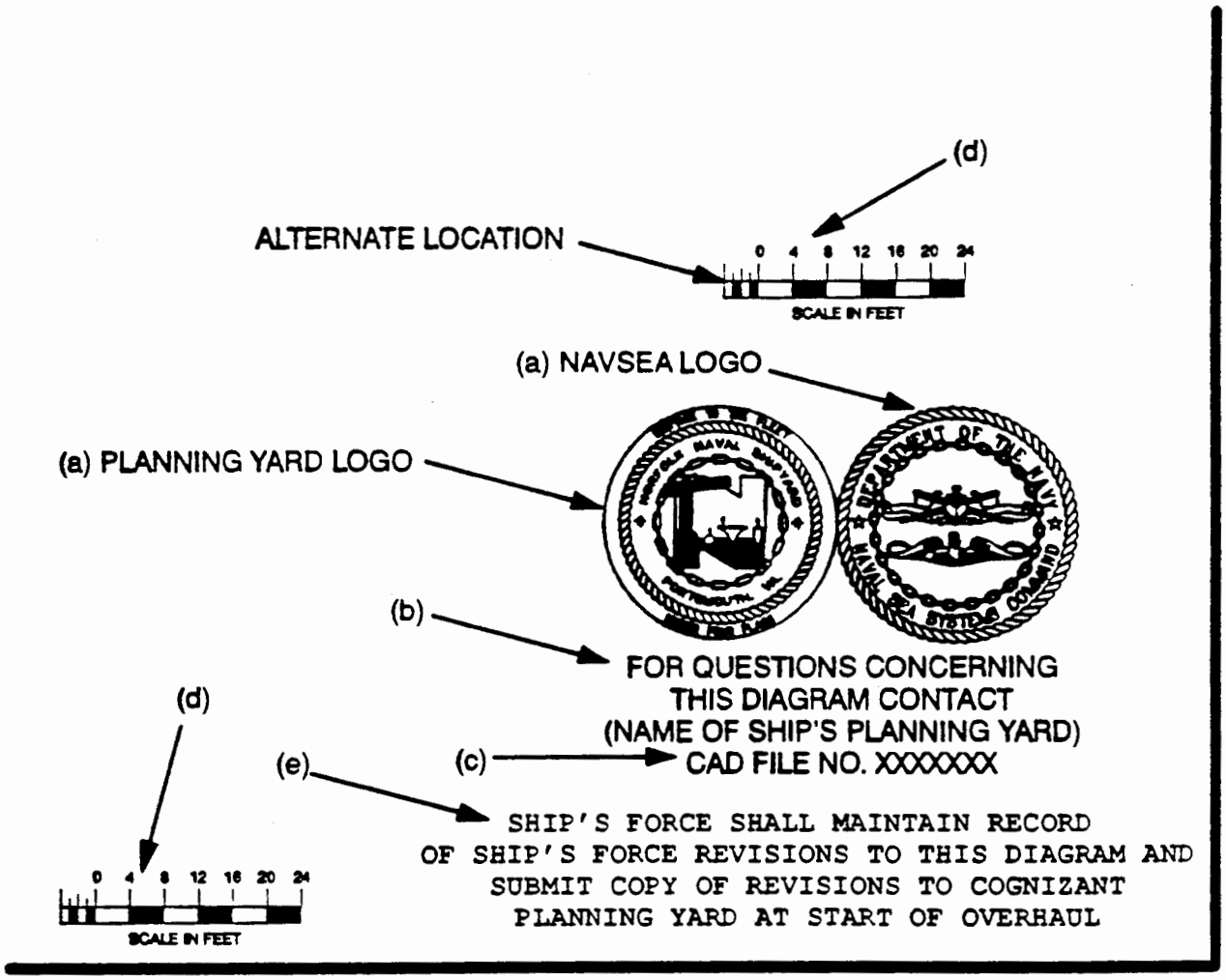


FIG. 4 LOWER TITLE BLOCK AND SCALE

SEE SECTION 5.4.8

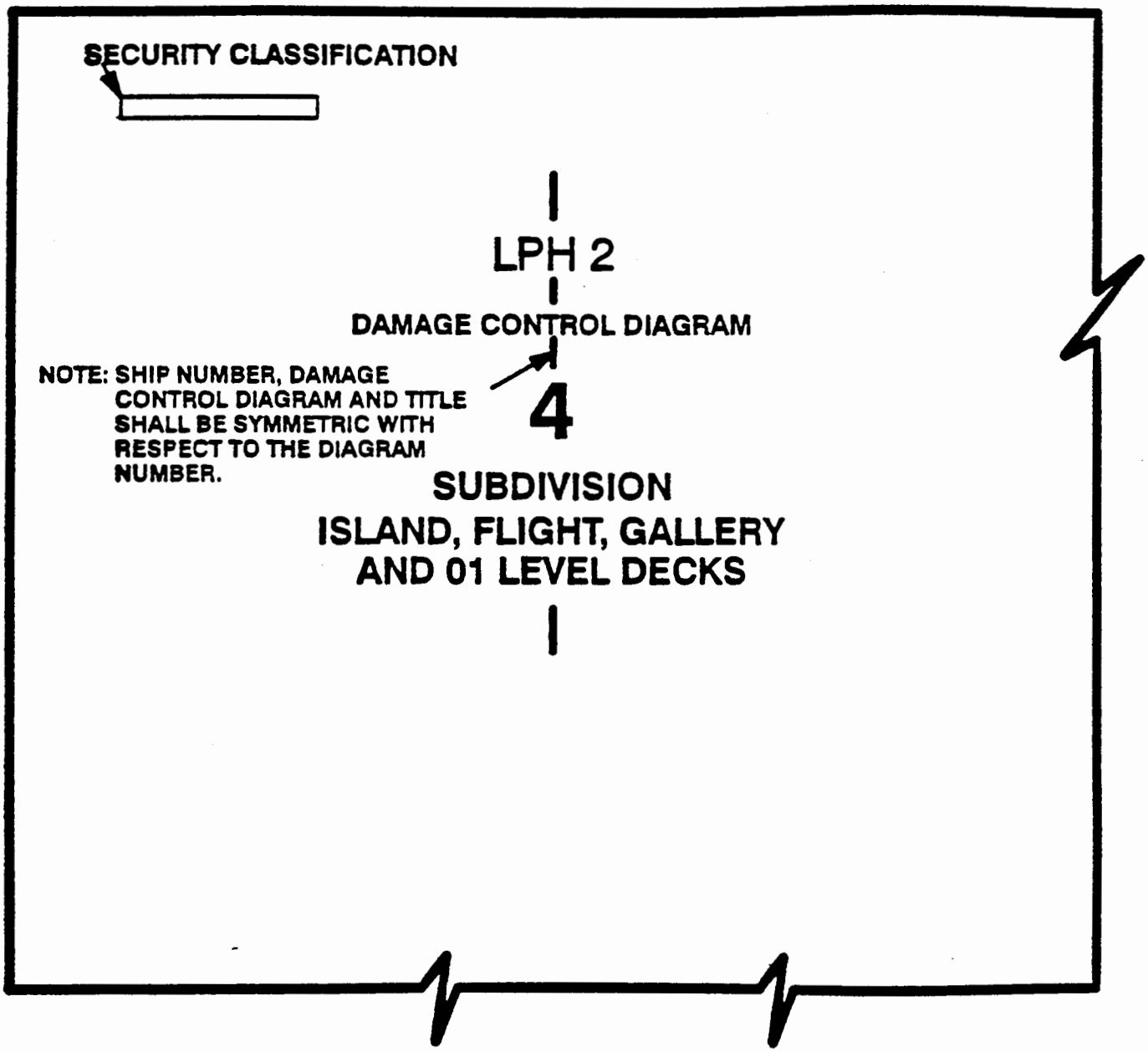


FIG 5 – SHIP AND DIAGRAM IDENTIFICATION
(UPPER LEFT HAND CORNER – ALL DIAGRAMS WHICH ARE CUT IN HALF)

(a) 800–6775069

DAMAGE CONTROL – TEXT (As Described Above)	CLASSIFICATION: (UNCLASSIFIED WHEN FORM IS BLANK) (b)

(c)

(d)

DAMAGE CONTROL BOOK (e)

CVN 63 (f)

ATTACK AIRCRAFT CARRIER (g)

VOLUME I (h)

PART 1 (i)

DEPARTMENT OF THE NAVY
NAVAL SEA SYSTEMS COMMAND
WASHINGTON, D.C. 20362 (j)

1960 (k)

(l)

(m) COMPLETE RETYPE 1993

	PAGE NUMBER	SHIP NUMBER	REVISION DATE

CLASSIFICATION: CONFIDENTIAL
(UNCLASSIFIED WHEN FORM IS BLANK)

FIG 6 – EXAMPLE OF DAMAGE CONTROL BOOK TITLE PAGE

TABLE OF CONTENTS

DAMAGE CONTROL – TEXT (As Described Above)	CLASSIFICATION (UNCLASSIFIED WHEN FORM IS BLANK)

VOLUME I

	PAGE	
Table of Contents	A–D	FRONT MATTER
Volume I – Part 1 & 2 and Volume II – Part 1 & 2		
Record of Page Revision Dates	E–X	
Procedure for Revising and Handling Damage Control Diagrams and Text	1	
Preface	2	
References	3–4	
Damage Control Diagrams, List of	5–6	
PART I – GENERAL INFORMATION	I–1–2	
Principle Characteristics	I(a)1–2	UNRELATED SECTIONS
Shoring	I(b)1–4	
Steering Gear	I(c)1–2	
Towing	I(d)1–2	
Ammunition Handling	I(e)1–2	
Medical Department	I(f)1–2	
Personnel Protection	I(g)1–4	
Aircraft Launching and Handling	I(h)1–8	
PART II – DAMAGE CONTROL SYSTEM	II – 1–2	
Stability and Loading (1989)	II (a) 1–89	RELATED SUBSECTIONS
Cross Curves of Stability	II (a) 91	
Draft Diagrams and Functions of Form	II (a) 92	
Subdivision and Access	II (b) 1–2	
Doors (watertight and Airtight), List of	II (b) 3–56	
Doors (Flametight), List of	II (b) 57–66	
Doors (Fumetight), List of	II (b) 67–70	
Hatches, List of	II (b) 71–98	
Manholes, List of	II (b) 99–184	
Wing Tank Ventilating Openings (10" Dia), List of	II (b) 185–226	
Quick Acting Scuttles, List of	II (b) 227–252	
Dogged Type Scuttles, List of	II (b) 253–254	
Airports, List of	II (b) 255–256	

	PAGE NUMBER	SHIP NUMBER	REVISION DATE
	A		1993

CLASSIFICATION:
(UNCLASSIFIED WHEN FORM IS BLANK)

FIG 7 – EXAMPLE OF A TABLE OF CONTENTS PAGE

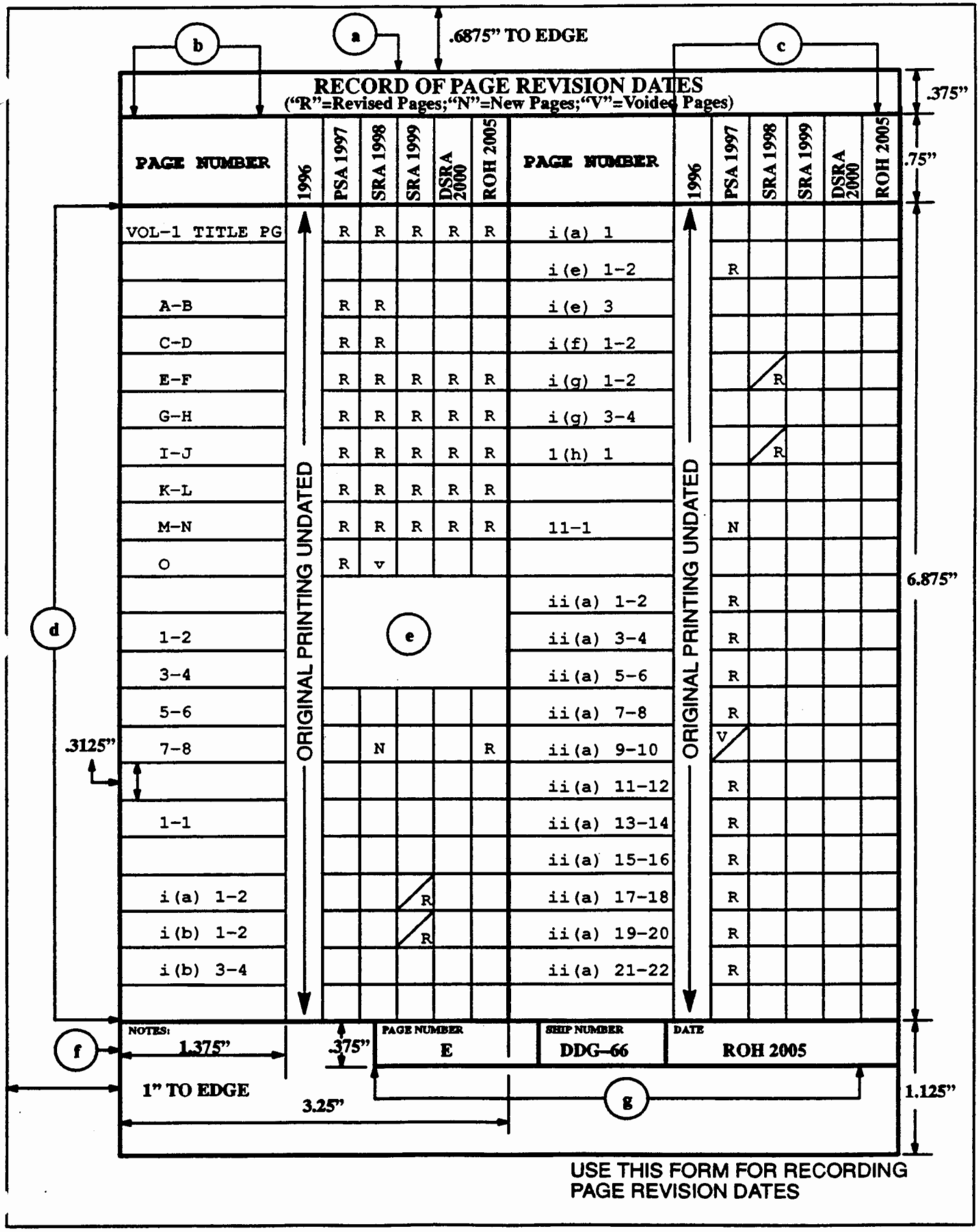


FIG 8 – RECORD OF PAGE REVISION DATES

DAMAGE CONTROL – TEXT *(As Described Above)*	CLASSIFICATION: UNCLASSIFIED

This book was prepared to assist in the understanding and teaching of damage control by embodying in a single volume the fundamental principles of damage control, together with sufficient data to apply these principles to the DDG-51.

NAVSEA is aware of the fact that during wartime the training period devoted to damage control is necessarily short, and that little time is available to the damage control officer for study and indoctrination of his crew. With this in mind an attempt has been made to consolidate this information, and to make it as brief and readable as possible without omitting any essential information.

Information on particular phases of damage control will continue to be published in pamphlet form to facilitate teaching of damage control personnel; however, all essential information contained in these pamphlets will also be included in this book.

NAVSEA will welcome any suggestions which will help to achieve the purpose expressed above.

