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SHIPBOARD HABITABILITY DESIGN PRACTICES MANUAL

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SHIPBOARD

HABITABILITY DESIGN

PRACTICES MANUAL

THIS MANUAL SUPERSEDES THE FOLLOWING DOCUMENTS

— HABITABILITY MANUAL, NS0933-005-8010

— HABITABILITY HANDBOOK, S9640-AF-HBK-010

NAVSEA 03H1 IS CUSTODIAN OF THIS MANUAL
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TABLE OF CONTENTS

TABLE OF CONTENTS

1.0 INTRODUCTION

1.1 **Purpose**. The purpose of the manual is to provide guidance and rationale for the design of shipboard habitability facilities.

1.2 **Cancellation**. The manual supersedes HABITABILITY MANUAL, NS 0933-005-8010, of 1 September 1969 and HABITABILITY HANDBOOK, S9640-AF-HBK-010.

1.3 **Applicability**. The manual applies to US Navy ships and submarines that are required to satisfy habitability standards contained in OPNAVINST 9640.1, Shipboard Habitability Program. This includes ships and submarines that have 100 or more accommodations, or are at least 150 feet in length. For other Navy ships and craft, the design practices contained herein may be used as guidance.

1.4 **Scope**.

1.4.1 The manual covers design of habitability facilities for male and female, including living, sanitary, recreation, leisure, community, foodservice, and service spaces. It does not cover support systems for habitability facilities such as lighting, heating, ventilation, and air conditioning. These systems are discussed in other design manuals. (See references.)

1.4.2 The manual does not cover medical/dental spaces, offices, nor storerooms, though these spaces are sometimes identified as habitability spaces. These spaces are covered in a separate design practices manual which is being developed and will be available in the near future.

1.4.3 Affordability Through Commonality (ATC). NAVSEA has initiated the ATC project to identify specific commonality approaches to ship construction, with high potential for improved affordability and to quantify the potential cost benefits. As a result of preliminary studies, the ATC project is in the process of building a prototype modular sanitary space to validate the concept and quantify the savings. This prototype could potentially form the nucleus of other habitability modules which could drastically change the design, construction, and support of Navy ships. Accordingly, as this ATC modularity concept is refined and accepted, the changes in habitability design practices will be incorporated into future revisions of the manual.

1.5 **References**. The references should be read and understood before attempting to use the guidance herein.

1.6 **Using this Manual**.

1.6.1 **Overview**. The manual must be used in conjunction with other documents, such as OPNAVINST 9640.1 and General Specifications for Ships of the US Navy (GEN SPECS). In general,

OPNAV Habitability Standards, GEN SPECS, and other documents specify what must be provided in a space and this manual provides guidance for designing an efficient arrangement. The manual assists the user in three ways:

- Design practices which are not found in standards and specifications are identified.
- Rationale is provided for these practices, which gives the user insight for making trade-offs where design constraints preclude optimum solutions.
- Examples of arrangements are included to illustrate efficient designs.

1.6.2 **Organization.** The manual parallels GEN SPECS. There is one general chapter and eight specific chapters corresponding to the nine habitability GEN SPECS sections - Sections 640-645, 651, 654, and 655.

1.6.3 **General procedure.** Use the following steps to create compartment arrangements. This procedure applies whether a designer is using pencil and paper or computer graphics.

1.6.3.1 Establish objective. - Determine the purpose and need for the proposed arrangement.

1.6.3.2 Review references. - From the applicable references, such as OPNAVINST 9640.1 and GEN SPECS, determine mandatory design requirements.

1.6.3.3 Review compartment configuration. - Determine the adequacy of compartment location, adjacencies, size, shape, and access. Make necessary adjustments where possible. Depending on design phase, compartment configuration may be contractually or physically locked in. If the configuration is undetermined, create a proposed compartment configuration based on all known design constraints and the space arrangements shown herein.

1.6.3.4 Enter design constraints.

1.6.3.4.1 Compartment boundaries. - Develop a scaled drawing or 3-dimensional view of the compartment boundaries based on the best available configuration information, such as Compartment & Access Drawings, Offsets, or General Arrangement Drawings. Note any overhead restrictions on the plan view.

1.6.3.4.2 Compartment interferences. - Indicate to scale on the compartment boundary drawing known accesses, structural scantlings, and mechanical and electrical distributive systems. Use an assumed space (volume) reservation if exact dimensions are not available or undefined. Show equipment

maintenance clearances where required. Consider the impact of spaces above, below, and on all sides.

1.6.3.5 Identify equipment. - Using GEN SPECS or baseline ship specification, identify all major equipment to be arranged in the compartment. Commercial items specified in the baseline ship specifications should be validated.

1.6.3.6 Develop arrangement. - Lay-out equipment within the compartment in an acceptable arrangement considering design constraints and the guidance found herein. Consider as many valid designs as time permits and select the best. Using scaled templates of the equipment is helpful in the development of the most advantageous arrangement.

1.6.3.7 Evaluate arrangement. - Review the selected design against its objective, mandatory requirements, and design constraints.

1.6.3.8 Finalize arrangement. - Finalize the design, add accessories, material list, notes, references, and title block to the compartment arrangement drawing.

2.0 GENERAL DESIGN GUIDANCE

2.1 **Goal**. The goal and definition of habitability is described in OPNAVINST 9640.1, Shipboard Habitability Program.

> "The Navy's primary mission is to be prepared to conduct prompt and sustained combat operations at sea in support of U.S. national interests and the national military strategy. The Navy is dependent upon shipboard personnel to accomplish this mission and therefore must provide them with living and working conditions which will result in levels of crew morale, safety, health and comfort, adequate to sustain maximum personnel effectiveness and to support optimum personnel retention. Habitability is that military characteristic of U.S. Navy ships which is directed toward satisfying personnel needs which are dependent upon the physical environment."

Habitability design is therefore the design of the shipboard physical environment with respect to meeting personnel needs. Good habitability design, when integrated with all other ship systems design, satisfies these needs at minimum cost as normally measured in terms of allocated space and weight.

2.2 **Standards**. Habitability Standards, representing minimum design requirements, were developed in the 1950s based on Fleet surveys and human engineering practices. They have been maintained by OPNAV with few changes. The standards differentiate between new construction and existing ships and note several important differences between ship types, particularly between surface ships and submarines. The standards also define small ships as 150-300 feet, mid-size ships as 301-600 feet, and large ships as greater than 600 feet. While all of the facility standards can be considered tight, those for submarines are significantly tighter than surface ships standards and in the chapters that follow separate sections are provided for surface ship and submarine design guidance. As compensation, submariners enjoy some key habitability/quality-of-life advantages over their surface ship counterparts. These advantages include additional pay, shorter deployments (rotational blue/gold crews), greater attention to human engineering, better air quality, more acoustic treatments, reduced ship motion (when underwater), and less formality.

2.3 **Manning**. Shipboard manning is the largest driver of habitability space requirements. Personnel requirements are in turn driven by a ship's required operational capabilities and projected operating environment. For new construction ships, consider a manning design margin factor to plan for growth, since historically, a ship's manning increases during its life cycle as new capabilities are added.

2.4 Compartment Design.

2.4.1 Location. Habitability facilities, excluding medical/dental spaces, offices, and staterooms, make up about 20 percent of the arrangeable area of a ship and are typically distributed through the upper decks and deckhouse. Locations for habitability facilities are normally determined after spaces for higher priority systems, such as weapons, electronics and machinery are fixed; however, some locations may be unsuitable for habitability facilities.

2.4.1.1 Noise. - Avoid locations near sources of loud noise, such as diesel generator rooms.

2.4.1.2 Vibration. - Avoid locations with excessive vibrations, such as in the vicinity of the ship's propeller.

2.4.1.3 Motion. - Avoid locations with excessive ship motion, such as the bow if subject to slam, or the extreme top of the superstructure.

2.4.1.4 Access. - Avoid locations that are too inaccessible for running distributive systems or where inclined ladder access is precluded, such as down near the bilges.

2.4.1.5 Radiation. - Maintain safe distances from reactors in nuclear powered ships. (See NAVSEA INSTRUCTION C9210.4A.)

2.4.1.6 Tanks. - Avoid locations above fuel tanks and collecting and holding tanks (CHT).

2.4.2 Boundaries. Compartment configuration is an essential design constraint that must be developed prior to developing an arrangement. Provide optimum configurations wherever practical. Many compartment boundaries are predetermined by overall ship general arrangement considerations.

2.4.2.1 Bulkheads. - Provide habitability facilities with lightweight, flush, joiner type bulkheads, except where structural bulkheads are required for other purposes. Ensure that bulkheads for spaces requiring privacy or for separating air conditioned spaces from non-air conditioned spaces are at least fumetight. Install bulkheads perpendicular to the baseline and either parallel or perpendicular to centerline to optimize producibility. Ensure that outside corners of bulkheads in passageways are rounded to preclude their being a hazard should personnel inadvertently fall against them as the ship rolls.

2.4.2.2 Shell and deckhouse. - Where the shell or deckhouse forms part of a compartment boundary, ensure that the space arrangement conforms to the flare, tumble home or other curvature and allow for structure and thermal insulation.

2.4.2.3 Overhead. - Installation of distributive systems such as piping, wiring, and HVAC ducts should be minimized in living spaces, sanitary spaces, foodservice spaces, recreation spaces, lounges, and medical spaces. Where distributive systems are located in these spaces, they should be installed as close as practicable to the deck over in order to provide maximum headroom above the minimum requirements. These requirements are not less than 6 feet 5 inches on surface ships and 6 feet 3 inches on submarines. The 6 feet 5 inches requirement is based on allowing a 95th percentile male crewmember (in shoes and helmet) to walk without hitting his head.

2.4.2.4 Deck. - Provide flat, flush decks wherever practicable. Where ramps are required, ensure they have a 1:8 maximum slope. Where high-hats are required, ensure they have steps and protective railings if greater than 9 inches.

2.4.3 **Access.** Compartment accesses have limited flexibility in location and require close coordination with the compartment configuration and arrangement. Ensure that access locations consider ship structure and avoid cutting main structural members.

2.4.3.1 Door. - Provide a 26 by 75 inch (no sill) joiner door for normal access to habitability spaces, except for wet spaces. Provide a 26 by 66 inch (9 inch sill) joiner door for wet spaces. Ensure that compartments occupied by 21 or more persons have more than one means of egress, which may be other doors or 25 inch diameter scuttle. Door swing may be either right or left handed and is normally into a compartment in order to avoid interference with passage traffic.

2.4.3.2 Scuttle. - Scuttles are normally provided for emergency egress and may be located in bulkheads, decks, or overheads. Overhead scuttles require a vertical ladder for access.

2.4.3.3 Hatch. - Hatches leading to other spaces are sometimes found in large living spaces. Ensure adequate clearance is provided for chain railings around the hatch for safety.

2.4.3.4 Manhole. - Compartments above tanks usually require manholes in the deck. Each tank has two accesses (one for personnel access and one for ventilation) located at the top of the tank and spaced as widely apart as possible. Spaces over tanks will also be penetrated by fill and overflow piping and sounding tubes that may affect the arrangement of equipment.

2.4.4 **Scantlings.** Structural support members often have a major impact on the arrangement of a compartment by reducing the net arrangeable area and by influencing the location of accesses and distributive systems. If scantlings are unknown, estimate their size and location and validate the estimate later.

2.4.4.1 Stiffeners. - Structural bulkheads typically have periodically spaced, "T" stiffeners on one side. Size and spacing of stiffeners may vary depending on load distribution.

2.4.4.2 Stanchions. - Stanchions to carry vertical loads, are often found in large compartments and in deck areas subdivided only by joiner bulkheads.

2.4.4.3 Longitudinals and stringers. - Longitudinals stiffen the underside of decks and, as the name implies, run longitudinally. Stringers run longitudinally along the shell or deckhouse following shell curvature.

2.4.4.4 Web frames. - Web frames, where provided, are deep members, spaced periodically and transversely circumscribing the shell. They are tied in to large transverse stiffeners on the underside of decks which can be the limiting factor in determining clear headroom within a space.