(d)

FIG 9 – EXAMPLE OF PREFACE

(a) REFERENCES

(b)

DAMAGE CONTROL – TEXT (As Described Above)	CLASSIFICATION: UNCLASSIFIED

Attention is invited to the following tabLe which lists the principal sources from which information pertaining to damage control may be obtained. Other information is disseminated from time to time in the form of letters, plans, pamphlets, and fleet orders.

TITLE	PROCUREMENT SOURCE
Tactical Doctrine Publications FXP, NWIP, and ATP	Reg. Pub. Iss. Office or Symbol I (FPSO) Stock Point
Liquid Loading Instruction (incl. Ballasting) ltr	Type Commander and NAVSEA
Various Fleet and Type Directives on Damage Control	Appropriate Fleet and Type Commander
NBC Warfare Publications	BUPERS
Booklet of General Drawings	Planning Yard
Ship Information Book	Navy Publications and Forms Center 5801 Tabor Road Philadelphia, PA 19120
Schedule of Watertight Intergrity Tests and Inspections	Planning Yard
Damage control Sections of COSAL	Navy Ships Parts Control Center Mechanicsburg, PA 17055
Engineering Casualty Control Book	Ship or Type Commander
Damage Control Bills	Ship or Precomdetail
Compartment Check-off Lists	Ship or Type Commander
Booklet of Plans of Machinery	NAVSEA
Copies of Hull Drawings	Planning Yard

(c)

PAGE NUMBER	SHIP NUMBER	REVISION DATE
3	LHA 2	PSA 1995

CLASSIFICATION: UNCLASSIFIED

(d)

FIG 10A – EXAMPLE OF A REFERENCE PAGE

(a) REFERENCES

(b)

DAMAGE CONTROL – TEXT (As Described Above)	CLASSIFICATION: UNCLASSIFIED

Naval Ships' Technical Manual ..... Naval Ship Weapon System Command, Port Hueneme, CA. 93043

First Aid Bullentins ..... BUMED

Training Manuals ..... NPFC, Philadelphia, PA. 19120

Effects of Nuclear Weapons (Published by Atomic Energy Commission) ..... Superintendent of Documents Government Printing Office Washington, DC

Principles of Radiation, Contamination and Control (NAVSEA 0900-LP-014-4010) NPFC, Philidelphia, PA 19120

Disaster Control (ashore and afloat) NAVEDTRA 10899 (Stock Number 052-LP-054-4950 ..... NPFC, Philidelphia, PA 19120

NAVSEA Revised Individual Allowance List (RIAL) & Shipboard Allowance List (SAL), or Coordination Shipboard Allowance List (COSAL) ..... NAVSEA

War Damage Reports ..... (Classified) NAVSEA

NSTM, NAVSEA S9086-CN-STM-010 Chapter 079 Volume 1 Damage Control Stability and Buoyancy ..... NAVSEA

NSTM, NAVSEA S9086-CN-STM-010 Chapter 079 Volume 2 Damage Control Practical Damage Control ..... NAVSEA

NSTM, NAVSEA S9086-CN-STM-010 Chapter 079 Volume 3 Damage Control Engineering Casualty Control ..... NAVSEA

(c)

PAGE NUMBER	SHIP NUMBER	REVISION DATE
4	LHA 2	PSA 1995

CLASSIFICATION: UNCLASSIFIED

(d)

FIG 10B – EXAMPLE OF A REFERENCE PAGE

List of diagrams furnished for use in conjunction with this book.

	Diagram	Revision Date
Flooding Effect	1A	PSA 1992
Liquid Loading	1B	PSA 1992
Subdivision – 2nd Platform & Below	2	PSA 1992
Subdivision – 1st Platform, Main Deck and 41' Flat	3	PSA 1992
Subdivision – 01 Level, 02 Level, 03 Level	4	PSA 1992
Subdivision – 04 Level and Above	5	PSA 1992
Main & Secondary Drainage & Clean Ballasting Systems	6A	PSA 1992
Plumbing, Gravity & Miscellaneous Drains, Sounding Tube Deck Plates & Sewage Disposal System	6B	PSA 1992
Firemain, Sprinkler, Foam & Washdown Systems	7A	PSA 1992
Firemain, Sprinkler, Foam & Washdown Systems	7B	PSA 1992
Firemain, Sprinkler, Foam & Washdown Systems	7C	PSA 1992
Firemain, Sprinkler, Foam & Washdown Systems	7D	PSA 1992
Fuel Filling, Transfer Storage Overflow & Stripping System	8A	PSA 1992
Fuel Filling, Transfer Storage Overflow & Stripping System	8B	PSA 1992
Fuel Filling, Transfer Storage Overflow & Stripping System	8C	
JP–5 Filling, Transfer, Service & Stripping & Overflow Systems	9A	PSA 1992
JP–5 Filling, Transfer, Service & Stripping & Overflow Systems	9B	PSA 1992
JP–5 Filling, Transfer, Service & Stripping & Overflow Systems	9C	
Ventilation Systems, Supply & Recirculating	10A	PSA 1992
Ventilation Systems, Supply & Recirculating	10B	PSA 1992
Ventilation Systems, Supply & Recirculating	10C	PSA 1992
Ventilation Systems, Supply & Recirculating	10D	PSA 1992
Ventilation Systems, Exhaust	11A	PSA 1992
Ventilation Systems, Exhaust	11B	PSA 1992
Ventilation Systems, Exhaust	11C	PSA 1992
Ventilation Systems, Exhaust	11D	PSA 1992
Chilled Water System	12A	PSA 1992
Chilled Water System	12B	PSA 1992
Chilled Water System	12C	PSA 1992
Chilled Water System	12D	
Compressed Air Systems	13A	PSA 1992

(List Contd)

FIG 11 – EXAMPLE OF LIST OF DIAGRAMS PAGE

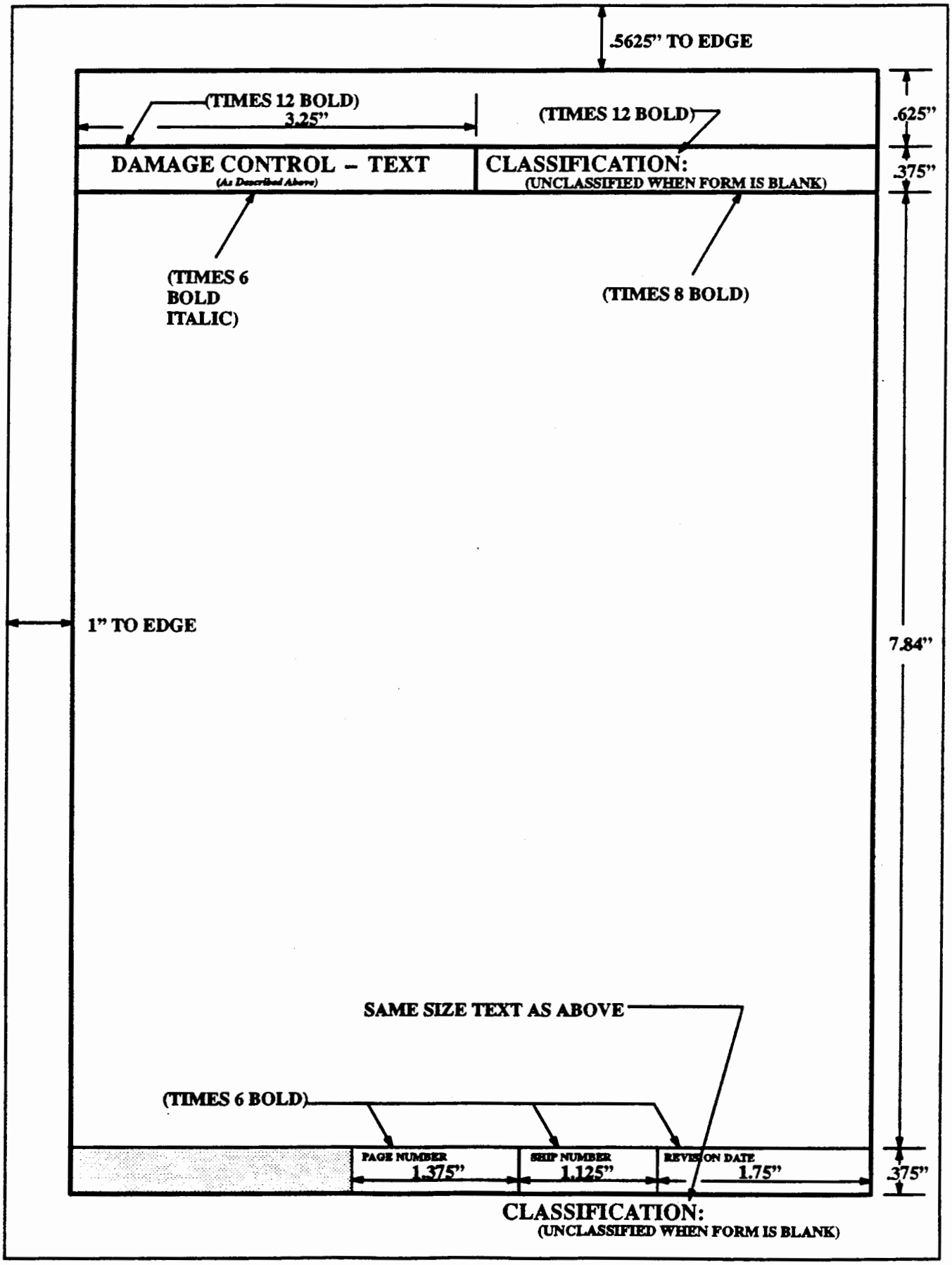


FIG 12 – TEXT PAGE FORMAT

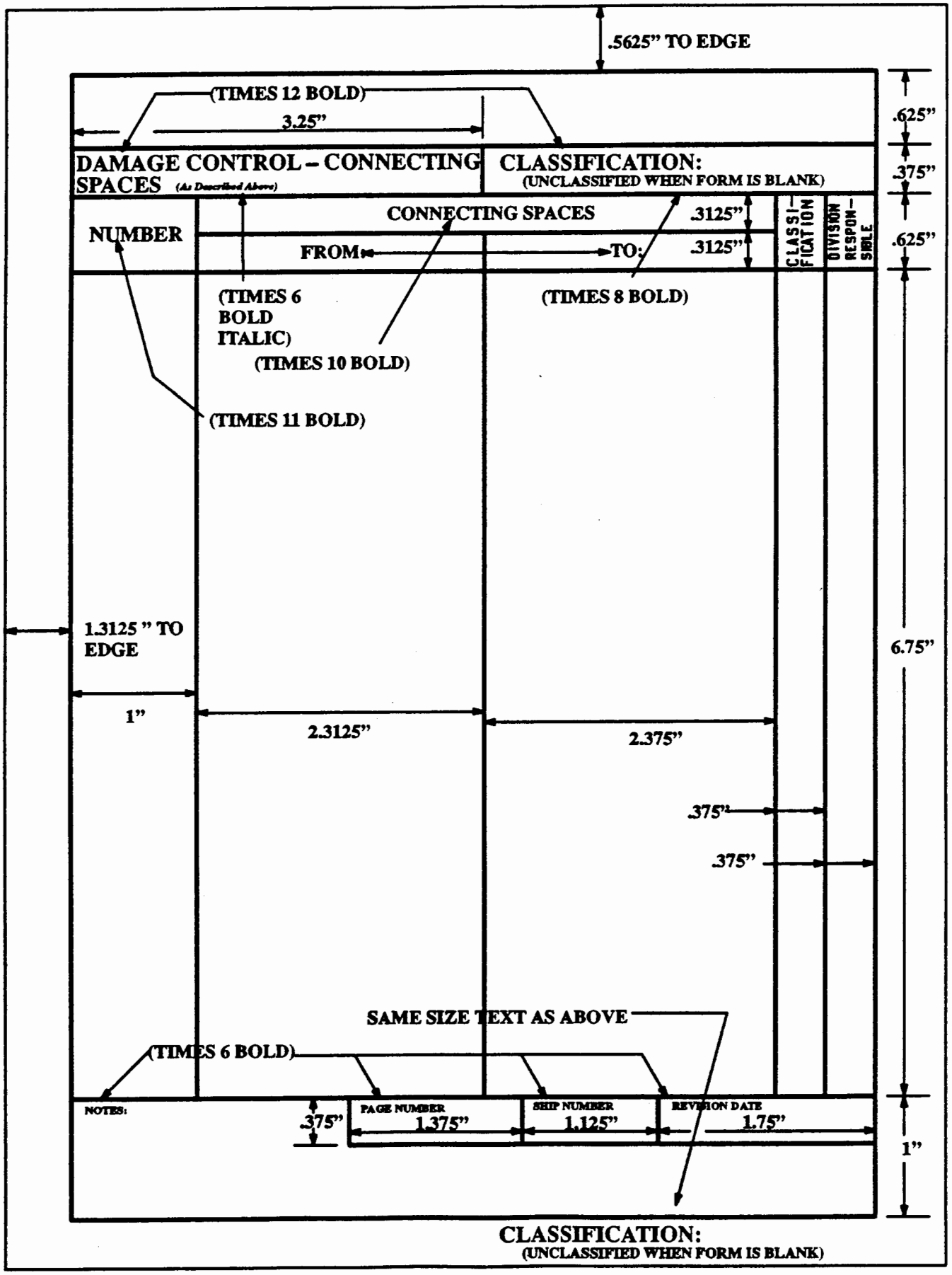


FIG 13 – TABLE FORMAT FOR CONNECTING SPACES

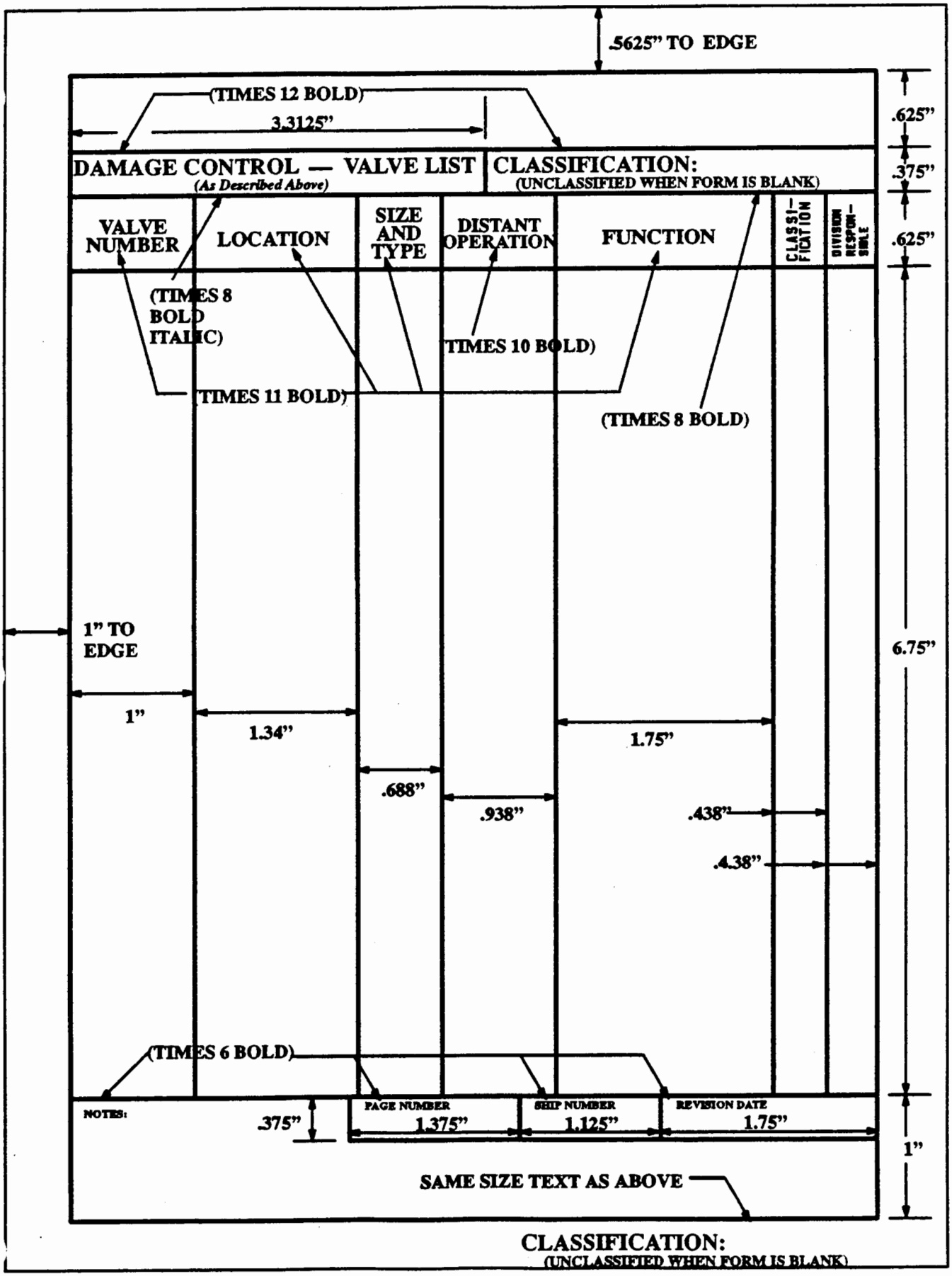


FIG 14 – TABLE FORMAT FOR VALVE LISTS

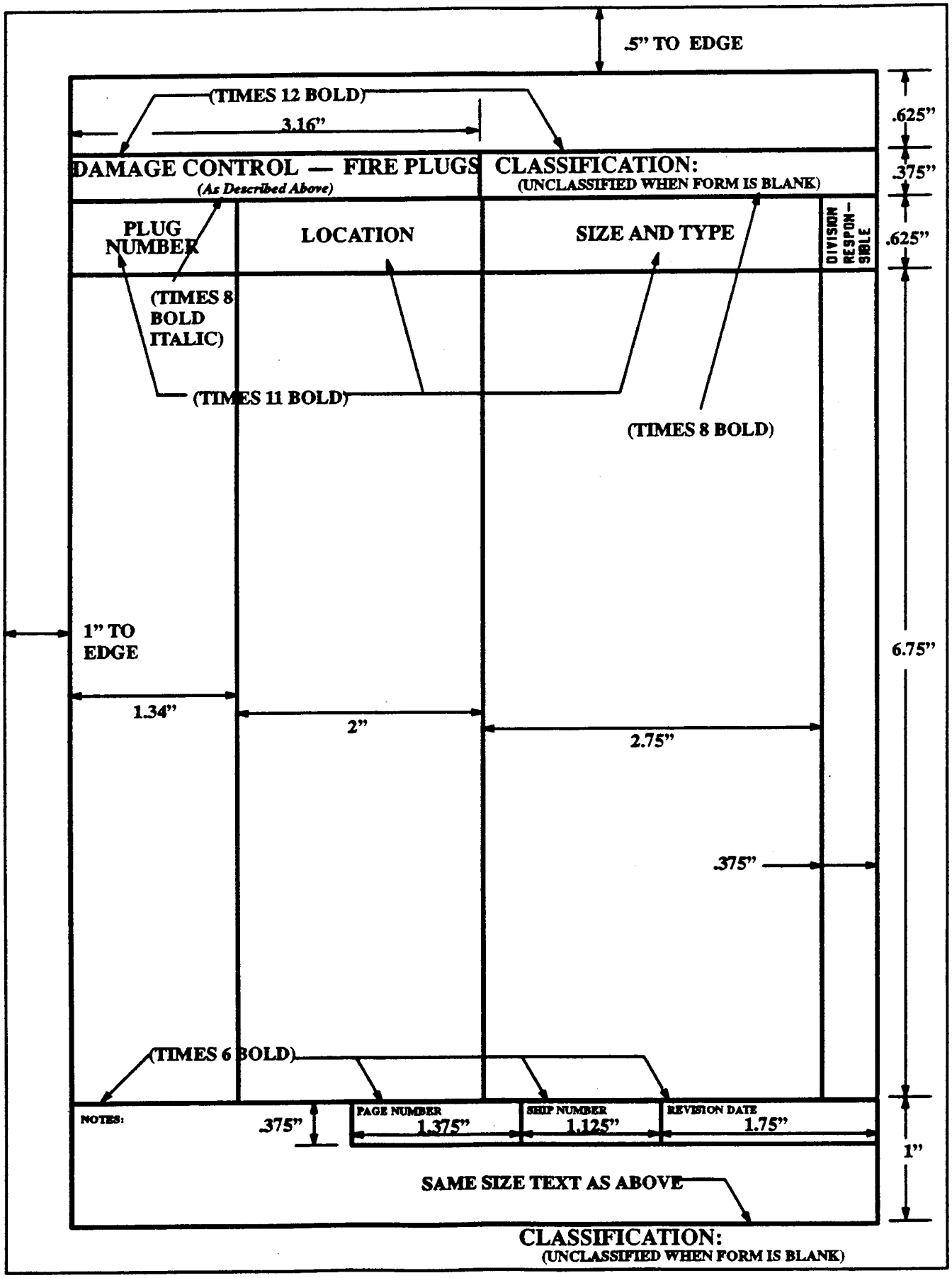


FIG 15 – TABLE FORMAT FOR FIRE PLUG LISTS

STATUS OF DAMAGE CONTROL BOOKS AND DIAGRAMS
OVERHAULS, NEW CONSTRUCTION & PSA

OVERHAUL				*NEW CONSTRUCTION / POST SHAKEDOWN AVAILABILITY*					
DATE_____ FISCAL QUARTER 1 ☐ 2 ☐ 3 ☐ 4 ☐ PLANNING YARD _____				DATE_____ FISCAL QUARTER: 1 ☐ 2 ☐ 3 ☐ 4 ☐ NEW CONSTRUCTION PSA FACILITY _____					
HULL NUMBER	OVERHAUL ACTIVITY	OVERHAUL COMPLETION (DATE)	REVISED DCB/ DCD TO SHIP (DATE)	HULL NUMBER	BUILDING YARD	BUILDERS SEA TRIAL (DATE)	PRELIMINARY DCB/DCD TO SHIP (DATE)	PSA ACTIVITY	FINAL DCB/DCD TO SHIP (DATE)