2.4.4.5 Miscellaneous. - An assortment of other structural elements, such as bents, catapult troughs, and kingposts, may impact habitability facilities depending on ship type and compartment location.

2.4.5 **Distributive Systems.** Mechanical and electrical distributive systems may further constrain net arrangeable area. Allow space for these systems prior to arranging a compartment and validate the distributive systems design periodically to guide and minimize their impact.

2.4.5.1 Ventilation. - Compartments bounded by machinery spaces and fan rooms should anticipate space loss to large vent ducts. If compartments are provided with fan coil units, indicate on the arrangement drawing.

2.4.5.2 Piping. - Compartments under wet spaces, above tanks and along the shell should plan for additional piping systems.

2.4.5.3 Wireways. - Compartments near electronics spaces and in the superstructure can expect wireways and antenna cables.

2.4.6 **Human Engineering.** Many of the design practices discussed in this manual are based on human engineering principles and can assist the designer encountering situations requiring human engineering considerations.

2.4.6.1 Personnel. - Design for the anthropometric dimensions and capabilities of the 5th percentile female to the 95th percentile male crewmember.

2.4.6.2 Standardization. - Multiple compartments serving the same purpose, such as crew living spaces, should

follow identical equipment selection and compartment configuration and arrangement practices.

2.4.6.3 Life cycle. - Ensure that the compartment configuration and arrangement takes into consideration the needs of the installer, operator, and maintainer in the various operating scenarios and environmental conditions expected in its life cycle.

2.5 Equipment Design.

2.5.1 **General.** Shipboard habitability equipment, including furniture, is expected to function for sustained periods in conditions not experienced in shore facilities. For some items, such as the crew berth, function and design are specific to the Navy. In the general case, however, shipboard habitability equipment represents commercial or commercial marine equipment that has been upgraded for Navy service. The major difference between Navy and commercial furniture is that Navy furniture is constructed primarily of aluminum for weight control. Commercial furniture is usually constructed of steel or wood. The following paragraphs describe general shipboard performance requirements for use in selecting equipment. Table 2-1 identifies common differences between commercial, commercial marine, and Navy equipment. These general requirements do not add or detract in any way from those in valid equipment drawings or specifications.

2.5.2 **Ship Motion Requirements.** Equipment must operate and survive in expected sea states at designed ship speeds. Ships at sea experience six kinds of motion, three translations (surge, sway, and heave), and three rotations (roll, pitch, and yaw). (See MIL-STD-1399.) The combined effect of these motions can be complex and severe. In addition, with various loading conditions, ships may take on trim or list that can accentuate other motions.

2.5.2.1 Foundation. - Ensure all equipment, except portable items, can be permanently mounted to a deck, bulkhead, dresser, shelf, or other structure. Ensure portable items have dedicated stowage locations and means of being secured. Special consideration should be given to items mounted on joiner bulkheads.

2.5.2.2 Inclination. - Select items that remain operable when inclined to 15 degrees and undamaged when inclined to 45 degrees.

2.5.2.3 Positive latching mechanisms. - Ensure that doors, drawers, and other hinged or sliding parts have positive latching mechanisms for both the closed and open positions. Bullet, bayonet, and magnetic catches are not considered to be positive latching mechanisms.

2.5.2.4 Battens. - Ensure that shelves have battens and upward flanged edges on open sides to retain their contents.

2.5.2.5 External design. - Select items that have smooth surfaces, rounded corners and projections, and protected switches and controls to minimize risk of injury to personnel, or damage to equipment.

2.5.3 **Ship Integration Requirements.** - Equipment installed in Navy ships must be compatible with other ship systems. Lack of compatibility will incur additional installation costs that can easily exceed the cost of the equipment.

TABLE 2-1 COMMERCIAL AND NAVY HABITABILITY EQUIPMENT DIFFERENCES

REQUIREMENT	COMMERCIAL	COMMERCIAL MARINE	NAVY
SHIP MOTION			
Foundation	N	Y	Y
Inclination	N	Y	Y
Positive Latching	N	Y	Y
Battens	N	Y	Y
External Design	N	Y	Y
SHIP INTEGRATION			
Minimum size & weight	N	P	Y
Hatchable	N	P	Y
Front Access	N	P	Y
Electrical Power	N	P	Y
EMI	N	N	Y
Equipment Heat, Noise, Vibration	N	P	Y
SHIP ENVIRONMENT			
Vibration	N	P	Y
Variable Services	N	P	Y
Temperature	Y	Y	Y
Water Spray	N	Y	Y
Corrosion	P	Y	Y
Shock	N	N	Y
Security	P	P	Y
SAFETY			
Protective Shields	P	P	Y
Interlocks	P	P	Y
Brittle Materials	N	Y	Y
Passive Fire Safety	N	P	Y
Hazardous Materials	P	P	Y

KEY:
N - Not generally considered
P - Partially considered
Y - Yes, required design feature

2.5.3.1 Size and weight. - Minimize equipment size and weight to reduce overall ship size and weight or to free up space and weight for other systems.

2.5.3.1.1 Hatchable. - Ensure that equipment for surface ships can pass through a 26 by 66 inch door or a limiting hatch dimension to avoid the need for access cuts in shell or other ship's structure. Larger items should be sectionalized if possible. For submarines, ensure that equipment can pass through the shipping hatch.

2.5.3.1.2 Front access. - Select equipment that can be operated, maintained, and repaired from the front in order to minimize total ship area and volume requirements and to facilitate maintenance.

2.5.3.2 Electrical power. - Select electrical equipment that uses either 440 Volt, 60 Hertz, 3 Phase AC, or 115 Volt, 60 Hertz, 1 Phase AC power to be compatible with the power produced by the ship.

2.5.3.3 EMI. - Select equipment that operates within safe levels of radiated and conducted electromagnetic interference. (See MIL-STD-461, tests RE01, CE01 and CE03.)

2.5.3.4 Heat, noise, and vibration. - Ensure that heat, noise, and vibration generated by equipment causes no safety concerns nor adversely affects other equipment.

2.5.4 **Shipboard Environmental Requirements.** - Ship environmental conditions are harsh and fluctuate widely. In addition, heavy usage, inexperienced personnel, and inadequate maintenance of equipment often combine to shorten expected life cycles.

2.5.4.1 Vibration. - Select equipment that can withstand vibration at resonant frequencies (below 33 Hertz) for up to two hours. (See MIL-STD-167, Type I Vibration.)

2.5.4.2 Varying service conditions. - Ensure that equipment can remain operable when subjected to higher or lower than designed water, steam, air, and electrical service conditions, and has safety devices installed to protect personnel and equipment when unacceptable operating conditions arise.

2.5.4.3 Temperature. - Select equipment that is operable at ambient temperatures between 32 degrees F and 122 degrees F and at relative humidities greater than 95 percent.

2.5.4.4 Water spray. - Select equipment that can remain operable after exposure to water spray and has no noticeable residual water collection.

2.5.4.5 Corrosion. - Use materials that are corrosion resistant. Coatings, where used, should be applied by the

manufacturer and should be easy to clean and resist abrasion. Dissimilar metals should have compatible galvanic properties.

2.5.4.6 Shock. - In general, habitability equipment shall meet grade C shock. An exception is troop living space furnishings, which shall meet grade B shock, (See MIL-S-901), because troops are stationed in their living spaces during general quarters.

2.5.4.7 Security. - Ensure that cabinets and lockers can be securely locked and resist forced entry.

2.5.5 **Additional Safety Requirements.**

2.5.5.1 Protective shields. - Provide protective shields at burn or scald hazards.

2.5.5.2 Safety interlocks. - Provide electrical and mechanical interlocks to ensure personnel safety when performing maintenance or repairs.

2.5.5.3 Brittle materials. - Restrict use of brittle materials. Suitably protect or reinforce essential glass, plastic, fiberglass, and cast metal parts.

2.5.5.4 Passive fire safety. - Use materials with passive fire protection to minimize smoke development, flame spread, and toxicity, and promote fire retardancy. Wood and wood products, except in mine warfare ships, are prohibited.

2.5.5.5 Hazardous materials. - Eliminate use of materials determined to be health hazards such as mercury, asbestos, cadmium, and some synthetic lubricants.

2.6 **Color Schemes.**

2.6.1 **Purpose.** Well chosen color schemes improve the appearance of habitability and other shipboard facilities and stimulate their designed functions.

2.6.2 **Components.** Color schemes are put together with consideration of colors, patterns, and textures of materials for bulkheads, overheads, decks, furniture, and accessories. This includes items such as paint, tile, carpet, upholstery, curtains, plastic laminate, and hardware.

2.6.3 **Numbers.** The number of different color schemes should be large enough to provide personnel with a change of environment during their daily routine, but small enough to keep logistical problems associated with repair and replacement of materials manageable. Provide officers, CPO and crew with different color schemes for their respective berthing, sanitary, recreation and messing spaces. Provide additional color schemes for community spaces that are used by all personnel such as, passages, offices, and other work and utility spaces.

2.6.3.1 Definition of change. - A change in color scheme is a change in bulkhead or deck color and an appropriate variation in accent colors. A small number of bulkhead and deck colors can be combined with a greater variety of accent colors to provide a sufficient number of different color schemes.

2.6.3.2 Multiple color schemes. - Multiple spaces of the same type that are not subject to general ship traffic, such as officer staterooms or crew living spaces, may use one color scheme for all spaces. Multiple spaces with general ship traffic, such as passages, should have two or more different schemes to provide variety.

2.6.4 **Objectives.** In general, habitability space color schemes should be cheerful, clean, comfortable, lend a natural appearance to the skin, and minimize the institutional look. Use socially stimulating color schemes in active spaces, such as messrooms, and quiet, restful schemes in passive spaces, such as berthing spaces. Use neutralizing color schemes in spaces that have more than one purpose as opposed to mixing too many colors. Since most shipboard compartments are of minimal size, use colors that make the space appear larger and cause projecting structure and furnishings to recede into the background.

2.6.5 **Color Selection Requirements.** Navy approved materials and manufacturers are listed in the NAVSEA Habitability Materials List. Individual manufacturers should be consulted to obtain current color samples, since new colors and patterns are continually being introduced while old ones are discontinued. Standard color chips can be reviewed in GSA's Federal Standard Color System, No. 595A. When practical, allow COs or PCOs to select color schemes (from a small number of optional schemes) for senior officer quarters.

2.6.5.1 Visibility. - A proper combination of color and light is necessary in order to see well. Light colors provide good seeing conditions without requiring high levels of illumination. Darker colors need higher levels of illumination. See Lighting on Naval Ships, DOD-HDBK-289 for detailed information on illumination, and recommended illumination levels to achieve various objectives. Also, colors appear different under varied lighting conditions. When developing color schemes, simulate shipboard compartment lighting conditions to the maximum extent possible.

2.6.5.2 Maintenance. - Select paints and materials that are easy to clean and resist damage. Avoid materials with heavily textured surfaces. Apply paints and materials in a manner that does not require extreme care or skill to refurbish. Philosophies of using dark colors because they do not show dirt and soil are not necessarily valid. Dirt, soil, and damage should be sufficiently obvious that these needs are not overlooked. Paints and materials are available that are highly resistant to discoloration or damage and are easy to clean and replace.

2.6.5.2.1 Repairables. - Since colors are periodically discontinued by manufacturers, small quantities of replacement items, such as deck tiles and sheathing, should be carried on board to ensure an exact match when repairs are made.

2.6.5.2.2 Consumables. - Items such as curtains and bedspreads are replaced when necessary. These items do not need to be carried on board. These items can be used advantageously for color accents.

2.6.5.3 Numbers of Colors. - Avoid using too many different colors for coverings, paint finishes, or fabric, as this only increases logistical problems, requires too many different cleaning materials or procedures, and requires special tools to clean or refurbish compartments or components. Limit materials that are carried on board such as paints and deck tile to no more than six to ten different colors each.