FIG 16 – EXAMPLE OF STATUS REPORT

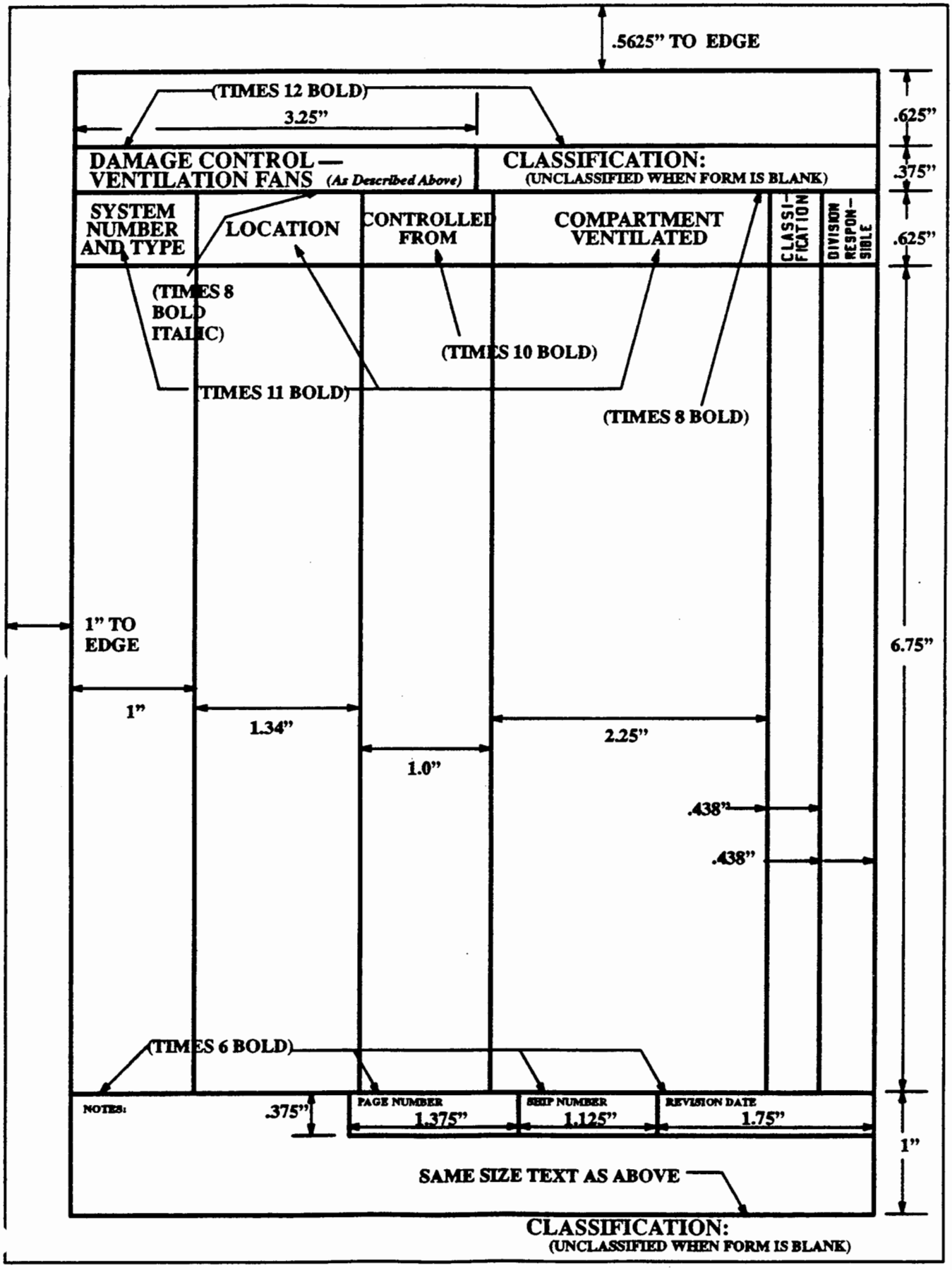


FIG 17 – TABLE FORMAT FOR VENTILATION FANS LIST

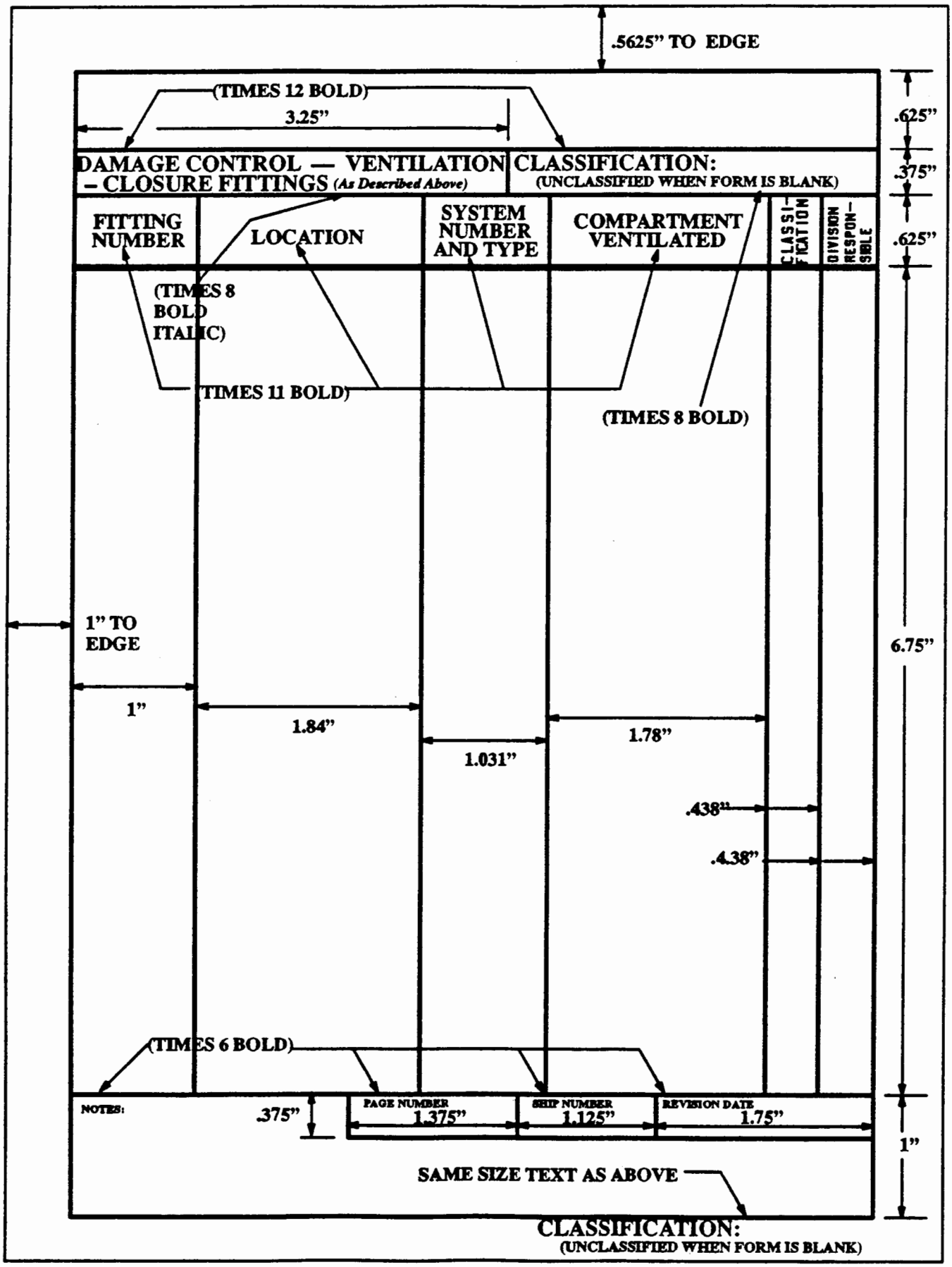


FIG 18 – TABLE FORMAT FOR VENTILATION CLOSURE FITTINGS LIST

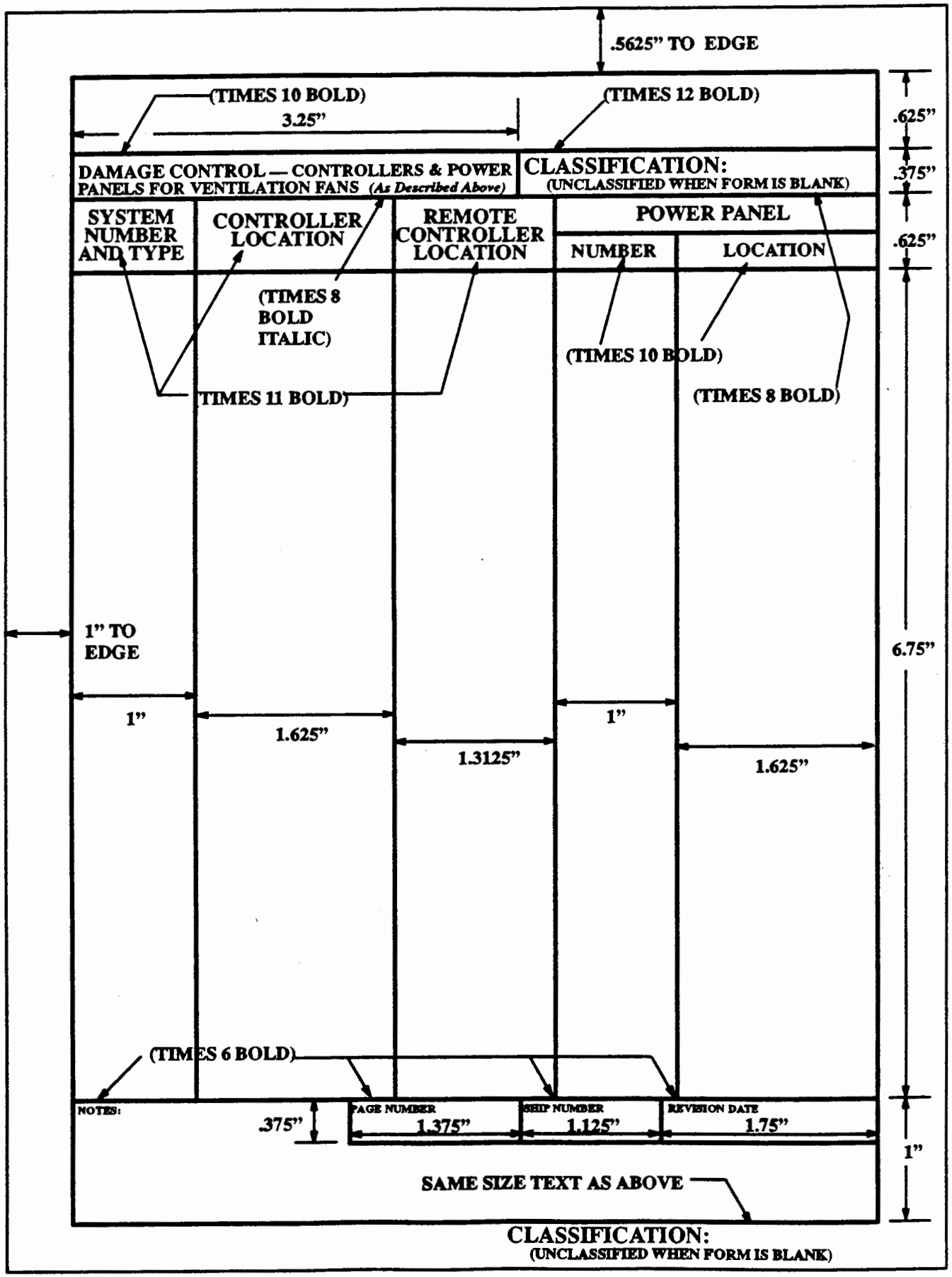


FIG 19 TABLE FORMAT FOR CONTROLLERS AND POWER PANELS FOR VENTILATION FAN LIST

(b)

DOORS (WATERTIGHT AND AIRTIGHT) (U)

(a) DAMAGE CONTROL – CONNECTING SPACES (As Described Above) | CLASSIFICATION: UNCLASSIFIED

	NUMBER	FROM:	TO:	CLASSIFICATION	DIVISION RESPONSIBLE
	SECOND PLATFORM (Cont'd)				
*	4 1/2-93-2	5-89-0-M No. 9 Upper Aviation/ Cargo Magazine (Port)	4 1/2-93-2-T Escape Trunk	X	
*	5-96-1	5-89-0-M No. 9 Upper Aviation/ Cargo Magazine (Port)	5-89-1-M No. 9 Upper Aviation/ Cargo Magazine (Stbd)	X	
*	5-97-0	5-97 1/2-2-T Access Trunk	5-98-0-M Ammo Hdlg Area	X	
Ø	5-98-1	5-98-0-M Ammo Hdlg Area	5-97-1-M FAE Mag	X	
	5-101-1	5-98-0-M Ammo Hdlg Area	5-97-01-GG Universal Tiedown Hold No. 10	X	
Ø	5-102-1	5-98-0-M Ammo Hdlg Area	5-102-1-M Avn & Troop White Phosphorous Mag	X	
*	5-121-1	5-115-1-T Access Trunk	6-121-1-E Steering Gear Rm	X	
*	5-121-2	5-115-2-T Access Trunk and Bow Thruster	5-121-2-E Steering Gear Rm	X	
	FIRST PLATFORM				
*	4-30-1	4-25-0-E Emer Gen Rm No. 1 and Bow Thruster	4-30-1-Q Emer Gen Swbd Rm	X	

(e) (f) (g) (h) (i) (J)

NOTES:
* Quick Acting
Ø Double Door

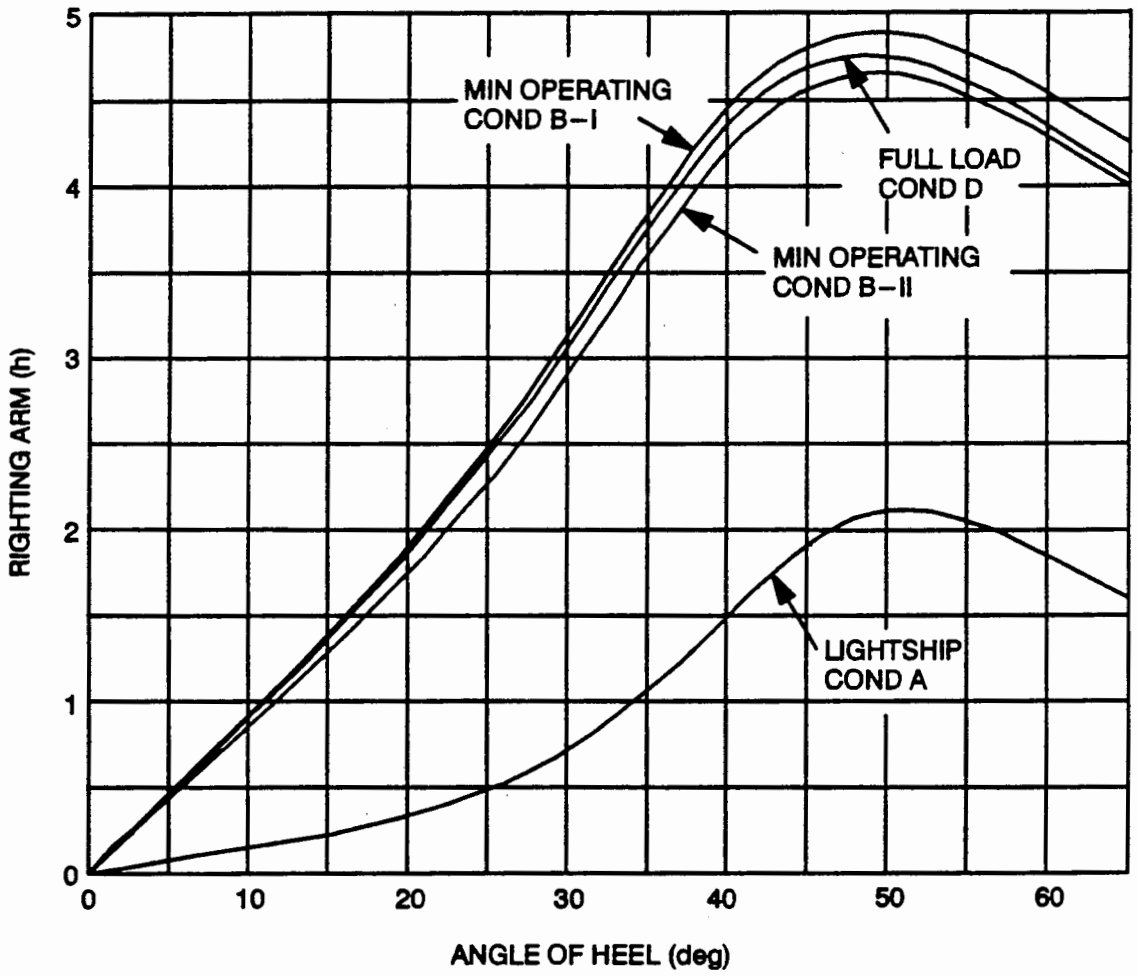
PAGE NUMBER	SHIP NUMBER	REVISION DATE
II (b) 5	LHA 1	ROH 1989

(c) (d)

CLASSIFICATION: UNCLASSIFIED

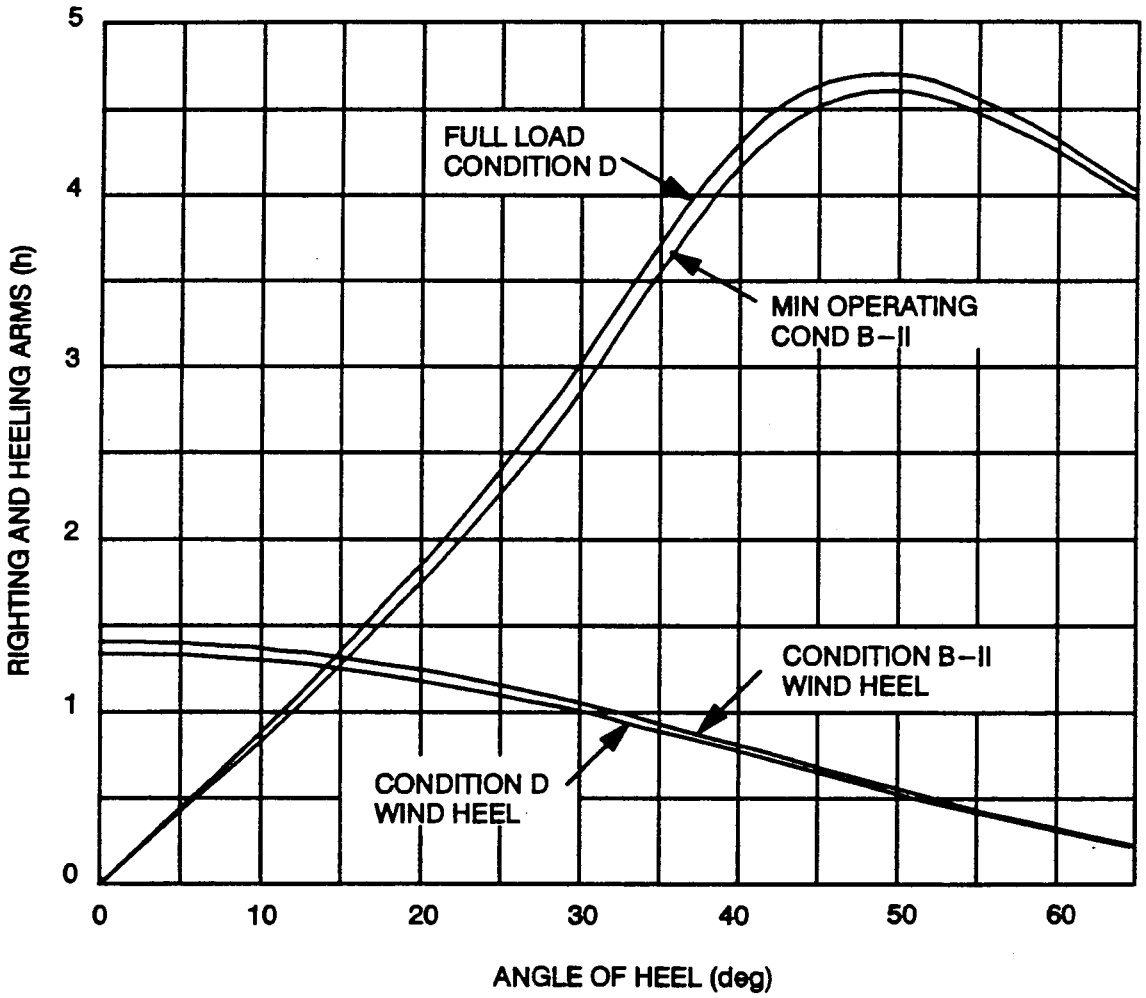
(b)

FIG 20 – EXAMPLE OF COMPLETED TABLE



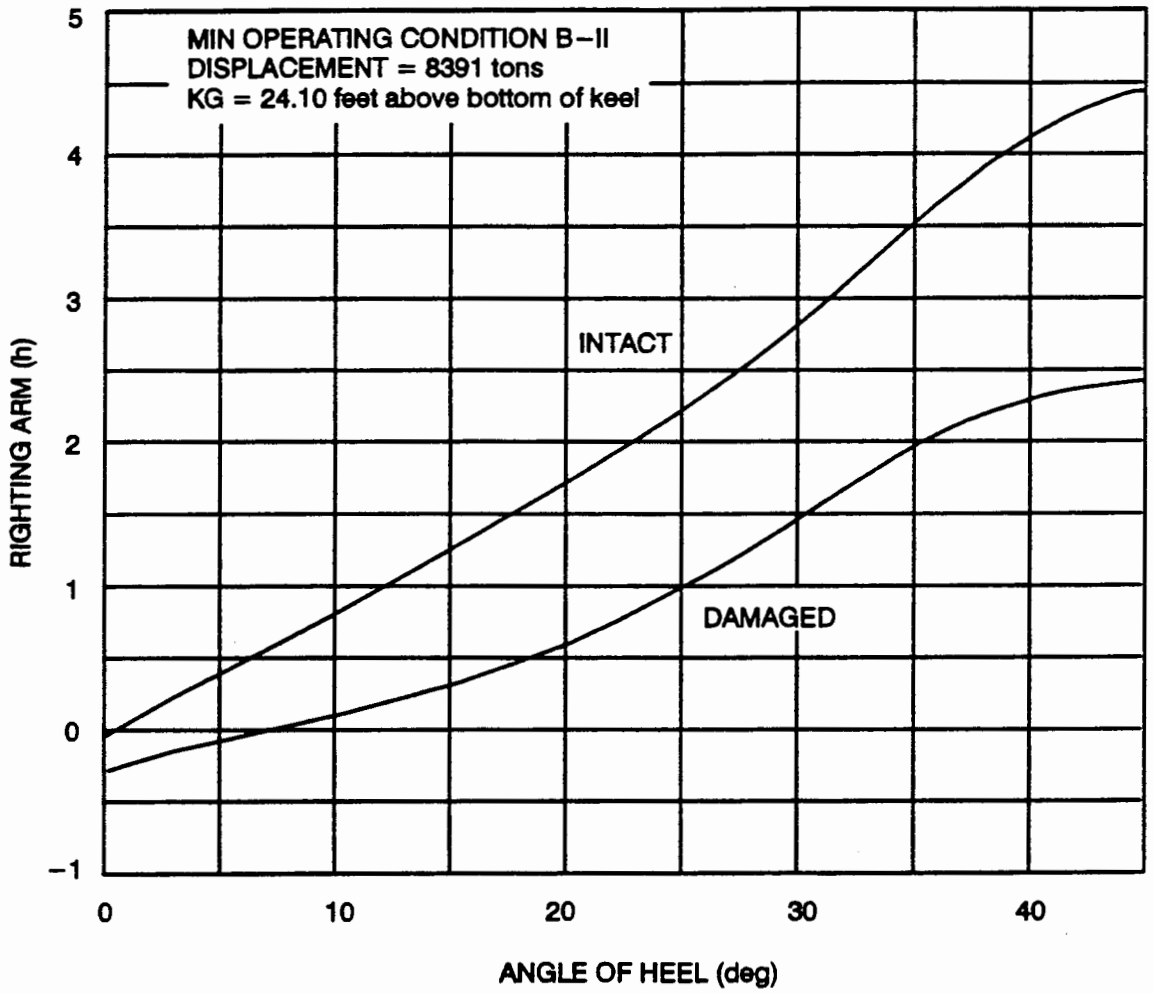
CURVES OF INTACT STATIC STABILITY

FIG – 25



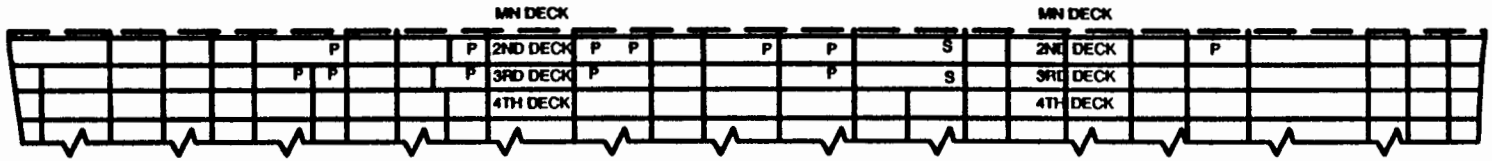
HEELING EFFECT OF BEAM WINDS

FIG – 26

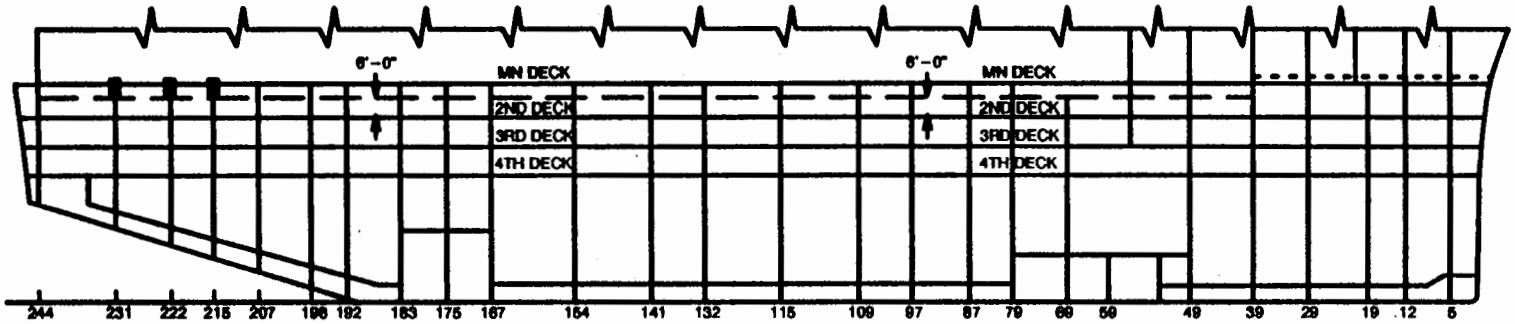


CURVES OF STATIC STABILITY AFTER DAMAGE
(DAMAGE BETWEEN FRAMES 300–410 STARBOARD SIDE)

FIG – 27



ELEVATION – OUTBOARD LONGITUDINAL BULKHEAD



ELEVATION – CENTERLINE

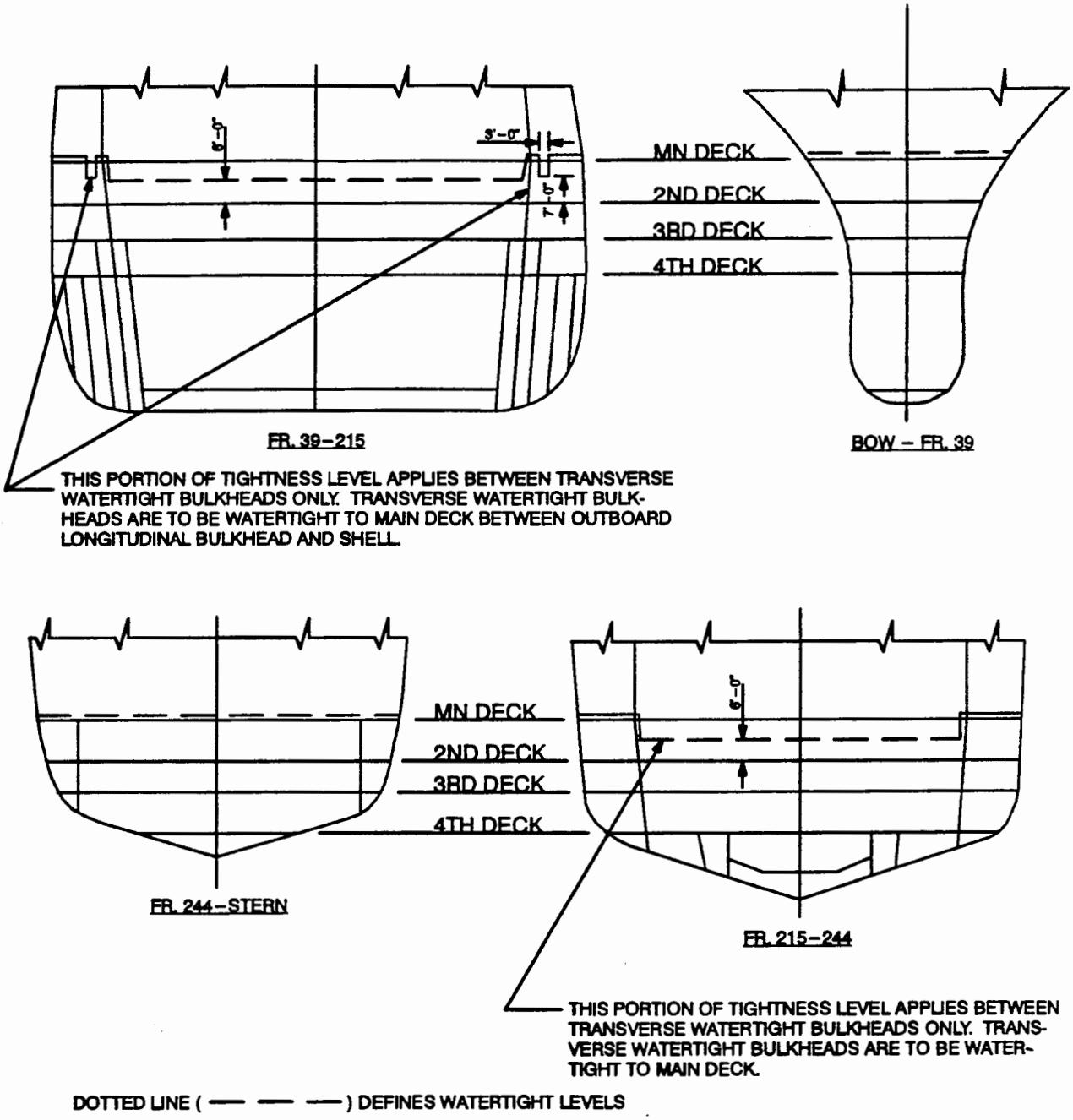
DOTTED LINE (— — —) DEFINES WATERTIGHT LEVELS.

TRANS. W.T. BHDS MARKED (— — —) OUTBOARD OF OUT'D LONG. BHD. ARE PORT OR STBD ONLY.

WATERTIGHTNESS LEVELS

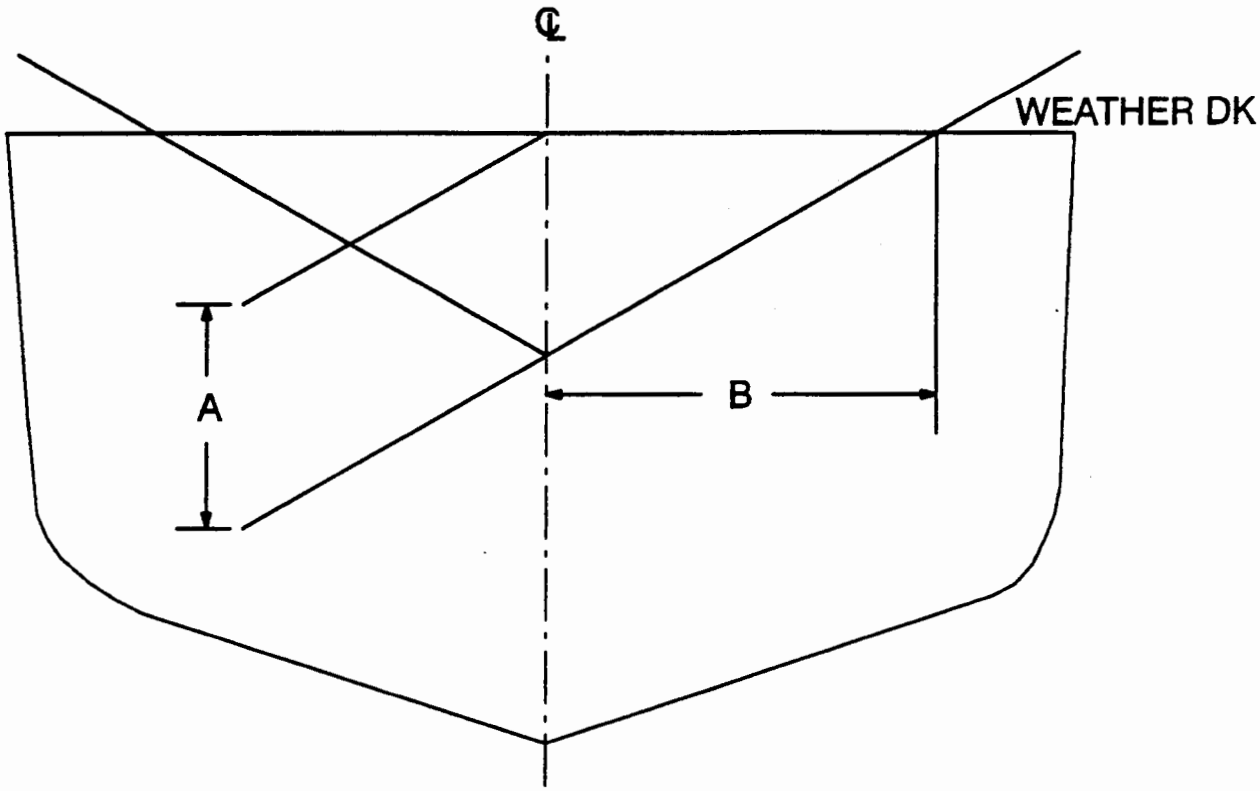
LONGITUDINAL SECTIONS

FIG – 28A



WATERTIGHTNESS LEVELS
TRANSVERSE SECTION

FIG – 28B

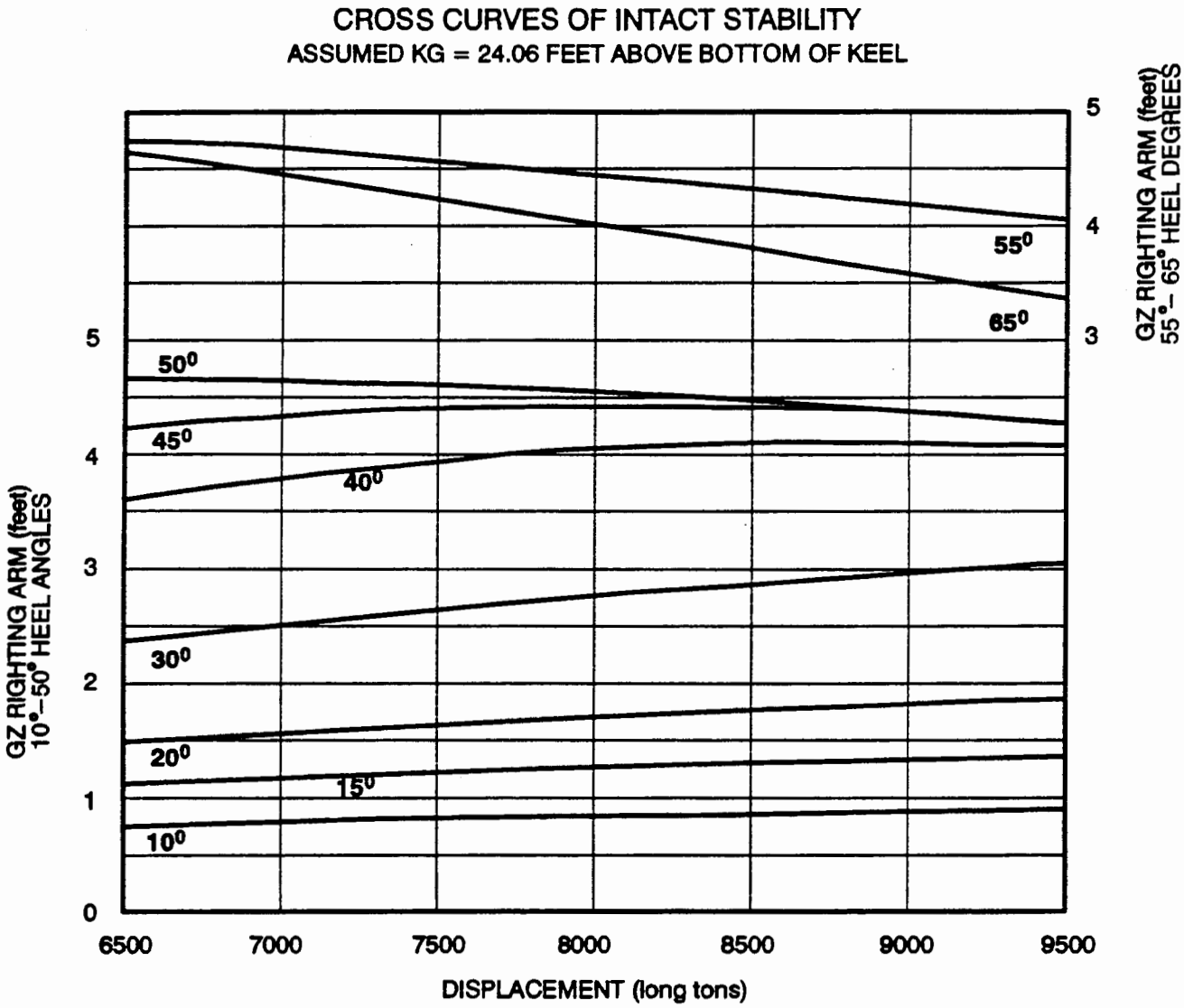


DIMENSION A – APEX "V" BELOW MAIN DK ON CENTERLINE
DIMENSION B – DISTANCE FROM CENTERLINE TO INTERSECTION WITH MAIN DK

TYPICAL SECTION WITH DEFINITION OF V–LINES DEMENSIONS "A" AND "B"