2.6.6 **Applications Guidelines.** In selecting colors for interior finishes, it is important to preserve sufficient reflectance to maintain adequate light distribution throughout the space. Use surface reflectance values in the following ranges: decks 15-35 percent; bulkheads 40-60 percent; overheads 70-80 percent; furniture 25-50 percent; and accessories 15-60 percent. Bulkheads and decks are the primary finishes to select and are the most critical to logistical concerns. Furniture finishes for case items, such as lockers, cabinets, and desks, should be standardized. Furniture finishes, for items such as tables, chairs, and accent items, such as curtains, can be more widely varied as necessary for accent and interest.

2.6.6.1 Bulkheads. - Select a single color paint scheme for most bulkhead treatments in order to provide a feeling of expanse. Use a light shade of the basic color family that has been selected. Use the same color on doors and door frames; coamings may be a darker shade. If pre-colored bulkhead coverings are used instead of paint, they too should be of a single color. In large compartments (over 1000 sq. ft.), one bulkhead may be of a slightly different shade of the basic color family or may be a woodgrain or other pattern in order to add interest to the visual environment. Avoid using very dark woodgrain panels with light painted surface treatments.

2.6.6.2 Overheads. - Paint compartment overheads an off-white, blended to match the basic color family represented by the bulkhead color. If overheads are not sheathed, paint structural elements, piping, ceiling mounted ducting, etc., the same color as the overhead in order to make them less intrusive.

2.6.6.3 Decks. - Deck colors should be a medium shade from the color family used on the bulkheads. If tile is used, select fine-grained patterns. If carpet is used, select fine-grained patterns or solid colors. If tile is used on one part of a compartment and carpet on another part, the two should be compatibility in color and pattern. Avoid large, prominent

deck covering patterns since they appear busy and attract too much attention. Where two or more spaces combine to form a complex, as in a senior officer's cabin and stateroom, a single deck color may be used throughout to provide a feeling of expanse.

2.6.6.4 Built-in cabinets. - Treat with a color or a woodgrain that causes them to remain neutral or recede and reduce their apparent size in the space. The larger the visual area represented by cabinets the lighter the color should be. Paint cabinets either the same color as the bulkheads or a color slightly darker, but compatible with basic bulkhead color family characteristics.

2.6.6.5 Furniture. - For structure of furniture, use the same or a similar color as any built-in cabinetry within the space. Use a light to medium shade on desk tops to minimize the brightness contrast between tops and any printed materials that may be placed on them. A single-color scheme may be used with compartments having woodgrain finish on bulkheads or on built-in cabinets. Match or blend woodgrain furniture with bulkhead or cabinet woodgrain. Avoid using two or more boldly patterned grains in the same space.

2.6.6.6 Upholstery. - Select a color that is compatible with the basic color family chosen. Upholstery may be either lighter or darker than the bulkhead color, or be a contrasting complementary color to provide accent to the general decor. Use either solid or patterned colors. Select small, fine-grained patterns as opposed to large, prominent patterns with highly saturated hues. If solid colors are selected, use no more than two different colors within the same compartment.

2.6.6.7 Curtains and drapes. - Select either a solid color or a patterned design. In the latter case the pattern should be small and fine-grained. Avoid using large, exotic patterns. The color of curtains and drapes may be selected from an analogous or complementary hue. If the curtains or drapes occupy a large visual area, use analogous colors. If the visual area covered is small, select complementary colors to provide accent and visual interest.

2.6.6.8 Accessories. - Items such as ash trays, table lamps, waste baskets, etc., should possess colors that are compatible with the basic color family chosen. Ash trays and lamps are of interest and may be of a complementary color while the wastebasket, being of less interest, should be of an analogous color or of the same woodgrain as any other woodgrain selected for the compartment.

2.6.6.9 Hardware and trim. - Where metal is used for cabinet handles, trim, etc., the color of the metal should be compatible with the basic color family. Brass and gold are associated with warm colors, while aluminum and silver are associated with cooler colors. Avoid using highly polished metal

trim; use antique or satin finish. Also, avoid using large amounts of metal surface and trim since this creates an institutional appearance.

3.0 OFFICER LIVING SPACES

3.1 General.

3.1.1 **Number.** Ship officers typically constitute 6-10 percent of total ship's company accommodations. Troop officers typically constitute 6-10 percent of total Marine detachment.

3.1.2 **Location.** In general, locate officer living spaces on the main deck or above in an area, designated as "officer country", that is not subject to enlisted personnel traffic. One exception is the Executive Officer living spaces which should be readily accessible to the crew. In surface combatants, provide separate officer country fore and aft for better survivability.

3.1.3 **Types of Officers.**

3.1.3.1 Ship's company -

Commanding Officer (CO)
Executive Officer (XO)
Department Heads (Engineering, Supply, Combat Systems, Operations, Deck, Navigation, and Medical)
Junior Officers

3.1.3.2 Staff -

Flag, Group, Squadron, or Unit Commander
Chief-of-Staff
Staff Officers

3.1.3.3 Detachments (Air Wing, Helo, Marine Guards, Amphibious Assault Unit, etc.)

3.1.4 **Types of Living Spaces.**

3.1.4.1 Sea cabin (surface ships only). - Provide sea cabins for COs and Flag officers in the vicinity of their at sea command stations (i.e. PH/CIC, TFCC), except where their staterooms are already near these stations.

3.1.4.2 Cabin and stateroom (surface ships only). - Provide a cabin and stateroom for COs (destroyer and larger ships), XOs (carriers, amphibious assault ships, and large auxiliaries), and staff and detachment officers of equivalent rank.

3.1.4.3 Single Stateroom. - Provide single staterooms for COs (submarines, small auxiliaries, and patrol craft), XOs (cruiser and destroyer ships), department heads (carriers, amphibious assault ships, and large auxiliaries), and staff and detachment officers of equivalent rank.

3.1.4.4 Double Stateroom. - Provide double staterooms for XOs (submarines, frigates, and small ships), department heads (cruiser and smaller ships), and all junior officers (except submarines).

3.1.4.5 Triple Stateroom. - Provide triple staterooms for junior officers in surface ships that are too tightly constrained to allow officers to be berthed in single and double staterooms.

3.1.4.6 Bunkroom (maximum of 6 junior officers). - Provide bunkrooms in submarines and surface ships that are too tightly constrained to allow officers to be berthed in single and double staterooms.

3.1.4.7 Transient Berthing. - Provide a triple stateroom or a bunkroom for officer transients in ships that receive a steady influx of transients.

3.1.4.8 Surge Berthing. - Provide a sleeping surface within existing troop officer living spaces except where surge officers are berthed in other spaces that are convertible to surge berthing.

3.1.5 Functions of Living Spaces.

Sleeping
Dressing
Personal stowage
Personal hygiene
Office work
Conferences
Recreation
Dining (in cabins)

3.1.6 Related Spaces.

Sanitary spaces (private and semiprivate baths, and community)
Messrooms and lounges
Baggage stowage
Linen lockers
Cleaning gear lockers
Passages

3.2 Outfit and Furnishings.

3.2.1 Sleeping Surfaces.

Beds - staterooms with adjoining cabins
Transom berths - sea cabins and single staterooms without cabins (department heads and above)
Single berths - single staterooms

Double berths - double staterooms and bunkrooms
3-High berths - junior officer and transient officer triple staterooms

3.2.2 **Modular Furniture Units** (surface ships, Figure 3-1).

No.	Name	Size	Ownership
5	Long Wardrobe	24-inch	Shared
12	Short Wardrobe & File Section	24-inch	(1)
14	Secretary Bureau(2)	24-inch	(1)
15	Secretary Bureau(2)	36-inch	Individual
16	Drawer, Locker Section	36-inch	Individual
N/A	Lavatory(3)	24-inch	Shared

Notes:
(1) Individual for ship's company and senior troop officers. Shared for troop junior officers.
(2) Secretary bureau features drop-leaf unit, light, and safe.
(3) Provide in staterooms and bunkrooms without adjoining private baths. Lavatory features CRES bowl, mirror, light, toilet case, electrical outlet, soap dish, and self-closing faucets.

3.2.3 **Modular Furniture Groups** (surface ships, Figure 3.1).

No.	Compartment
1	Single Stateroom
2	Single Stateroom
3	Double Stateroom
4	Not used
5	Single Stateroom
6	Sea Cabin
7	Double Stateroom
8	Single Stateroom

3.2.4 **Accessory Furnishings.**

Berth accessories (curtains, ladder, lee rail stowage clips, light, mattress, and spring unit)
Bookrack (or built-in bookshelves)
Chair (arm, armless, and lounge)
Coat hooks (or coat and hat rack)
Curtains (for airports or fixed lights)
Desk (single or double pedestal, flat top)
Grabrod (for access to upper berth)
Key cabinet
Locker, table leaf
Mirror, full length
Safe locker
Shelf, utility

Stowage, built-in (above modular units)
Tables (coffee, corner, end, dining, night, serving, and sideboard)

3.3 **Arrangement Practices for Surface Ships.** Approximate sizes of cabins, staterooms, and bunkrooms are shown in the figures.

3.3.1 **Single Staterooms for Small Surface Ships** (Figure 3.2, Modular Group 8).

3.3.1.1 Berth. - Locate berth/bed away from passages and other sources of intermittent noise. Orient berths primarily fore-and-aft. Use athwartships orientation where arrangement is improved. Avoid locating modular furniture in way of berth drawers.

3.3.1.2 Lavatory. - Orient lavatory facing forward or aft and position it away from berth and secretary bureau units to avoid splash from lavatory bowl. In adjacent staterooms, group lavatories back-to-back, where practicable.

3.3.1.3 Secretary bureau. - Orient modular unit 14 facing forward or aft to reduce the effects of ship roll when using drop-leaf desk. Provide clear working and chair area with drop-leaf open. On small ships only, provide chair tie-downs at locations where chairs are to be secured for rough weather.

3.3.1.4 Long wardrobe. - Locate modular unit 5 near the door for easier access to outerware.

3.3.1.5 Bookrack. - Locate the bookrack adjacent to, but above, the lavatory and position lavatory accessories (towel rack, and tumbler and toothbrush holder) under the bookrack.

3.3.1.6 Access. - Orient door swing into the space and towards a bulkhead to avoid interference with passageway traffic.

3.3.1.7 Furniture clearance. - Position deck mounted furniture about 1-inch from bulkheads to ensure adequate welding clearance.

3.3.1.8 Sheathing and carpeting. - Decorative bulkhead and overhead sheathing and carpeting are authorized in senior officer living spaces only.

3.3.2 **Double Staterooms for Small Surface Ships** (Figure 3-2, Modular Group 7). Arrangement practices for small ship single staterooms apply to small ship double staterooms with the following addition.

3.3.2.1 Secretary bureau. - Separate secretary bureaus with at least one modular furniture unit between bureaus to provide adequate elbow room.

3.3.3 **Single Staterooms for Mid-Size and Large Surface Ships** (Figure 3-3, Modular Group 1). Arrangement practices for small ship single staterooms apply to mid-size and large ship single staterooms. The secretary bureau is larger as is net walking area.

3.3.4 **Double Staterooms for Mid-Size and Large Surface Ships** (Figure 3-3, Modular Group 3). Arrangement practices for small ship double staterooms apply to mid-size and large ship double staterooms. The secretary bureaus are larger as is net walking area.

3.3.5 **Triple Staterooms for All Surface Ships** (Figure 3-4, Modular Group 7 modified). Arrangement practices for mid-size and large ship double staterooms apply to triple staterooms. The long wardrobe is larger as is net walking area.

3.3.6 **Bunkrooms (ship's company)** (Figure 3-4, Modular Group 7). Arrangement practices for staterooms apply to bunkrooms with the following modifications.

3.3.6.1 Furniture. - Berth and modular furniture unit requirements for 4 and 6-person bunkrooms are double and triple those for double staterooms, respectively, except that bookracks are not installed and only one lavatory is provided for each bunkroom.

3.3.6.2 Functional area separation. - Isolate sleeping area from working area using modular furniture units in order to minimize noise to sleepers.

3.3.7 **Troop Officer Bunkrooms** (Figure 3-5, Modular Group 7). Troop officers are Marines that are riding the ship either in an extended deployment or point-to-point mode. Their mission is usually linked to an amphibious assault. Except for the most senior ranks, extended deployment troop officers are berthed in bunkrooms and are provided with roughly half the modular furniture units that Navy officers get since they have less administrative workload and different uniforms and do not require as much stowage volume. Surge troop officers are provided with a sleeping surface only. All other arrangement practices for bunkrooms apply.