NOT TO SCALE

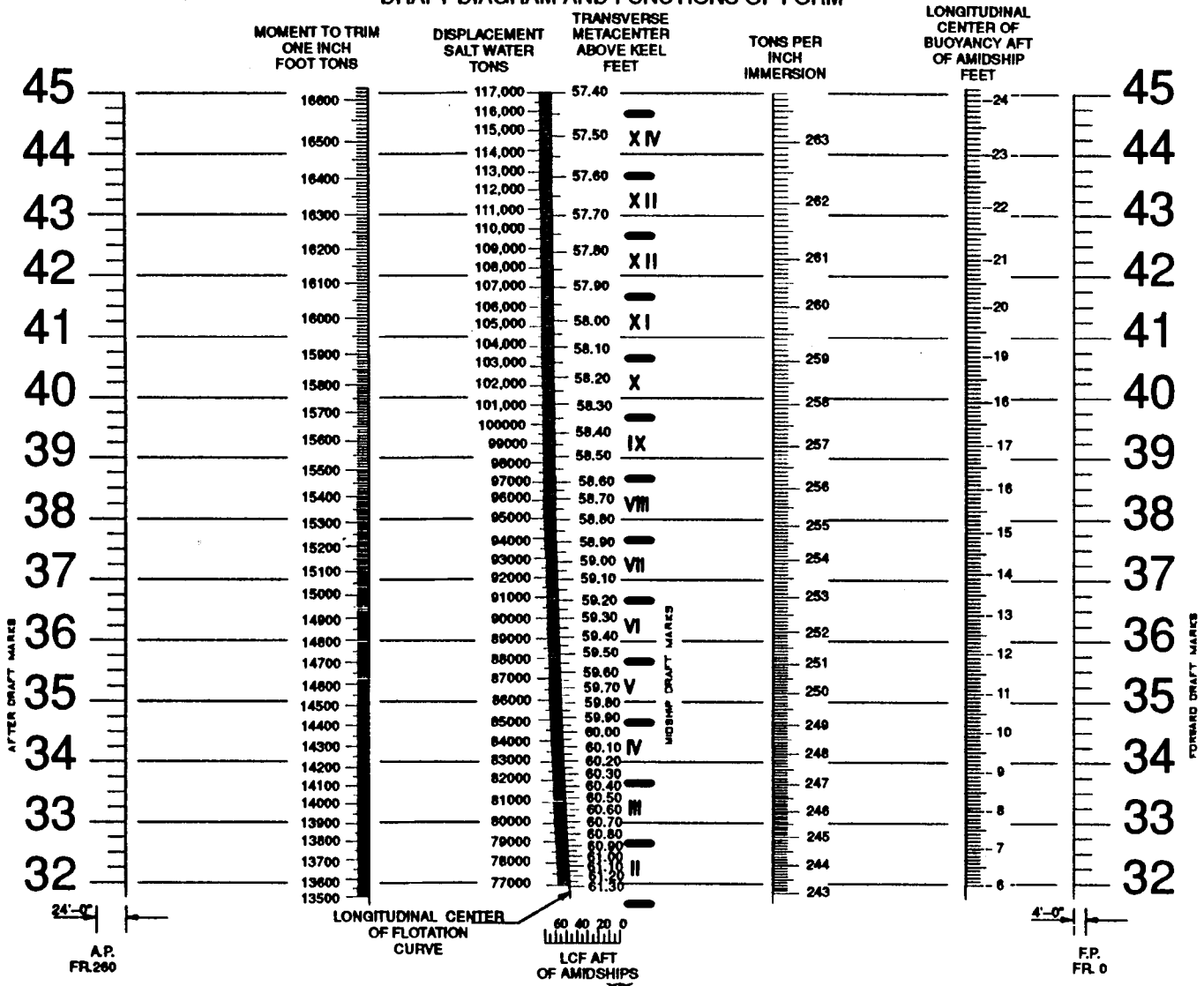
FIG – 29



CROSS CURVES OF INTACT STABILITY

FIG – 30

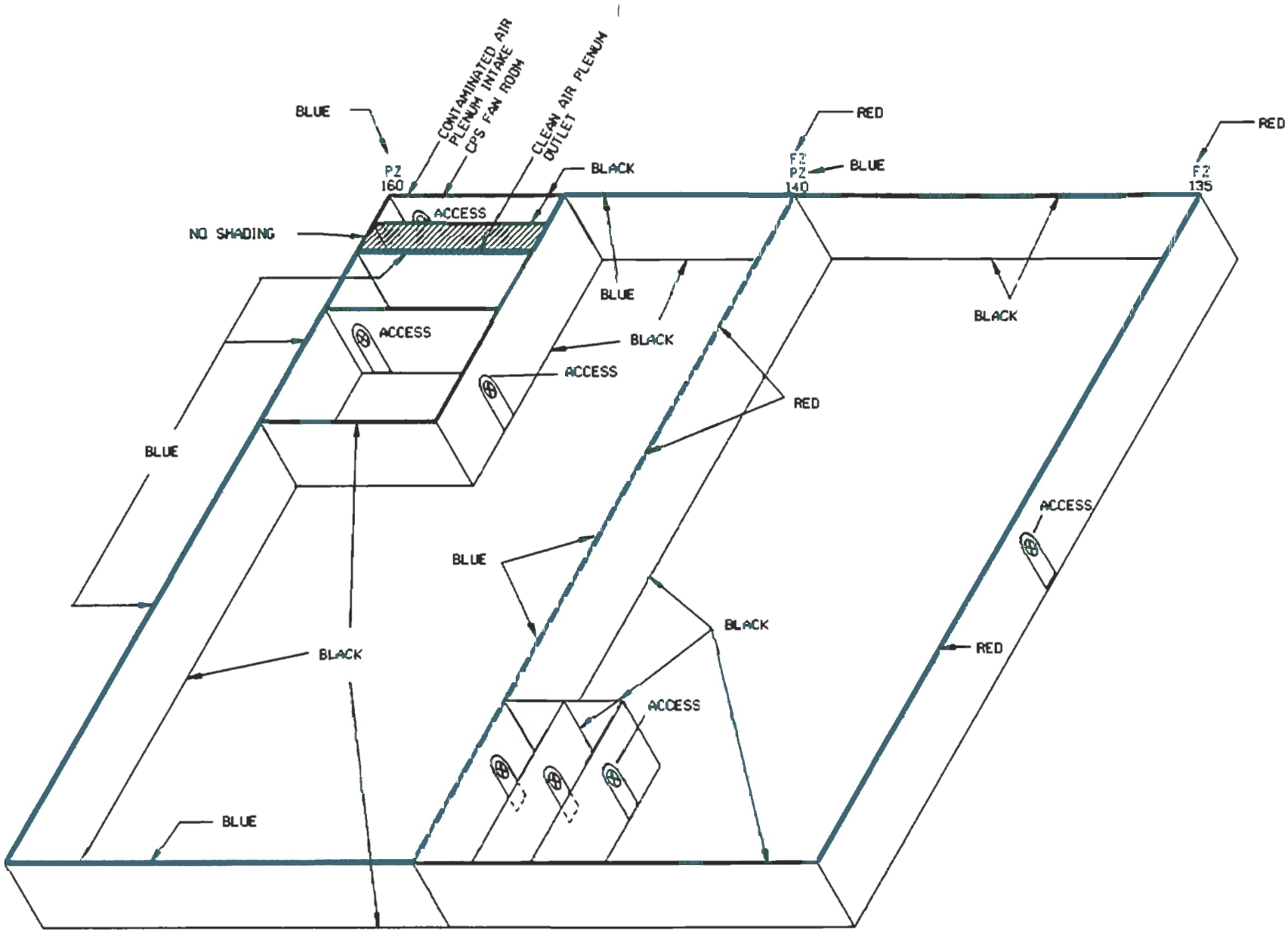
DRAFT DIAGRAM AND FUNCTIONS OF FORM



DISPLACEMENT AND TRANSVERSE METACENTER ARE READ DIRECTLY AT POINT WHERE A STRAIGHT LINE CONNECTING DRAFTS FORWARED AND AFT CROSSES THESE SCALES. OTHER FUNCTIONS ARE READ ON A HORIZONTAL LINE THROUGHT THIS POINT.

NOTE: DRAFTS READ FROM THE SHIPS DRAFT MARKS SHOULD BE CORRECTED (IF NECESSARY) AS NOTED ON DOCKING PLAN.

FIG – 31



FIRE ZONE AND COLLECTIVE PROTECTION SYSTEM BOUNDARIES

FIG - 32

LINE NO.	PANEL		SWITCH			ENERGIZED FROM				EQUIPMENT ENERGIZED																
	NO.	COMPT. NO	ABT.	MBT.	OTHER.	MAIN DISTR.		ALTN. DISTR.		VENTILATION SYSTEM			MULTI PURPOSE OUTLET	PUMPS	GUNS	DIREC-TOR	ELECTRONICS			ELEVA-TOR	AMM HOIST	CIRCUIT		MISC	MO VALVE
						NO.	FEEDER	NO.	FEEDER	SUPPLY	EXHAUST	RECIRC.					RADAR	RADIO	SONAR			IC	FC		
1																									
2																									
3																									
4																									
5																									
6																									
7																									
8																									
9																									
10																									
NO.	NO.	COMPT. NO	ABT.	MBT.	OTHER.	MAIN DISTR.		ALTN. DISTR.		SUPPLY	EXHAUST	RECIRC.	MULTI PURPOSE OUTLET	PUMPS	GUNS	DIREC-TOR	RADAR	RADIO	SONAR	ELEVA-TOR	AMM HOIST	IC	FC	MISC	MO VALVE
						NO.	FEEDER	NO.	FEEDER																

EXAMPLE LAYOUT OF VITAL DAMAGE CONTROL EQUIPMENT AND POWER SUPPLY CHART

FIG – 33

ABBREVIATIONS

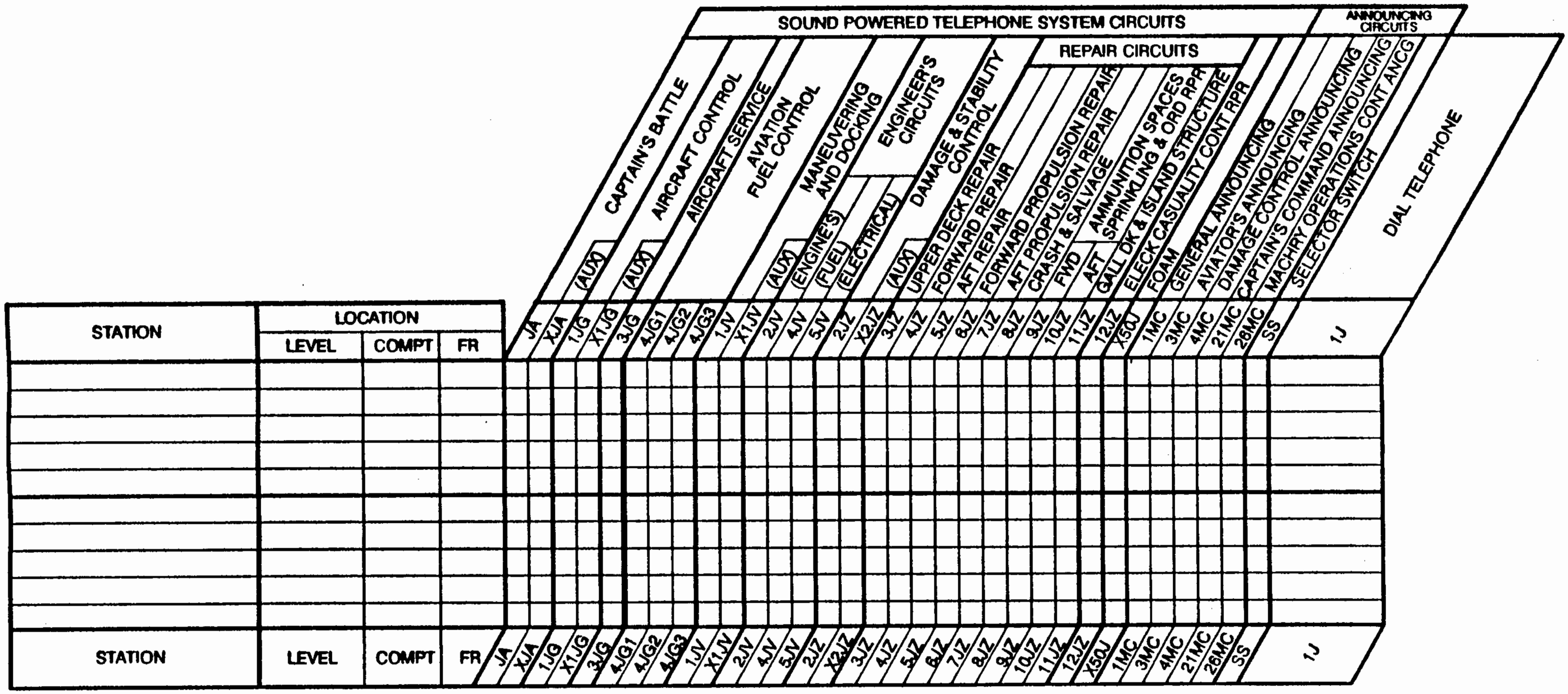
ABT	=	AUTOMATIC BUS TRANSFER
ACC	=	AUXILIARY CONTROL CONSOLE
ALTN	=	ALTERNATE FEEDER
CCS	=	CENTRAL CONTROL STATION
CHW	=	CHILLED WATER
CSW	=	CENTRALIZED SEA WATER
DCC	=	DAMAGE CONTROL CONSOLE
DR	=	DATA TRANSFER
FCU	=	FAN COIL UNIT
FW	=	FRESH WATER
LC	=	LOAD CENTER
IOU	=	INPUT OUPUT UNIT
MBT	=	MANUAL BUS TRANSFER
PP	=	POWER PANEL
PACC	=	PROPULSION/AUXILIARY CONTROL CONSOLE
1S	=	SHIP SERVICE SWITCHBOARD 1S
2S	=	SHIP SERVICE SWITCHBOARD 2S
3S	=	SHIP SERVICE SWITCHBOARD 3S
4S	=	SHIP SERVICE SWITCHBOARD 4S
1SF	=	SHIP SERVICE SWITCHBOARD 1SF (400 CYCLE)
2SF	=	SHIP SERVICE SWITCHBOARD 2SF (400 CYCLE)
STC	=	POWER DISTRIBUTIION PANEL, AC
Y	=	UNDERWATER LOG SYSTEM
*	=	FAN COIL UNIT

IC CIRCUITS

CA	=	COLLISION ALARM
CS	=	INTEGRATED VOICE COMMUNICATIONS SYSTEMS (IVCS)
12EC	=	COLLECTIVE PROTECTIVE SYS LOW PRESSURE ALARM
F	=	HIGH TEMPERATURE AND SMOKE ALARM SYSTEM
FC	=	FLIGHT CRASH ALARM
3F	=	VLS MODULE HIGH TEMPERATURE ALARM SYSTEM
10F	=	HIGHT TEMPERATURE ALARM TORPEDO
FD	=	FLOODING ALARM SYSTEM
14FD	=	VLS MODULE PLENUM HIGHWATER ALARM
15FD	=	VLS MODULE HIGH WATER ALARM SYSTEM
FH	=	SPRINKLING ALARM SYSTEM
1FH	=	VLS MODULE SPRINKLING SYSTEM
FP	=	FIRE PUMP STATUS INDICATOR AND CONTROL SYSTEM
2FR	=	HALON 1301 RELEASE ALARM SYSTEM
FZ	=	SECURITY ALARM SYSTEM
G	=	GENERAL AND CHEMICAL ATTACK ALARM
L	=	RUDDER ORDER SYSTEM
LB	=	STEERING EMERGENCY SIGNAL SYSTEM
LN	=	INERTIAL NAVAGATION SYSTEM
1MC	=	GENERAL ANNOUNCING SYSTEM
N	=	RUDDER ANGLE INDICATOR SYSTEM
PF	=	POWER FAILURE ALARM SYSTEM
1PF	=	IC SWITCHBOARD POWER FAILURE ALARM SWITCH
VS	=	VALVE POSITION INDICATOR
1VS	=	FIREMAIN VALVE POSITION AND INDICATOR SYSTEM
5VS	=	FIRE PUMP SUCTION VALVE INDICATOR SYSTEM
12VS	=	DRAINAGE SUCTION VALVE INDICATOR SYSTEM
13VS	=	VLS MODULE MAIN EDUCTOR VALVE CONTROL AND POSITION INDICATOR SYSTEM