3.3.8 **Department Head Staterooms for Mid-Size and Large Surface Ships** (Figure 3-6, Modular Group 2). Arrangement practices for small ship single staterooms apply to mid-size and large ship department head staterooms with the following modifications.

3.3.8.1 Desk. - Orient desk facing forward or aft and position the bookrack and safe locker over desk, with light mounted under bookrack. Locate the desk close to the transom berth to facilitate group meetings. Provide adequate clearance for chair.

3.3.8.2 Locate transom berth away from passage for noise considerations. Allow adequate clearance for persons seated in the transom berth and for drawers under the berth.

3.3.9 **CO Stateroom/XO Stateroom for Small Surface Ships** (Figure 3-6, Modular Group 2). Arrangement practices for department head staterooms in mid-size and large surface ships apply with the following modifications.

3.3.9.1 Special functions. - These living spaces have the additional functions of being conference rooms. Provide lounge furniture, decorative bulkhead and overhead sheathing, carpeting and a private bath. Also, install a computer workstation, special telephone, and IC service in CO and XO living spaces.

3.3.9.2 Location. - Locate CO living spaces, based on tradition, in the forward deck house, starboard side. Widely separate XO living spaces from CO living spaces and ensure that the XO is readily accessible to the crew.

3.3.10 **XO, Squadron, and Unit Commander Living Spaces On Large Ships** (Figure 3-7, Modular Group 2).

3.3.10.1 Living spaces typically include a stateroom, cabin, and private bath. Install carpet and bulkhead and overhead sheathing throughout these spaces.

3.3.10.2 Stateroom. - Includes bed, night table, and lounge chair, in addition to Modular Group 2. Provide curtains at fixed port light and airports.

3.3.10.3 Cabin. - Includes conference table, executive desk, computer workstation, television, and lounge furniture. Orient tables and desk with long axis athwartship. Orient lounge furniture to best suit the arrangement.

3.3.11 **CO Sea Cabin** (Figure 3-6). Sea cabins are scaled down versions of senior officer staterooms. Sheathing and carpet may be installed. Sanitary fixtures including the lavatory and toilet may be within the sea cabin. All arrangement practices for department head staterooms apply to sea cabins.

3.3.12 **CO/Flag Living Spaces on Large Ships** (Figure 3-8, Modular Group 5).

3.3.12.1 CO/Flag living spaces on large ships typically include a stateroom, cabin, and private bath. They also include a separate galley or pantry adjacent to the cabin. This ensures provision for private dining and conferences. Size spaces and select furnishings appropriate to the rank and responsibilities of these individuals. Install carpet and bulkhead and overhead sheathing throughout these spaces. Although typical orientations are shown for all furnishings in

Figure 3-8, the negative effects of ship motion are so small in large ships that any orientation is acceptable.

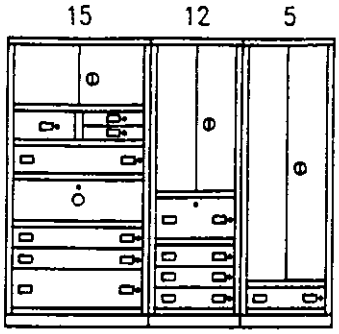
3.3.12.2 Stateroom. - includes bed, night tables and lounge chair in addition to Modular Group 5. Provide curtains at fixed port lights and airports.

3.3.12.3 Cabin. - includes dining/conference table, sideboard, executive desk, computer workstation, television, and lounge furniture. Orient tables and desk with long axis athwartship. Orient lounge furniture to best suit the space configuration.

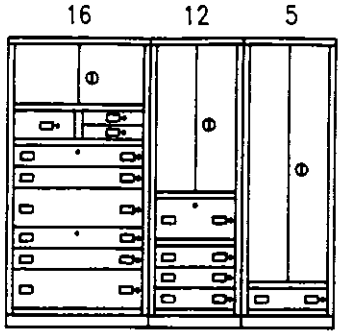
3.4 Arrangement Practices for Submarines (Figure 3-9).

3.4.1 **Living Spaces.** In submarines, habitability area and volume is greatly reduced due to the necessity of maximizing use of available space. Provide the CO with a single stateroom (no cabin). Berth the XO in a double stateroom. Berth all other officers in triple staterooms with three-high berths.

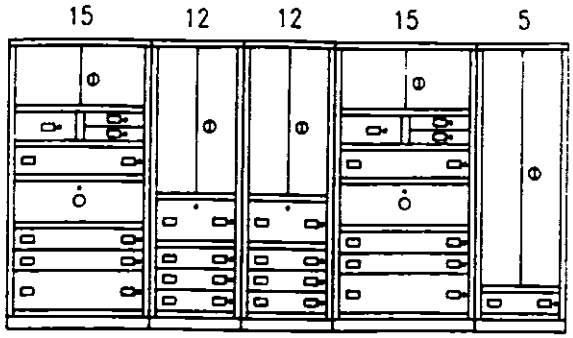
3.4.2 **Built-in Furnishings.** Furnishings for submarine officer living spaces are frequently built-in to suit available space and designed to just meet their reduced set of standards for drawer and locker volume, and hanging space. Many units, such as secretary bureaus and wardrobes are shared. Furniture orientation in submarines is not critical due to the greater stability of the platform underwater.



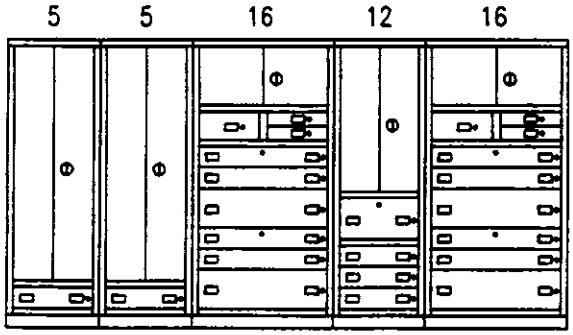
GROUP 1
SINGLE STATEROOM



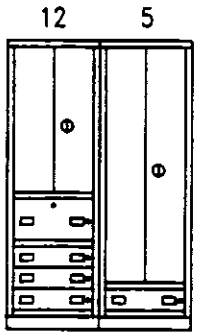
GROUP 2
SINGLE STATEROOM



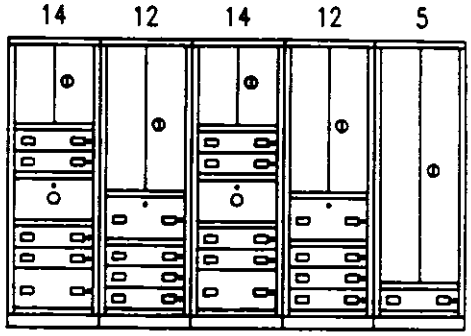
GROUP 3
DOUBLE STATEROOM



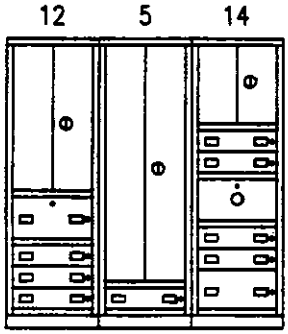
GROUP 5
SINGLE STATEROOM



GROUP 6
SEA CABIN



GROUP 7
DOUBLE STATEROOM

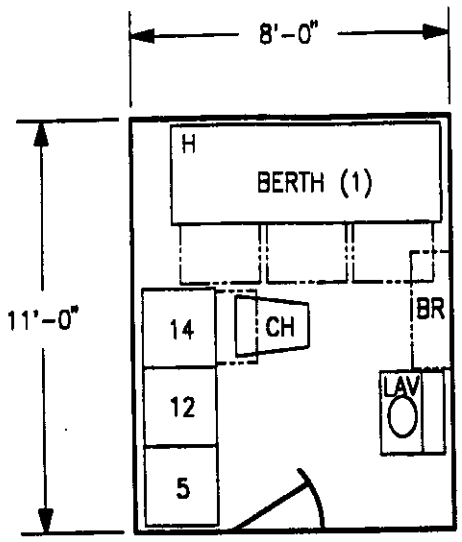


GROUP 8
SINGLE STATEROOM

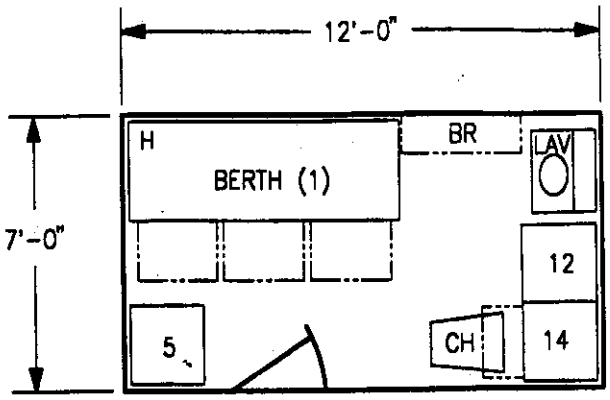
MOD GR	MODULAR UNITS	DWR VOL CU FT	LKR VOL CU FT	HANGING INCHES
1	5–12–15	16.8	8.0	24L/24S
2	5–12–16	22.1	7.1	24L/24S
3	5–12–12–15–15	32.7	16.0	24L/48S
5	5–5–12–16–16	40.0	14.2	48L/24S
6	5–12	5.1	0	24L/24S
7	5–12–12–14–14	24.1	11.0	24L/48S
8	5–12–14	12.5	5.5	24L/24S

MOD UNIT	TITLE	WIDTH INCHES	DWR VOL CU FT	LKR VOL CU FT	HANGING INCHES	NAVSEA DWG NO.
5	WARDROBE LONG	24	0.9	0	24 LONG	805–1622993
12	WARDROBE AND FILE SECT	24	4.2	0	24 SHORT	805–1636403
14	SECRETARY BUREAU	24	7.4	5.5	0	805–1636410
15	SECRETARY BUREAU	36	11.7	8.0	0	805–1637639
16	DRAWER, LOCKER SECT	36	17.0	7.1	0	805–1637670

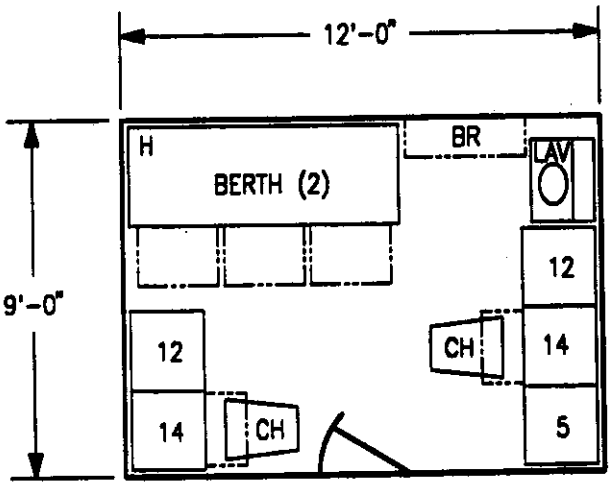
FIGURE 3–1
MODULAR FURNITURE GROUPS



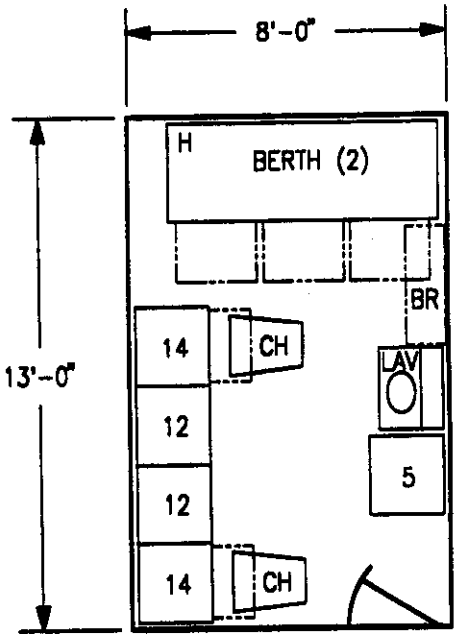
SINGLE STATEROOM
MODULAR GROUP 8
84 SQ FT GROSS AREA



SINGLE STATEROOM
MODULAR GROUP 8
84 SQ FT GROSS AREA

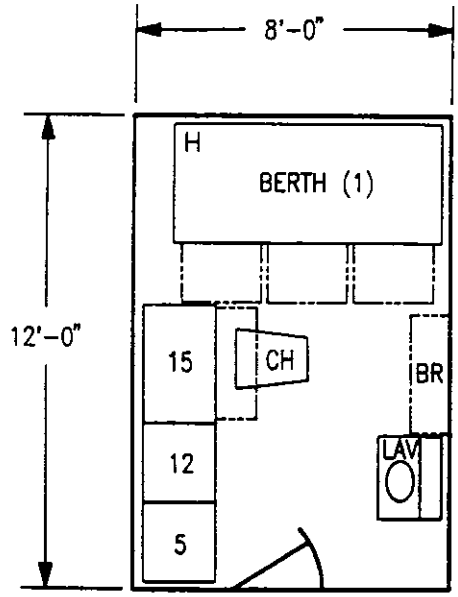


DOUBLE STATEROOM
MODULAR GROUP 7
108 SQ FT GROSS AREA

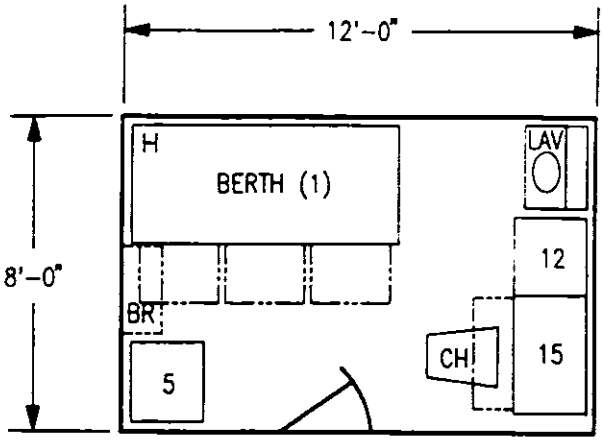


DOUBLE STATEROOM
MODULAR GROUP 7
104 SQ FT GROSS AREA

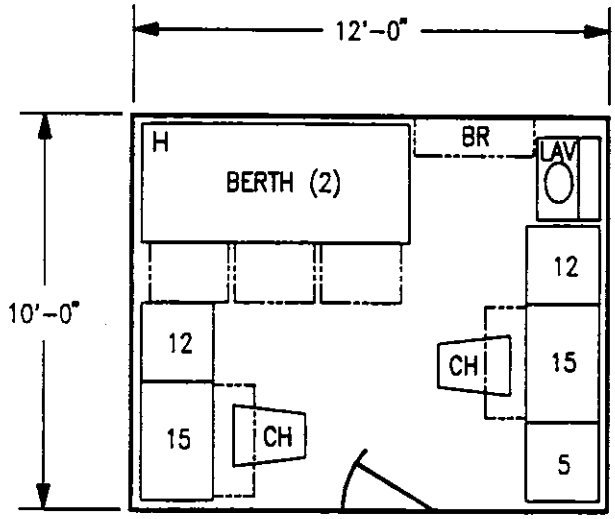
FIGURE 3-2
TYPICAL SINGLE AND DOUBLE
STATEROOM ARRANGEMENTS



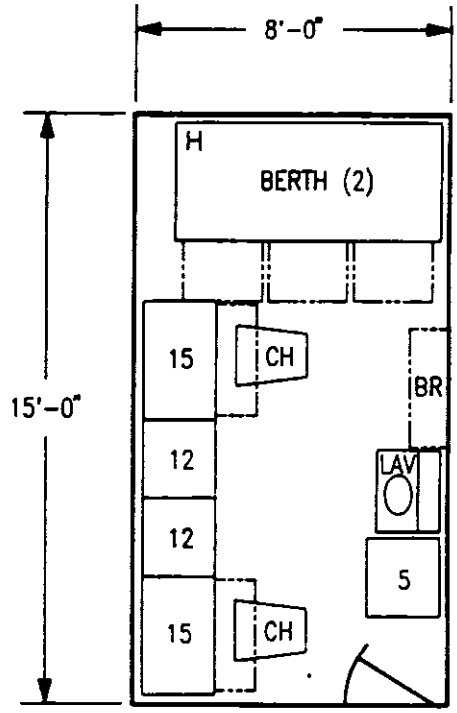
SINGLE STATEROOM
MODULAR GROUP 1
96 SQ FT GROSS AREA



SINGLE STATEROOM
MODULAR GROUP 1
96 SQ FT GROSS AREA

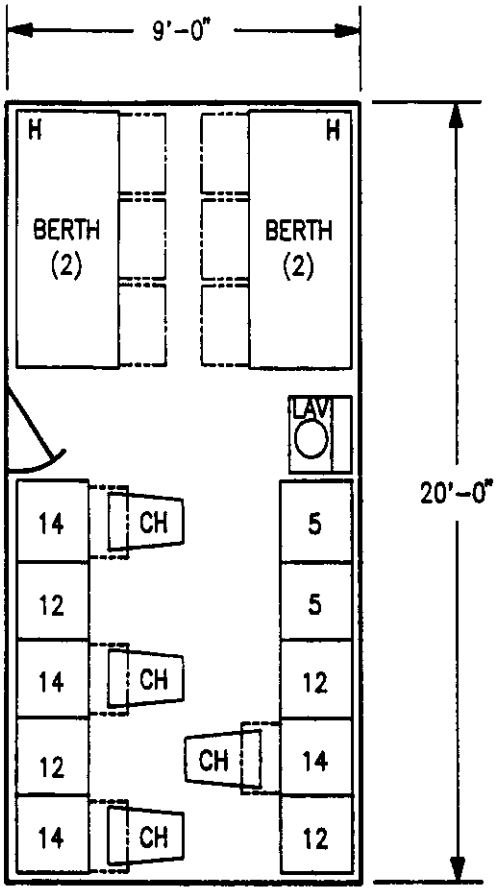


DOUBLE STATEROOM
MODULAR GROUP 3
120 SQ FT GROSS AREA

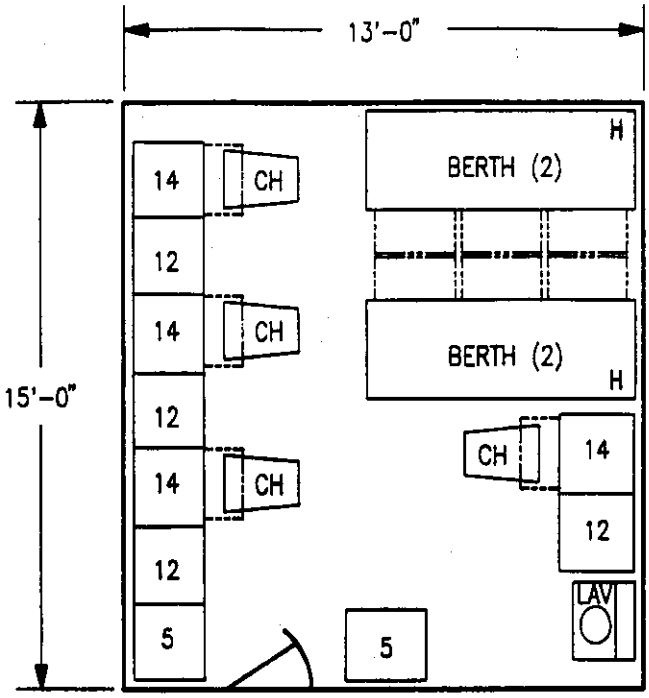


DOUBLE STATEROOM
MODULAR GROUP 3
120 SQ FT GROSS AREA