LIST OF ABBREVIATIONS AND IC CIRCUITS FOR VITAL DAMAGE CONTROL ELECTRICAL EQUIPMENT AND POWER SUPPLY CHART

FIG – 34



EXAMPLE OF COMMUNICATION DIRECTORY GRID LAYOUT

FIG – 35

STATION	LOCATION			ENGINEERS NET CIRCUIT								DAMAGE & STABILITY CONTROL NET/CIRCUIT		AIRCRAFT SERVICE & AVIATION FUEL CONTROL NET			CAPTAINS BATTLE NET		ANNOUNCING		DAMAGE CONTROL AND REPAIR NET		FIRE FIGHTING EQUIP NET	
	LEVEL	COMPT	FR	NET 83	NET 84	NET 85	NET 86	NET 53	NET 58	X5K	X1JV	NET 80	X2JZ	NET 11	NET 12	NET 51	1MC	1MC	NET 81	NET 82	NET 90			
STATION	LEVEL	COMPT	FR	NET 83	NET 84	NET 85	NET 86	NET 53	NET 58	X5K	X1JV	NET 80	X2JZ	NET 11	NET 12	NET 51	1MC	1MC	NET 81	NET 82	NET 90			
	LOCATION																							

EXAMPLE OF COMMUNICATION DIRECTORY GRID LAYOUT FOR IVCS NETS

FIG – 36

DC SYMBOLS

SYM NO.	SYMBOL (TO SCALE) SOLID	SYMBOL (TO SCALE) HIDDEN	SYMBOL DESCRIPTION (DESCRIPTIVE TEXT HGT & WD .062 FONT 31)	PLATE /SYSTEM APPLICABILITY	NOTES
1			DOOR, FUME-TIGHT, FIRE-RETARDING, OR NON-TIGHT.	SUBDIVISION & SYSTEM BASE	D.C. NO. SHOWN ON SUBDIVISION ONLY
2			DOOR, QUICK-ACTING WATERTIGHT OR AIRTIGHT (WEIGHT OF BULKHEAD LINE INDICATES TYPE OF DOOR).	"	"
3			DOOR, WATERTIGHT OR AIRTIGHT (WEIGHT OF BULKHEAD LINE INDICATES TYPE OF DOOR).	"	"
4			DOOR, QUICK-ACTING FUMETIGHT FIRE-RETARDING OR NON-TIGHT	"	"
5			DOOR, WITH PASSING SCUTTLE	"	"
6			ARCH OR OPENING	"	NO D.C. NUMBER REQUIRED
7			HATCH	"	D.C. NO. SHOWN ON SUBDIVISION ONLY SIZE VARIABLE
8	H	H	HATCHWAY	"	D.C. NO. SHOWN ON SUBDIVISION ONLY SIZE VARIABLE
9			HATCH WITH QUICK ACTING SCUTTLE	"	D.C. NO. SHOWN ON SUBDIVISION ONLY SIZE VARIABLE
10			HATCH (OPERABLE FROM ABOVE AND BELOW)	"	D.C. NO. SHOWN ON SUBDIVISION ONLY SIZE VARIABLE
11			HATCH, WITH QUICK-ACTING SCUTTLE (OPERABLE FROM ABOVE AND BELOW)	"	D.C. NO. SHOWN ON SUBDIVISION ONLY SIZE VARIABLE
12			MANHOLE	"	ONLY D.C. NO. FOR HINGED MANHOLE SHOWN ON SUBDIVISION.

TABLE-III SYMBOLS
FIG - 37

DC SYMBOLS

SYM NO.	SYMBOL (TO SCALE) SOLID	SYMBOL (TO SCALE) HIDDEN	SYMBOL DESCRIPTION (DESCRIPTIVE TEXT HGT & WD .062 FONT 31)	PLATE /SYSTEM APPLICABILITY	NOTES
13			SCUTTLE, QUICK-ACTING	SUBDIVISION & SYSTEM BASE	D.C. NO. SHOWN ON SUBDIVISION ONLY
14	*	*	SCUTTLE, PASSING OR 10" DIA. MANHOLE	SCUTTLE SHOWN ON SUBDIVISION AND SYSTEM BASE. 10" DIA. MANHOLE SHOWN ON SUBDIVISION ONLY.	* DENOTES SCUTTLE NO.
15			LADDER	SUBDIVISION (ALL LADDERS) SYSTEM BASE (LADDERS LOCATED IN WEATHER)	ANGLE AND LENGTH VARIABLE
16	A	A		SYSTEMS DIAGRAMS	LETTER REFERS TO AN ENLARGED VIEW OR SKETCH
17	A			SYSTEMS DIAGRAMS	LETTER REFERS TO KEY
18			WINDOW	SUBDIVISION & SYSTEM BASE	SIZE VARIABLE
19			BALLAST CONNECTION	LIQUID LOADING DIAGRAM	
20			VALVE, STOP	ALL PIPING SYSTEMS	INCLUDES GATE, BUTTERFLY, NEEDLE, AND GLOBE, ETC.
21			VALVE, STOP REMOTELY OPERATED	ALL PIPING SYSTEMS	INCLUDES GATE, BUTTERFLY, NEEDLE, AND GLOBE, ETC.
22			VALVE, HOSE, OR FIREPLUG	ALL PIPING SYSTEMS	
23			DECK DRAIN (WITH VALVE)	DRAINAGE SYSTEMS	
24			DECK DRAIN (WITHOUT VALVE)	DRAINAGE SYSTEMS	

TABLE-III SYMBOLS (CONTINUED)
FIG - 37

DC SYMBOLS

SYM NO.	SYMBOL (TO SCALE)		SYMBOL DESCRIPTION (DESCRIPTIVE TEXT HGT & WD .062 FONT 31)	PLATE /SYSTEM APPLICABILITY	NOTES
	SOLID	HIDDEN			
25			HOSE CONNECTION	ALL PIPING SYSTEMS	
26			VALVE, PLUG COCK	DRAINAGE SYSTEMS	
27			VALVE, PLUG COCK REMOTELY OPERATED	DRAINAGE SYSTEMS	
28			VALVE, DIVERTER, 3 WAY	DRAINAGE SYSTEMS	
29			VALVE, DIVERTER, 3 WAY REMOTELY OPERATED	DRAINAGE SYSTEMS	
30			VALVE, GAGGED SCUPPER (SHADED PORTION IS OUTLET)	DRAINAGE SYSTEMS	
31			GAGGED SCUPPER REMOTELY OPERATED (SHADED PORTION IS OUTLET)	DRAINAGE SYSTEMS	
32			VALVE, CHECK (SHADED PORTION IS OUTLET)	ALL PIPING SYSTEMS	
33			VALVE, LIFT CHECK SPRING LOADED (SHADED PORTION IS OUTLET)	ALL PIPING SYSTEMS	
34			VALVE, STOPCHECK (APEX INDICATES DIRECTION OF FLOW	ALL PIPING SYSTEMS	
35			VALVE, STOPCHECK REMOTELY OPERATED (APEX INDICATES DIRECTION OF FLOW)	ALL PIPING SYSTEMS	
36			VALVE, HOSE STOPCHECK (ARROW INDICATES DIRECTION OF FLOW)	ALL PIPING SYSTEMS	

TABLE-III SYMBOLS (CONTINUED)
FIG - 37

DC SYMBOLS

SYM NO.	SYMBOL (TO SCALE) SOLID	SYMBOL (TO SCALE) HIDDEN	SYMBOL DESCRIPTION (DESCRIPTIVE TEXT HGT & WD .062 FONT 31)	PLATE /SYSTEM APPLICABILITY	NOTES
37			VALVE, STOP LIFT CHECK (ARROW INDICATES DIRECTION OF FLOW)	ALL PIPING SYSTEMS	
38			VALVE, PRESSURE REDUCING (SHADED PORTION OUTLET)	ALL PIPING SYSTEMS	*DENOTES INLET/OUTLET PRESSURE
39			VALVE, PRESSURE REDUCING (SHADED PORTION OUTLET)	ALL PIPING SYSTEMS	*DENOTES PRESSURE RELIEF SETTING
40			VALVE, REGULATOR (*)	ALL PIPING SYSTEMS	INDICATES TYPE TEMPERATURE, PRESSURE, PRIORITY, ETC.
41			VALVE, COMBINED REDUCING AND AUTOMATIC STOP (SHADED PORTION IS OUTLET)	FIREMAIN, COMPRESSED AIR SYSTEMS	
42			PUMP (SHADED PORTION IS DISCHARGED)	ALL PIPING SYSTEMS	*DENOTES TYPE & NO. OF PUMP
43			VALVE, WYE GATE	FIREMAIN SYSTEMS	
44			VAVLVES IN MANIFOLD	ALL PIPING SYSTEMS	
45			VALVES (INTERLOCKING) IN MANIFOLD	ALL PIPING SYSTEMS	
46			SEA CHEST	DRAINAGE BALLASTING OR A FIREMAIN SYSTEM	
47			FUNNEL	ALL PIPING SYSTEMS	
48			OVERBOARD DISCHARGE FOR PORTABLE PUMP	DRAINAGE SYSTEMS	

TABLE-III SYMBOLS (CONTINUED)
FIG - 37

DC SYMBOLS

SYM NO.	SYMBOL (TO SCALE) SOLID	SYMBOL (TO SCALE) HIDDEN	SYMBOL DESCRIPTION (DESCRIPTIVE TEXT HGT & WD .062 FONT 31)	PLATE /SYSTEM APPLICABILITY	NOTES
49			BILGE SUCTION OR DRAIN WELL	DRAINAGE, FUEL SYSTEMS	
50			EDUCTOR, FLOW IS IN DIRECTION OF APEX	DRAINAGE, FIREMAIN, FUEL, GAS SYSTEMS	
51			REMOTE CONTROL STATION	ALL PIPING SYSTEMS	*DENOTES VALVE NUMBER
52			OVERBOARD DISCHARGE CONNECTION	ALL PIPING SYSTEMS	
53			VENTURI (FLOW IS IN DIRECTION OF LARGE APEX)	ALL PIPING SYSTEMS	
54			SPRAY NOZZLE (FLOW IS IN DIRECTION OF APEX)	FIREMAIN, FOAM, WASHDOWN, MAG. SPRINKLING SYSTEM	
55			FLANGE, SPECTACLE	JP-5 FUEL SYSTEMS	
56			CAP, PIPE	ALL PIPING SYSTEMS	
57			FILTER	JP5, COMPRESSED AIR SYSTEMS	
58			ORFICE	ALL PIPING SYSTEMS	
59			SPECIAL FOR MISCELLANEOUS USE AS REQUIRED	ALL PIPING SYSTEMS	
60			SOUNDING TUBE WITH CAP OR SOUNDING TUBE DECK PLATE *(NO. INDICATES COMPT. SOUNDED)	DRAINAGE, FUEL, JP-5 SYSTEMS	

TABLE-III SYMBOLS (CONTINUED)
FIG - 37

DC SYMBOLS

SYM NO.	SYMBOL (TO SCALE) SOLID	SYMBOL (TO SCALE) HIDDEN	SYMBOL DESCRIPTION (DESCRIPTIVE TEXT HGT & WD .062 FONT 31)	PLATE /SYSTEM APPLICABILITY	NOTES
61			SOUNDING TUBE WITH VALVE *(FIRST NO. INDICATES COMPT. SOUNDED, SECOND NO. INDICATES SOUNDING TUBE FITTING NUMBER)	DRAINAGE, FUEL, FIREMAIN SYSTEMS	
62			COMMINUTER DELUMPER	DRAINAGE (CHT SYSTEM)	
63			VENTILATION DAMPER (MECHANICALLY OPERATED)	VENTILATION SYSTEMS	
64			VENTILATION DAMPER (OPERATED FROM ADJOINING COMPARTMENT ON SAME DECK)	VENTILATION SYSTEMS	
65			VENTLATION CLOSURE FITTING OR AIR SWEEP VALVE (FLOW IS DIRECTION OF APEX)	VENTILATION SYSTEMS (CPS) SYSTEMS	
66			VENTILATION DIVERTER VALVE	VENTILATION SYSTEMS	
67			VENTILATION CLOSURE FITTING (REMOTELY OPERATED FROM ADJOINING COMPARTMENT ON SAME DECK)	VENTILATION SYSTEMS	
68			BELLMOUTH (INLET)	VENTILATION SYSTEMS	
69			VENTILATION CLOSURE FITTING (REMOTELY OPERATED FROM STATION ON ANOTHER DECK OR SEPERATED BY ON OR MORE COMPARTMENTS)	VENTILATION SYSTEMS	
70			AIR ESCAPE RETURN BEN. VENT	FUEL, JP-5, VENTILATION SYSTEMS	
71			PCV (PRESSURE CONTROL VALVE)	VENTILATION (CPS) SYSTEMS	
72			CROSS HATCHED BULKHEAD INDICATES CPS FILTER (CLEAN SIDE INBOARD)	VENTILATION (CPS) SYSTEMS	

TABLE-III SYMBOLS (CONTINUED)
FIG - 37

DC SYMBOLS

SYM NO.	SYMBOL (TO SCALE) SOLID	SYMBOL (TO SCALE) HIDDEN	SYMBOL DESCRIPTION (DESCRIPTIVE TEXT HGT & WD .062 FONT 31)	PLATE /SYSTEM APPLICABILITY	NOTES
73	* PRS	* PRS	PRESSURE REDUCING STATION	ALL PIPING SYSTEMS	*DENOTES INLET/OUTLET PRESSURE
74			CYLINDER OR TANK, AIR	COMPRESSED AIR, OXYGEN NITROGEN SYSTEMS	
75			COMPRESSOR, AIR	COMPRESSED AIR, OXYGEN NITROGEN SYSTEMS	
76	*	*	COOLING COIL, UNIT COOLER, FAN COIL ASSY, GRAVITY COIL, HEAT EXCHANGER, ETC.	CHILLED WATER SYSTEM	*DENOTES ABBREVIATED DESCRIPTION CC, UC, FCA, GC, WITH NO.
77	AC	AC	AIR CONDITIONING CHILLED WATER PLANT	CHILLED WATER SYSTEM	
78			FAN HAVING CONTROLLER IN THE SAME COMPARTMENT	VENTILATION SYSTEM	
79			FAN HAVING CONTROLLER IN ANOTHER COMPARTMENT	VENTILATION SYSTEM	
80			RISER TERMINAL	CASUALTY POWER SYSTEM	
81			SWITCHBOARD, POWER PANEL, POWER TRANSFER PANEL OR LIGHTING TRANSFORMER JUNCTION BOX	CASUALTY POWER SYSTEM	*DENOTES ABBREVIATED DESCRIPTION SWBD, PWR PNL, ETC.
82			TERMINAL (IN BULKHEAD)	CASUALTY POWER SYSTEM	
83			JACKBOX (FIGURE INDICATES NUMBER OF JACKS)	CASUALTY POWER SYSTEM	
84			OUTLET, MULTIPURPOSE	CASUALTY POWER SYSTEM	

TABLE-III SYMBOLS (CONTINUED)
FIG - 37

DC SYMBOLS

SYM NO.	SYMBOL (TO SCALE)		SYMBOL DESCRIPTION (DESCRIPTIVE TEXT HGT & WD .062 FONT 31)	PLATE /SYSTEM APPLICABILITY	NOTES
	SOLID	HIDDEN			
85			RACK FOR PORTABLE CABLE STOWAGE	CASUALITY POWER SYSTEM	
86			BULKHEAD PENETRATION	ALL SYSTEMS	
87			VENTILATION CLOSURE REMOTE CONTROL STATION (FIGURE INTICATES FITTING NUMBER)	VENTILATION SYSTEM	

TABLE-III SYMBOLS (CONTINUED)
FIG - 37

APPENDIX A

HANDLING AND DISTRIBUTION INSTRUCTIONS FOR DAMAGE CONTROL BOOK AND DIAGRAM COMPONENTS

1. Purpose. The purpose of this appendix is to provide generic guidance for the handling and distribution of damage control book and diagram components during their development. The damage control book and diagram components and the delivery schedule shown below is typical of most ship building contracts. The exact list of damage control book and diagram components and their delivery schedule shall be specified in the CONTRACTING DOCUMENT for each contract. The building yard shall forward to Supervisor of Shipbuilding conversion and Repair (SUPSHIPS) a copy of the cover letter or transmittal sheet indicating that the required data as defined in this appendix has been forwarded to the recipients in accordance with the schedule defined here in.