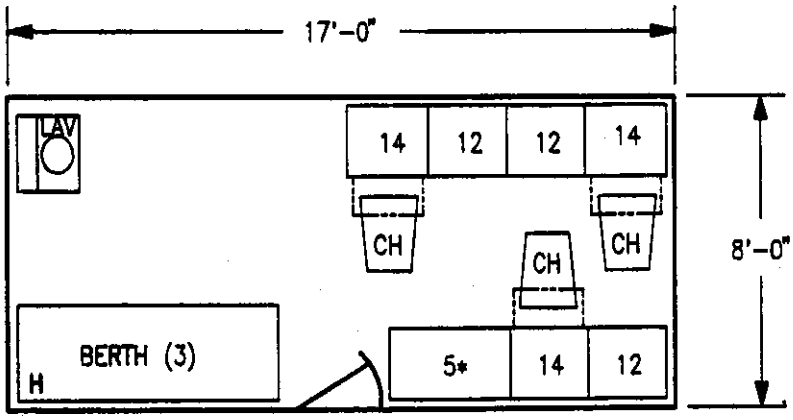
FIGURE 3-3
TYPICAL SINGLE AND DOUBLE
STATEROOM ARRANGEMENTS



4 PERSON BUNKROOM
MODULAR GROUP 7
180 SQ FT GROSS AREA

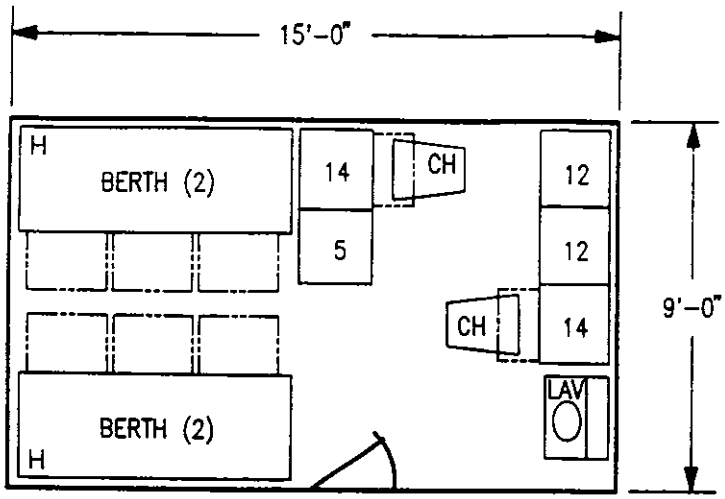


4 PERSON BUNKROOM
MODULAR GROUP 7
195 SQ FT GROSS AREA

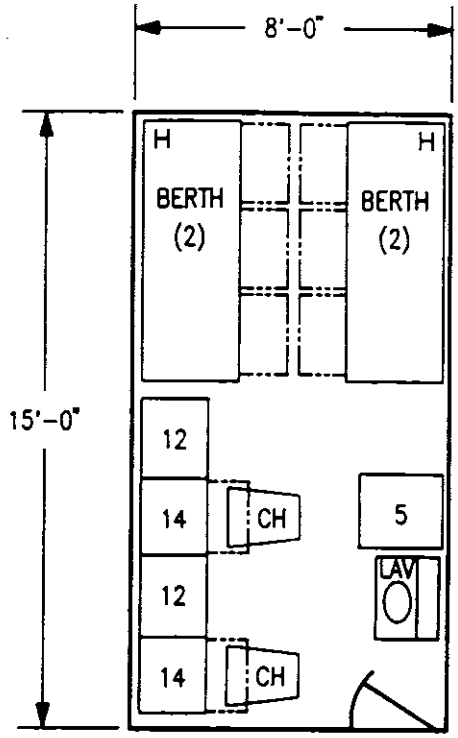


TRIPLE STATEROOM
MODULAR GROUP 7 MODIFIED
136 SQ FT GROSS AREA
*UNIT 5 MODIFIED TO 36 INCHES WIDE

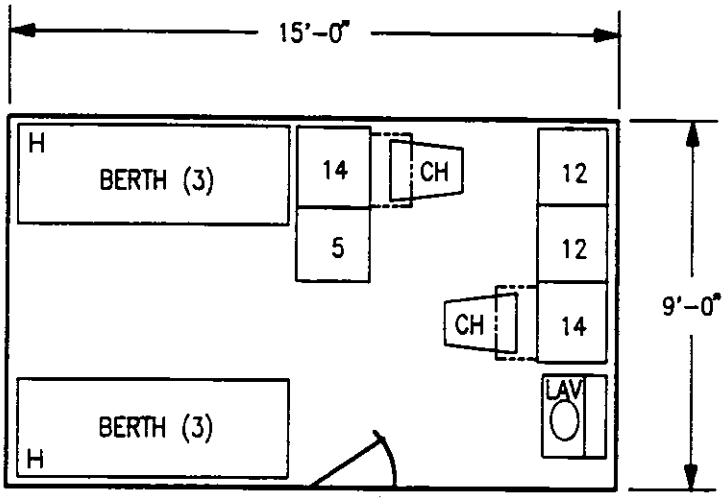
FIGURE 3-4
TYPICAL TRIPLE STATEROOM AND BUNKROOM ARRANGEMENTS



4 PERSON BUNKROOM
MODULAR GROUP 7
135 SQ FT GROSS AREA



4 PERSON BUNKROOM
MODULAR GROUP 7
124 SQ FT GROSS AREA



4 PERSON BUNKROOM
PLUS 2 SURGE
MODULAR GROUP 7
135 SQ FT GROSS AREA

FIGURE 3-5
TYPICAL TROOP OFFICER
BUNKROOM ARRANGEMENTS

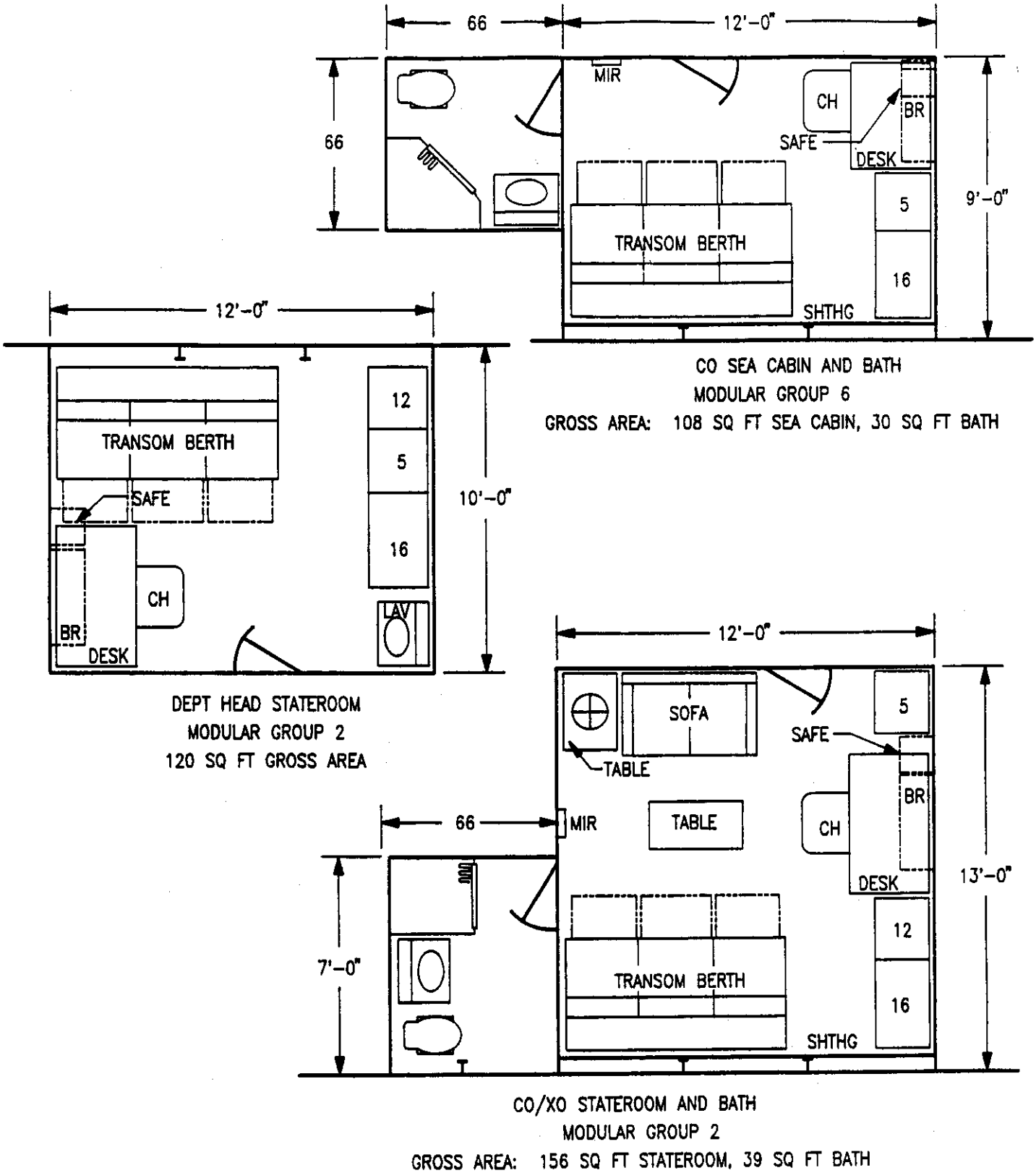
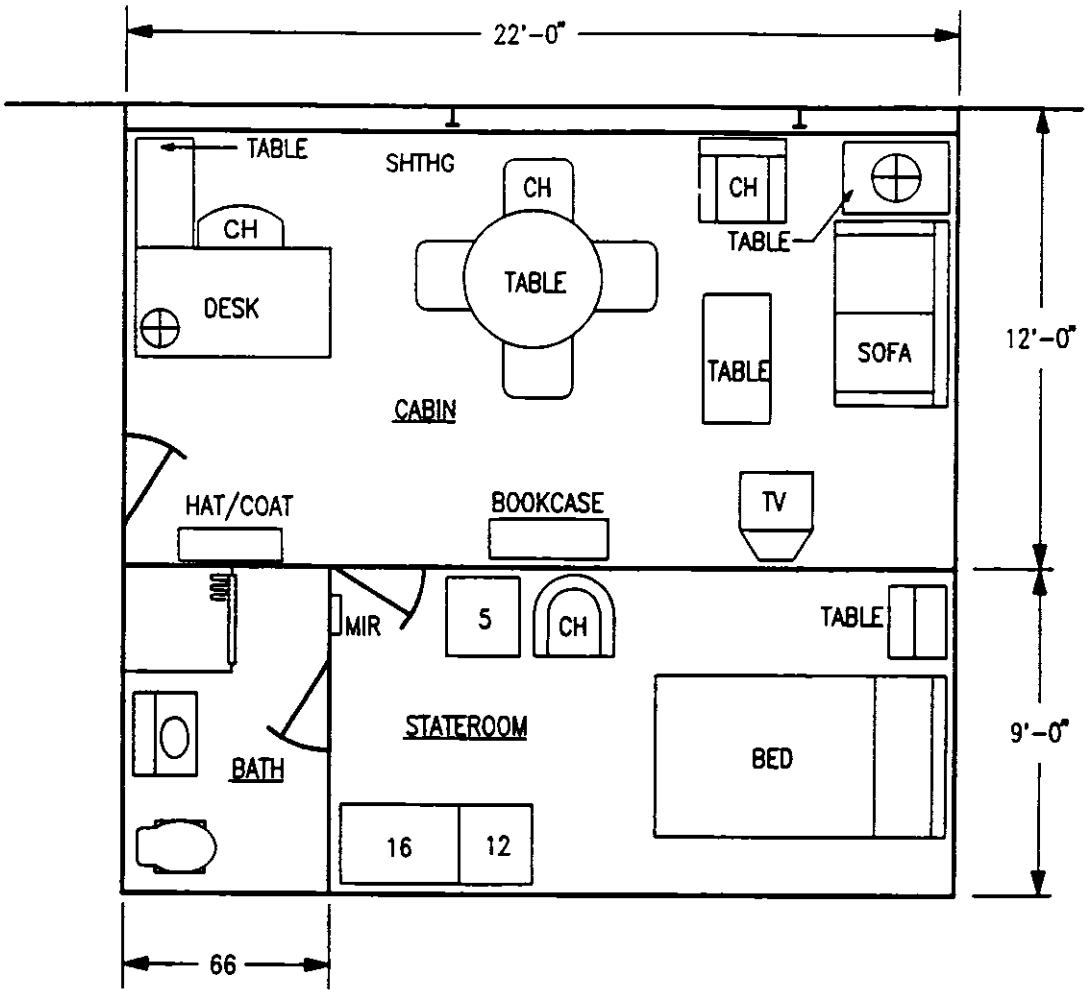
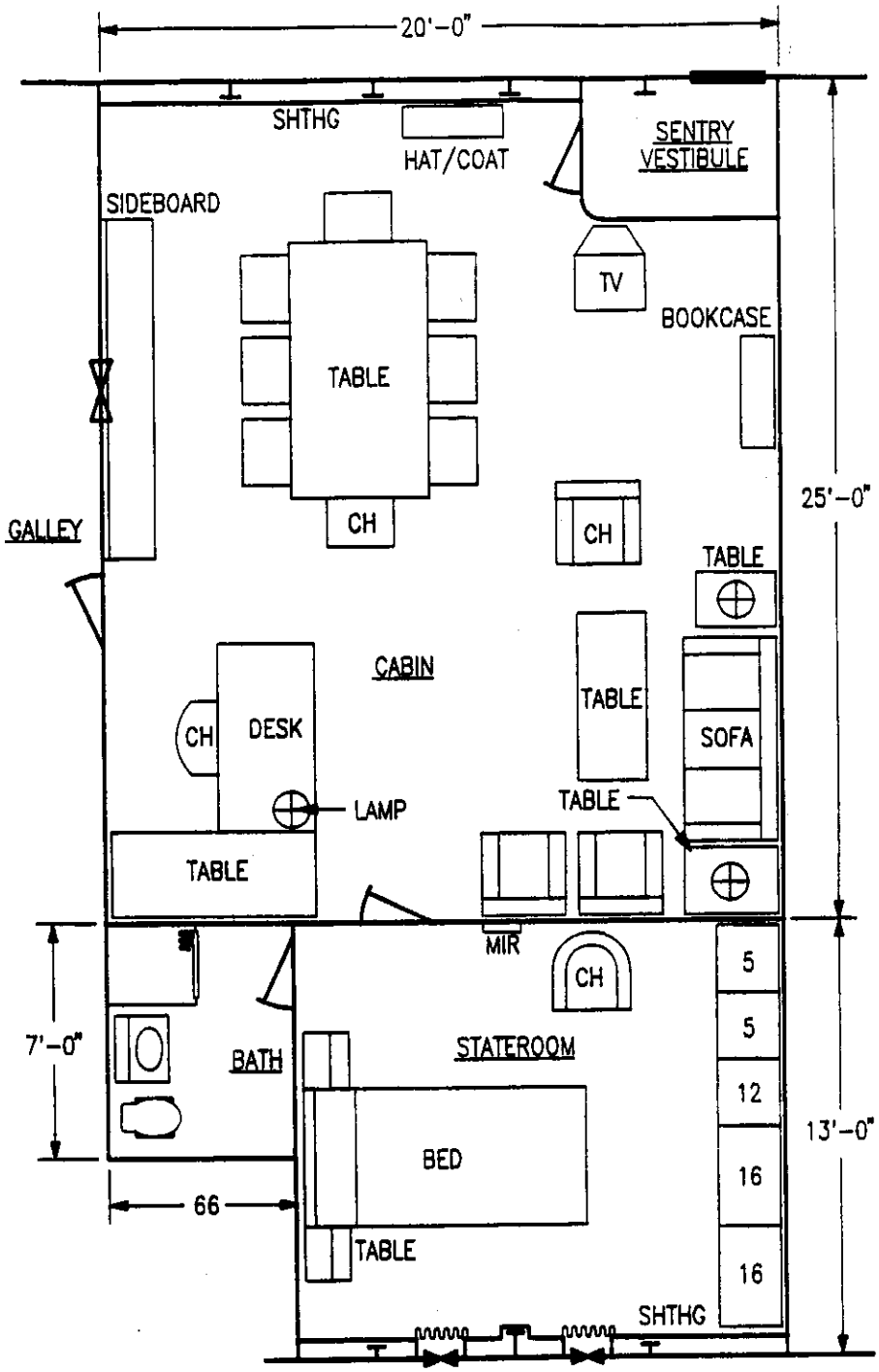


FIGURE 3-6
TYPICAL SENIOR OFFICER LIVING
SPACES ON SURFACE SHIPS



XO, SQUADRON, AND UNIT COMMANDER CABIN, STATEROOM, AND BATH
MODULAR GROUP 2
GROSS AREA: 136 SQ FT STATEROOM, 255 SQ FT CABIN, 46 SQ FT BATH

FIGURE 3-7
TYPICAL EXECUTIVE OFFICER, SQUADRON, AND
UNIT COMMANDER LIVING SPACES



CO/FLAG CABIN, STATEROOM, AND BATH
MODULAR GROUP 5
GROSS AREA: 500 SQ FT CABIN, 189 SQ FT STATEROOM, 39 SQ FT BATH

FIGURE 3-8
TYPICAL CO/FLAG LIVING SPACES

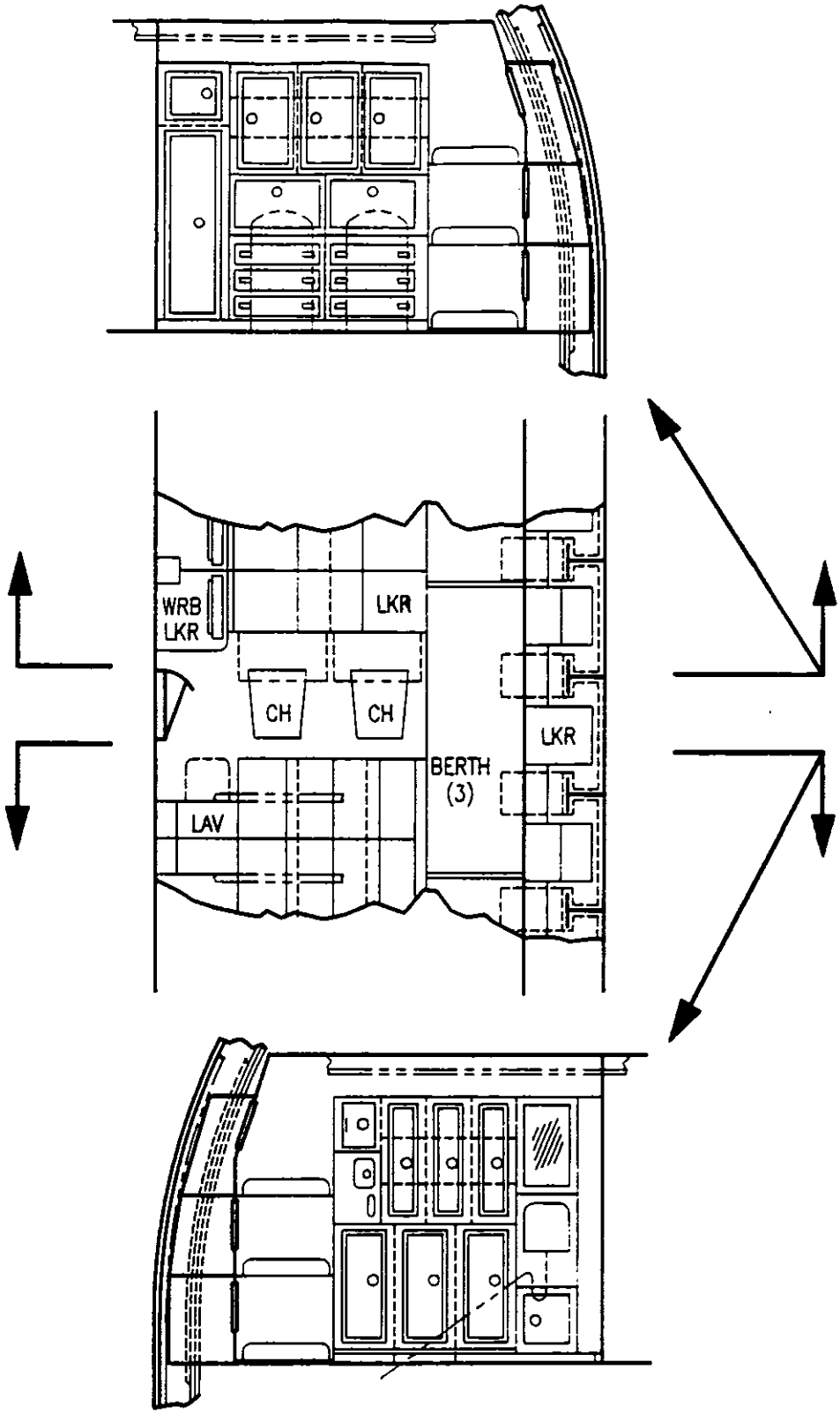


FIGURE 3-9
TYPICAL SUBMARINE OFFICER LIVING SPACES

4.0 CHIEF PETTY OFFICER (CPO) AND SENIOR STAFF NONCOMMISSIONED OFFICER (SSNCO) LIVING SPACES

4.1 General.

4.1.1 Ratings. CPOs and SSNCOs are enlisted rates E7-E9.

4.1.2 Number. CPOs typically constitute 6-10 percent of total ship's company accommodations. SSNCOs typically constitute 3-7 percent of total Marine detachment. CPO and SSNCO living spaces can vary in number of spaces per ship and number of accommodations per space depending on ship type.

4.1.3 Location.

4.1.3.1 Living spaces. - Berth CPOs and SSNCOs separately from other enlisted personnel. Berth female CPOs separately from their male counterparts. Where practical, locate CPO living spaces on the second deck, or above, and adjacent to their messroom and lounge facilities. In surface combatants, divide CPO accommodations fore and aft for better survivability.

4.1.3.2 Access. - Provide at least two means of egress in living spaces with 21 or more personnel. Ensure that these accesses are widely separated. On ships with both males and females, provide privacy partitions or curtains around entrance doors to living spaces that are accessed from passages. Provide direct access between living and associated sanitary spaces.

4.1.4 Enlisted Rates - E7 to E9.

Ship's company
Staff (Flag, Group, Squadron, Unit)
Detachments (Air Wing, Helo, Marines)
Troops (SSNCO)

4.1.5 Functions.

Sleeping
Dressing
Personal stowage
Recreation
General quarters station for SSNCO

4.1.6 Related Spaces.

Sanitary spaces (community)
Messrooms and lounges
Baggage stowage
Cleaning gear lockers
Passages

4.2 **Outfit and Furnishings** (surface ships).

4.2.1 **Berth Cubicles.** Subdivide living spaces using berths and personal stowage lockers to form cubicles of not more than six persons per cubicle. The cubicle concept maximizes habitability features such as privacy, access to and security for personal belongings, and reduction of noise and light within a minimum amount of area. Ensure that an HVAC exhaust terminal is installed within each cubicle. Lockers shall not be installed within the berth cubicle. Berths may be either 2 or 3 high. Compartment configuration and space available will be the determining factors in selecting 2 or 3-high berths; but, ensure that all cubicles within a space and all spaces within a ship are consistent in so far as is practical.

4.2.1.1 Two-high berth cubicles (Figure 4-1).

4.2.1.1.1 Berths. - Select locker type berths containing 10 cu. ft. of stowage volume under the sleeping surface. Additional features and accessories include:

Built-in curtain/grab bar assembly
Built-in magazine rack, towel bar, and robe hooks
Built-in small security locker for valuables
Built-in step for climbing into upper berth
EEBD stowage integral with berth
Emergency escape kick-out panel
Individually controlled ventilation fan pulling air into the berth. Provide only where HVAC terminal is not provided within the berth cbicle during a rearrangement project.
Lee strap for retaining occupant in rough weather (for small ships only)
Light located at the head end for reading/writing
Mattress, 28 inches wide, 4 inches thick, and 76 inches long (except that 10 percent of berths are sized for 80-inch long mattresses)
Privacy curtain in two sections along the accessible side
Privacy partitions on the other three sides except where adjoining a bulkhead, shell, or other structure that provides equivalent privacy
Provision for deck mounting (bottom berth can be made removable where berth is located over a manhole or other access fittings)

4.2.1.1.2 Locker. - Provide a clothing locker for each accommodation. Locker features include:

6-inches long hanging space
12-inches short hanging space
4-cu. ft. stowage volume

Where 15 or more inches of usable space is available above tops of lockers, provide additional built-in stowage.

4.2.1.2 Three-high berth cubicles (Figure 4-2).

4.2.1.2.1 Berths. - Select pan type berths without stowage under the sleeping surface. All other berth features and accessories are similar to 2-high berths, except EEBD stowage and security locker are not integral with the pan berth.

4.2.1.2.2 Lockers. - Provide a clothing locker for each accommodation. Locker features include:

6-inches long hanging space
12-inches short hanging space
14-cu. ft. stowage volume

Where 15 or more inches of usable space is available above the tops of lockers, provide additional built-in stowage.

4.2.2 **Accessory Furnishings.**

Bulletin board
Chairs
Coat hooks
Drinking fountain
Iron and ironing board
Locker, soiled clothes
Mailbox
Mirror, full length
Mirror, standard
Table with game top
Television support

4.3 Arrangement Practices for Surface Ships.

4.3.1 **CPO Living Spaces** (Figure 4-3).

4.3.1.1 Cubicles. - Subdivide compartments into cubicles. Ensure that each cubicle contains not more than six persons. Main passages serving the cubicles must be not less than 36 inches wide.

4.3.1.2 Berths. - Locate berths away from main passages, sanitary spaces, ladders, recreation areas, and other noise sources. Locate heads of berths away from cubicle entrances. Orient berths primarily longitudinally; however athwartships orientation may be used for up to 30 percent of berths within a space where compartment arrangement is improved. In living spaces with 15 or more persons, 10 percent of berth tiers shall be sized to fit an 80-inch long mattress. All other berth tiers shall accommodate a 76-inch long mattress.

4.3.1.3 Shell. - To the extent practical, avoid locating berths and lockers along the shell in order to have better access to shell structure and damage control distributive systems.

4.3.1.4 Soiled clothes. - Place soiled clothes locker next to the sanitary space to take advantage of the negative air pressure within the head which will help control odors.

4.3.1.5 Installation. - Position deck mounted furniture about 1-inch from bulkheads to ensure adequate clearance for welding. Group like furniture together as much as possible to simplify foundations and minimize deck covering cutouts.

4.3.1.6 Accessories. - Locate mirrors, drinking fountain, watch quarter and station bill panel, and iron and ironing board outside of cubicles in places where their use does not cause personnel traffic congestion. Locate the full length mirror near the primary compartment access.

4.3.1.7 Recreation. - Recreation spaces should be separate from living spaces; however, recreation areas that are located within living spaces should be adjacent to the sanitary space. This will help group potentially noisy areas and provide a waiting area for personnel during high use periods for the head. Configure recreation areas to permit easy conversion to berthing should additional accommodations be required in wartime. Use partitions and/or lockers to help isolate recreation areas from sleeping areas. Ensure that recreation areas have separate lighting circuits from berthing cubicles.

4.3.1.8 Sanitary space. - Where the access to the sanitary space is from within the living space, position the access so that a person entering the living space does not have to traverse a sleeping area to use the head.

4.3.1.9 Fan coil assemblies. - Where practicable, locate fan coil assemblies outside of living spaces. Where fan coil assemblies must be located within living spaces, position them away from sleeping areas. Ensure that adequate clearance is provided for servicing filters.

4.3.1.10 Accesses. - Enclose ladders entering living spaces and those that lead to other spaces above or below the living spaces, in order to provide privacy, to reduce noise, and to contain smoke in the event of a fire.

4.3.1.11 Sheathing. - Decorative sheathing or carpet is not authorized.

4.3.2 **Master CPO stateroom** (Figure 4-3). - The Master CPO is the highest rated CPO. Provide the Master CPO with a small single stateroom adjacent to the CPO living space. A lavatory is provided within this stateroom. The Master CPO stateroom performs traditional stateroom functions, such as office and conference room. Arrangement practices for small single staterooms (see chapter 3.3.1) apply to the Master CPO stateroom.