BUILDING YARD FORWARD TO NAVSEA HYDRODYNAMICS DIVISION			
ITEM NO.	ITEM	NO.OF COPIES	DELIVERY SCHEDULE
1	Unlaminated color prints of Liquid Loading and Flooding Effects Diagram for initial NAVSEA review and comment (labeled PRELIMINARY)	2	120 days prior to Builder's Trials
2	Damage Control Book, Section II(a) Stability and Loading text and the following diagrams (labeled PRELIMINARY) for initial NAVSEA review and comment: (DATA SHALL BE BASED UPON LATEST WEIGHT REPORT) (a) Cross Curves of Stability (b) Draft Diagram and Functions of Form (c) Curves of Static Stability (d) Heeling Effect of Beam Winds	1	120 days prior to Builder's Trials
3	UPDATED color prints of Liquid Loading and Flooding Effects Diagram for final NAVSEA review and approval	2	30 days prior to Builder's Trials
4	UPDATED Damage Control Book, Section II(a) Stability and Loading text and the following diagrams for final NAVSEA review and comment: (a) Cross Curves of Stability (b) Draft Diagram and Functions of Form (c) Curves of Static Stability (d) Heeling Effect of Beam Winds	1	30 days after Inclining Experiment

BUILDING YARD FORWARD TO NAVSEA HYDRODYNAMICS DIVISION (continued)			
ITEM NO.	ITEM	NO OF	DELIVERY SCHEDULE COPIES
5	FINAL - Damage Control Book Section II(a) Stability and Loading text and the following diagrams: (INCORPORATING DATA FROM INCLINING EXPERIMENT) (a) Cross Curves of Stability (b) Draft Diagram and Functions of Form (c) Curves of Static Stability (d) Heeling Effect of Beam Winds	1	60 days after Inclining Experiment

BUILDING YARD FORWARD TO EACH SHIP'S DAMAGE CONTROL ASSISTANT (DCA)			
ITEM NO.	ITEM	NO. OF COPIES	DELIVERY SCHEDULE
1	PRELIMINARY Unlaminated color prints of the Liquid Loading and Flooding Effects Diagrams (labeled PRELIMINARY) **(SEE NTS 9090-820 APPENDIX B PARAGRAPH 5.1.1 (g))**	1	30 days prior to Builder's Trials
2	PRELIMINARY Damage Control Book, Section II(a) Stability and Loading text and the following diagrams (all labeled PRELIMINARY):(INCORPORATING COMMENTS FROM FIRST NAVSEA REVIEW) (a) Cross Curves of Stability (b) Draft Diagram and Functions of Form (c) Curves of Static Stability (d) Heeling Effect of Beam Winds	1	30 days prior to Builder's Trials
3	PRELIMINARY Damage Control Book (labeled PRELIMINARY) (bound copy)	Quantity per Contract	30 days prior to Builder's Trials
4	PRELIMINARY Laminated color prints of each Damage Control Diagram (labeled PRELIMINARY)	Quantity per Contract	30 days prior to Builder's Trials
5	PRELIMINARY Unlaminated color prints of each Damage Control Diagram (labeled PRELIMINARY)	Quantity per Contract	30 days prior to Builder's Trials
6	UPDATED - Damage Control Book, Section II(a) Stability and Loading text and the following diagrams: (a) Cross Curves of Stability (b) Draft Diagram and Functions of Form (c) Curves of Static Stability (d) Heeling Effect of Winds	1	30 days after Inclining Experiment
7	FINAL Damage Control Book Section II(a)	Quantity per Contract	14 days prior to ship's departure from shipyard
8	FINAL Damage Control Book (labeled FINAL) (Bound copy)	Quantity per Contract	14 days prior to ship's departure from shipyard
9	FINAL Laminated color prints of each Damage Control Diagram (with FINAL seal)	Quantity per Contract	14 days prior to ship's departure from shipyard
10	FINAL Unlaminated color prints of each Damage Control Diagram (with FINAL seal)	Quantity per Contract	14 days prior to ship's departure from shipyard

BUILDING YARD FORWARD TO FOLLOW YARD (if applicable)			
ITEM NO.	ITEM	NO. OF COPIES	DELIVERY SCHEDULE
1	Color prints of each Damage Control Diagram (labeled PRELIMINARY) (unlaminated) for lead ship	1	30 days prior to Builder's Trials of lead ship
2	Computer Aided Drafting (CAD) Magnetic Tape of Damage Control Diagrams (labeled PRELIMINARY) and hard file of database validation operations for lead ship	1	30 days prior to Builder's Trials of lead ship
3	Damage Control Book for lead ship (labeled PRELIMINARY) (1) Hard copy (bound) (2) Word processing disk	1	30 days prior to Builder's Trials of lead ship

BUILDING YARD FORWARD TO PLANNING YARD			
ITEM NO.	ITEM	NO. OF COPIES	DELIVERY SCHEDULE
1	Plan Layout-(**see paragraph 4.2.1**)	1	24 months prior to delivery of ship
2	FINAL-Unlaminated color prints of all damage control diagrams	2	14 days prior to departure of the ship from the shipyard
3	FINAL-Damage Control Book (a) Camera Ready Copy (b) Word processing disk	1	60 days prior to delivery of ship
4	FINAL-Computer Aided Drafting (CAD) magnetic Tape of Damage Control Diagrams and hard file of database validation operations	1	60 days prior to delivery of ship
5	Up-to-date ship construction drawings of ship systems from which damage control diagrams were developed	1	60 days prior to delivery of ship
6	Up-to- date Compartment and Access (C&A) Drawings	1	60 days prior to delivery of ship
7	FINAL - Damage Control Book Section II(a) Stability and Loading text and associated diagrams for final printing and distribution in the following medias: (a) One (1) - reproducible camera - ready copy (b) One (1) - photo copy (c) Quantity as required - computer software	1	Upon review and final NAVSEA approval

POST SHAKEDOWN ACTIVITY (PSA) DAMAGE CONTROL EXECUTING YARD FORWARD TO SHIP'S DCA			
ITEM NO.	ITEM	NO. OF COPIES	DELIVERY SCHEDULE
1	Damage Control Book (Illustrating PSA changes)	Quantity Per CDRL	5 days prior to the end of Availability
2	Unlaminated color prints of each Damage Control Diagram (Illustrating PSA Changes)	Quantity Per CDRL	5 days prior to the end of Availability
3	Approval / Comments from the local Supervisor and the ship should be returned to the PSA Executing Activity 45 days after CDRL delivery.	Quantity Per CDRL	30 days after Navy Approval
4	Damage Control Book (labeled FINAL) (bound copy)	Quantity Per CDRL	30 days after Navy Approval
5	Laminated color prints of each Damage Control Diagram (with FINAL Seal) Unlaminated color prints of each Damage Control Diagram (with FINAL Seal)	Quantity Per CDRL	30 days after Navy Approval

APPENDIX B

INSTRUCTIONS FOR THE LIFE CYCLE REVISION OF DAMAGE CONTROL BOOKS AND DIAGRAMS

1. SCOPE. This appendix provides requirements for the revision of the damage control book and diagrams. This appendix forms a mandatory part of NAVSEA Technical Specification (NTS) 9090-820

2. REFERENCED DOCUMENTS

S9086-CN-STM-020/CH 079 VOL 2 (0901-LP-079-0050) Naval Ships Technical Manual, Volume 2, Damage Control - Practical Damage Control

3. DEFINITIONS

None applicable.

4. GENERAL REQUIREMENTS

4.1 Ships Force Instructions. Instructions for the ship's force when preparing and submitting their damage control books and diagrams to the overhauling activity for revision, are contained in **S9086-CN-STM-020/CH 079 VOL 2 (0901-LP-079-0050)**

4.2 Ships Master Copy of Damage Control Book and Diagrams. If the ship's force has made marked up revisions to their master Damage Control Books and Diagrams, the planing yard (or designated revision activity as delegated by the planning yard) shall obtain a copy of these documents from the ship at the start of the overhaul or availability.

5. REQUIREMENTS FOR REVISION OF DAMAGE CONTROL DIAGRAMS.

5.1 Incorporation of Ship's Force and Overhauling Activity Revisions. The overhauling activity shall incorporate (as applicable) revisions from the Damage Control Diagrams received from the ship's force, and revisions made by the overhauling activity during the overhaul or availability.

5.1.1 Revision Procedures.

(a) Revision Date. The revision date, including the overhaul activity name, shall be entered in each overhaul block of each of the affected Damage Control Diagrams. The year in the overhaul block shall correspond to the date of the revision, the overhauling activity shall add its name and the year of the overhaul.

(b) Change in Ship's Classification or Hull Number. When the classification or the ship's hull number is changed, the upper identifying title on the diagram shall be changed in accordance with the following:

(1) Before change in classification:
DLGN 25
DLGN 25 CLASS

(2) After change in classification:
CGN 25
(EX-DLGN 25)
CGN 25 CLASS

(c) Color. Additions or revisions to an existing system shall be shown in the same color as the system as required by NTS 9090-820.

(d) Line Weight. The line weight of revisions shall conform to the requirements of NAVSEA Technical Specification (NTS) 9090-820, Appendix C.

(e) Symbols. Symbols used in the revisions shall conform to the symbols contained in (NTS) 9090-820. Overhauling activities shall not invent new symbols. Requests for new symbols shall be submitted to NAVSEA via the ship's planning yard, and approved in writing by NAVSEA prior to their use.

(f) Location of Revision. The location of revisions shall be drawn to accurately represent the location of the system on the ship.

(g) Preliminary Diagram Marking. If preliminary Damage Control Diagrams are provided to the ship the diagrams shall contain a preliminary label in place of the planning yard logo next to the NAVSEA logo in the lower title block area of the diagram. **(see NTS 9090-820 *Figure 1* and *Figure 4*)** the preliminary label shall appear as shown below:

PRELIMINARY
1. THIS IS A PRELIMINARY DIAGRAM DEVELOPED BY (INSERT PLANNING YARD NAME)TO REFLECT SRA_____(FY_____).
2. THIS DIAGRAM IS FOR OPERATIONAL USE AND TRAINING PENDING RECEIPT OF FINAL (APPROVED) DIAGRAMS.
3. DISPOSE OF THIS DIAGRAM UPON RECEIPT OF FINAL D.C. DIAGRAMS IN ACCORDANCE WITH PRESCRIBED PROCEDURES.
PRELIMINARY

NAVSEA LOGO

6. PROCEDURE FOR REVISING THE DAMAGE CONTROL BOOK TEXT AND TABLES.

6.1 Incorporation of Ship's Force and Overhauling Activity Revisions. The overhauling activity shall incorporate (as applicable) revisions from the Damage Control Book received from the ship's force, and revisions made by the overhauling activity during the overhaul or availability.

6.2 Partisal or Complete Revision. When the total number of revised Damage Control Book pages exceeds 45 percent of the total volume, the entire Damage Control Book shall be reprinted and distributed.

6.3 Revised Pages. Changes shall be made in accordance with the following:

(a) Page Format. The format of the revised pages or the reprinted book shall be in accordance with NTS 9090-820.

(b) Page Numbering. The revised pages shall be numbered in accordance with NTS 9090-820.

(c) Title Page. A notation shall be printed on the title page following each overhaul or availability, to indicate whether the text revision is partial or complete, for example, "Partial Revision". Under this notation shall be the date of the overhaul, and it shall correspond with the overhaul date on the diagrams and other text pages. The overhaul date (year only) of the diagrams, shall be included on the title page.

(d) Text and Table Pages Date Box. The Date of the overhaul or availability shall be printed in, the date box of each revised text or table page, ie: COH 1995, ie: SRA 1995.

7. DISTRIBUTION OF REVISED DAMAGE CONTROL BOOKS AND DIAGRAMS.

The required quantity of reprinted Damage Control Books and Diagrams (or only the affected pages and diagrams) shall be distributed to the ship by the end of the overhaul or availability. Additional copies of the reprinted or revised Damage Control Books and Diagrams shall be distributed to other required activities in accordance with the following Distribution table, including type and number, of copies.

a. The following distribution table is subject to modification by the Naval Sea Systems Command (NAVSEA) as systems and program requirements change, or as required by a NAVSEA administered contract for such services where such contract exists.

b. Naval activities not specifically listed for automatic receipt of documentation, but having need for the information, should contact the Planning Yard (PY) if the distribution represents a special case; or NAVSEA O3G, if routine distribution of certain items is necessary. Activities no longer desiring distribution copies, are requested to contact NAVSEA O3G.

TABLE IV
SURFACE SHIP DAMAGE CONTROL BOOK AND DIAGRAM DISTRIBUTION
New Construction and Overhauls

	ITEMS				
RECIPIENT	DC BOOK TEXT Number of Bound Copies (or change pages)	LAMINATED DC DIAGRAM QUANTITY	NON-LAMINATED DC DIAGRAM QUANTITY	DC DIAGRAM CAD SOFTWARE	DC BOOK COMPUTER SOFTWARE
SHIP See Note 1 See Note 3	1 per: DC Repair Station DC Central Pilot House	1 set per: DC Repair Station DC Central Pilot House	2 sets per ship	None	None
Surface Warfare Officers School (SWOS) Newport R.I.	1 See Note 2	None	1 set See Note 2	None	None
NAVSEA Technical Library	1 See Note 2	None	1 set See Note 2	None	None
The Ship's Planning Yard	1	None	1 Set	1 Set	1 Set

NOTES:

1. Schedule for delivery of PRELIMINARY and FINAL damage control books and diagrams for new construction ships is contained in **Appendix A.**, or the contracting document for the shipbuilding contract.

2. The ship's planning yard is responsible for delivery of final damage control books and diagrams to the recipients.

3. Schedule for delivery of final REVISED damage control books (or associated change pages) and final REVISED diagrams is contained in **Appendix B.** paragraph 7.