4.3.3 **SSNCO Living Spaces.** SSNCOs are Marines that are riding the ship either in an extended deployment mode or in a point-to-point mode. Their mission is usually linked to an amphibious assault. Extended deployment SSNCOs are considered accommodations and are fully supported in terms of sanitary fixtures, food service facilities, provisions, potable water, and all other habitability considerations. Surge SSNCOs are unsupported except for a berth. Arrangement practices for CPO living spaces apply, with the following modifications.

4.3.3.1 Extended deployment SSNCO living spaces (Figure 4-4). - Provide SSNCOs with living spaces that are separate from CPO living spaces. SSNCOs have different stowage requirements than CPOs and receive different outfit and furnishings including stowage for field packs. Location of field pack stowage is dependent upon the ship mission; therefore, should be coordinated with the Marines during the design process. Ensure that furnishings for SSNCO spaces are shock qualified since these spaces are occupied during general quarters.

4.3.3.2 Surge SSNCO living spaces. - Berth surge SSNCOs in multipurpose spaces that can function as recreation spaces or areas for extended deployment SSNCOs when surge are not on board. Ensure that these spaces are convertible from one arrangement mode to the other within 48 hours by ship's force. Select berths, recreation tables, and chairs that can alternate between stowed and installed configurations depending on which arrangement mode is in effect. Stowage for alternative mode equipment shall be located in the space and configured to least conflict with whatever mode is in effect. The stowage area shall serve as a common stowage area for equipment not in use. Do not use the cubicle concept for surge. Permanently installed lockers shall be in locations that do not interfere with either arrangement mode. Since surge SSNCOs are on board for only short periods of time, they are provided fewer habitability considerations than their extended deployment counterparts. These spaces shall be provided with a conversion diagram showing the arrangement of furniture and equipment in each functional mode, including instructions for installation and stowage. The conversion diagram shall be installed in an unobstructed location within the space. Figure 5-4 of Chapter 5 shows an arrangement of a surge troop living space. Similar arrangement practices apply to surge SSNCO living spaces.

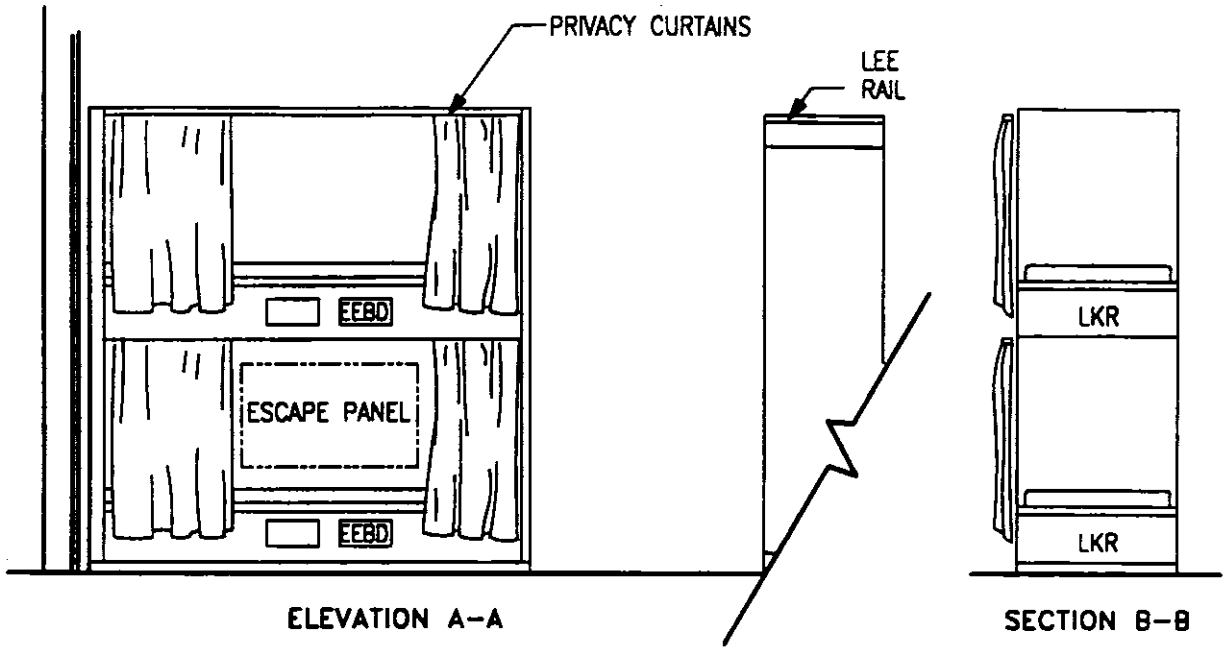
4.3.4 **Sergeant Major Stateroom** (Figure 4-4). The Sergeant Major is the top NCO of a Marine detachment. Provide the Sergeant Major with a small single stateroom adjacent to the enlisted Marine detachment living space. A lavatory is provided within this stateroom. The Sergeant Major's stateroom performs traditional stateroom functions such as office and conference room. Arrangement practices for small single staterooms apply to the Sergeant Major stateroom.

4.4 Arrangement Practices for Submarines (Figure 4-5).

4.4.1 **Living Space.** In submarines, habitability area and volume is greatly reduced due to the necessity of maximizing use of available space. Berth CPO in a living space as in surface ships. Surface ship arrangement practices apply; however, cubicle size usually exceeds six persons and less area per person is provided than on surface ships.

4.4.2 **Furnishings.** Furnishings for CPO living spaces are frequently built-in to suit available space and designed to just meet the standards for stowage volume and hanging space. Berths are three high with the lower two having lockers under the sleeping surfaces. Many lockers are community type with shared ownership of the stowage volume. Minimum personal stowage volumes per person are as follows:

6-inches hanging space
4-cu. ft. drawer volume
6-cu. ft. locker volume



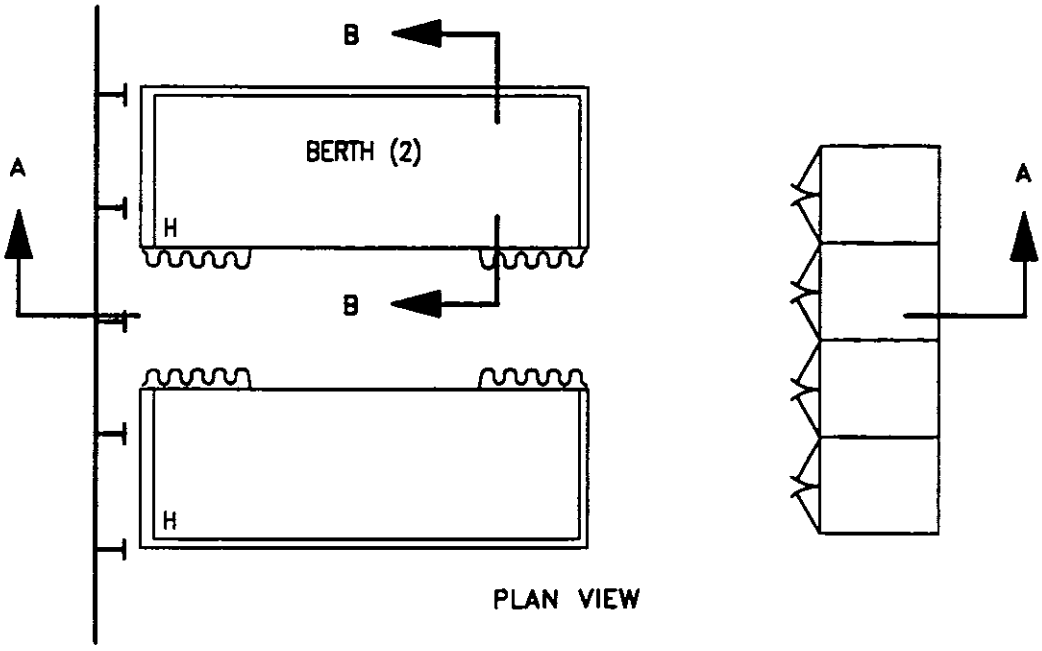


FIGURE 4-1
CPO BERTHING – 2 HIGH
TYPICAL FOUR PERSON CUBICLE

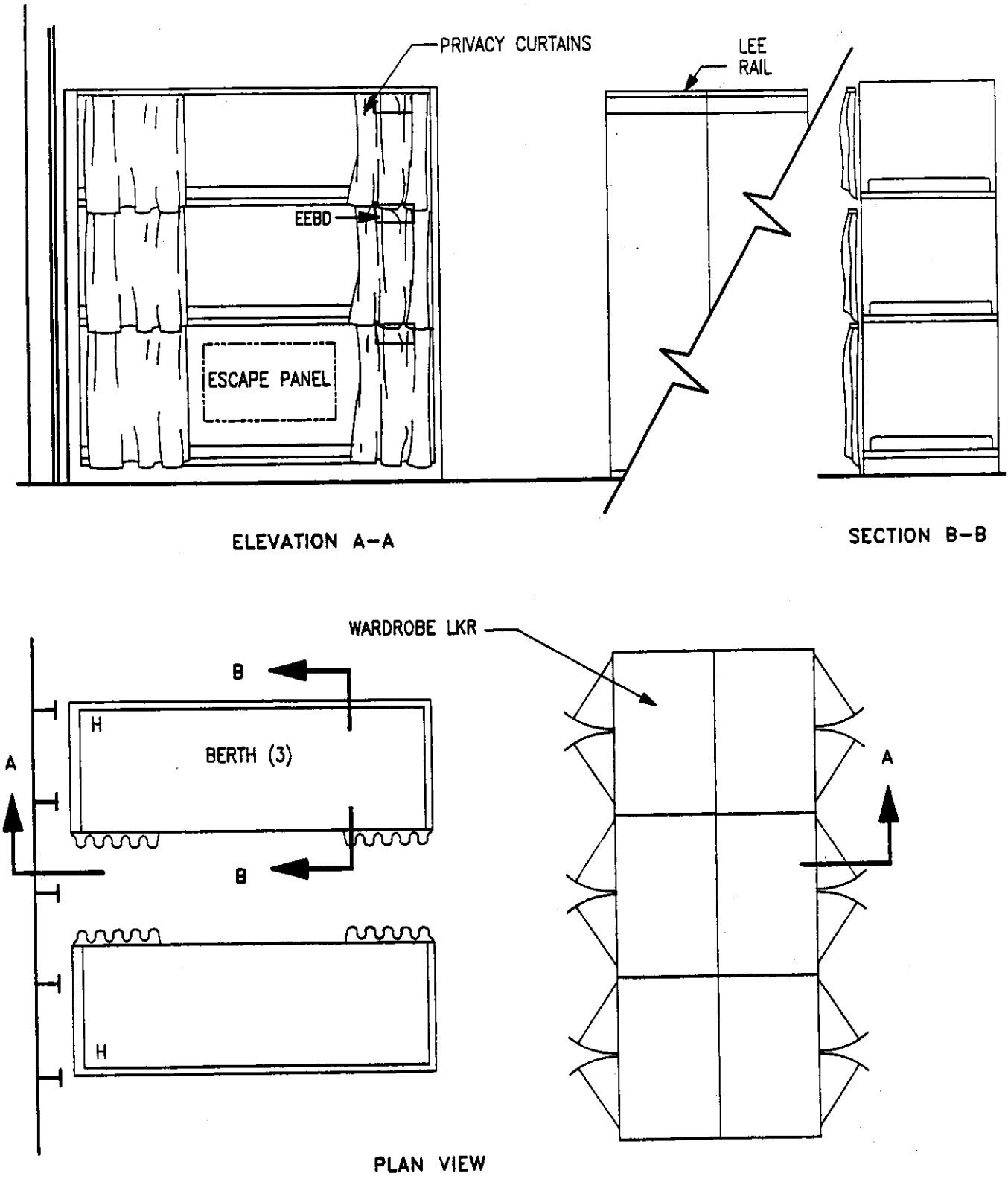
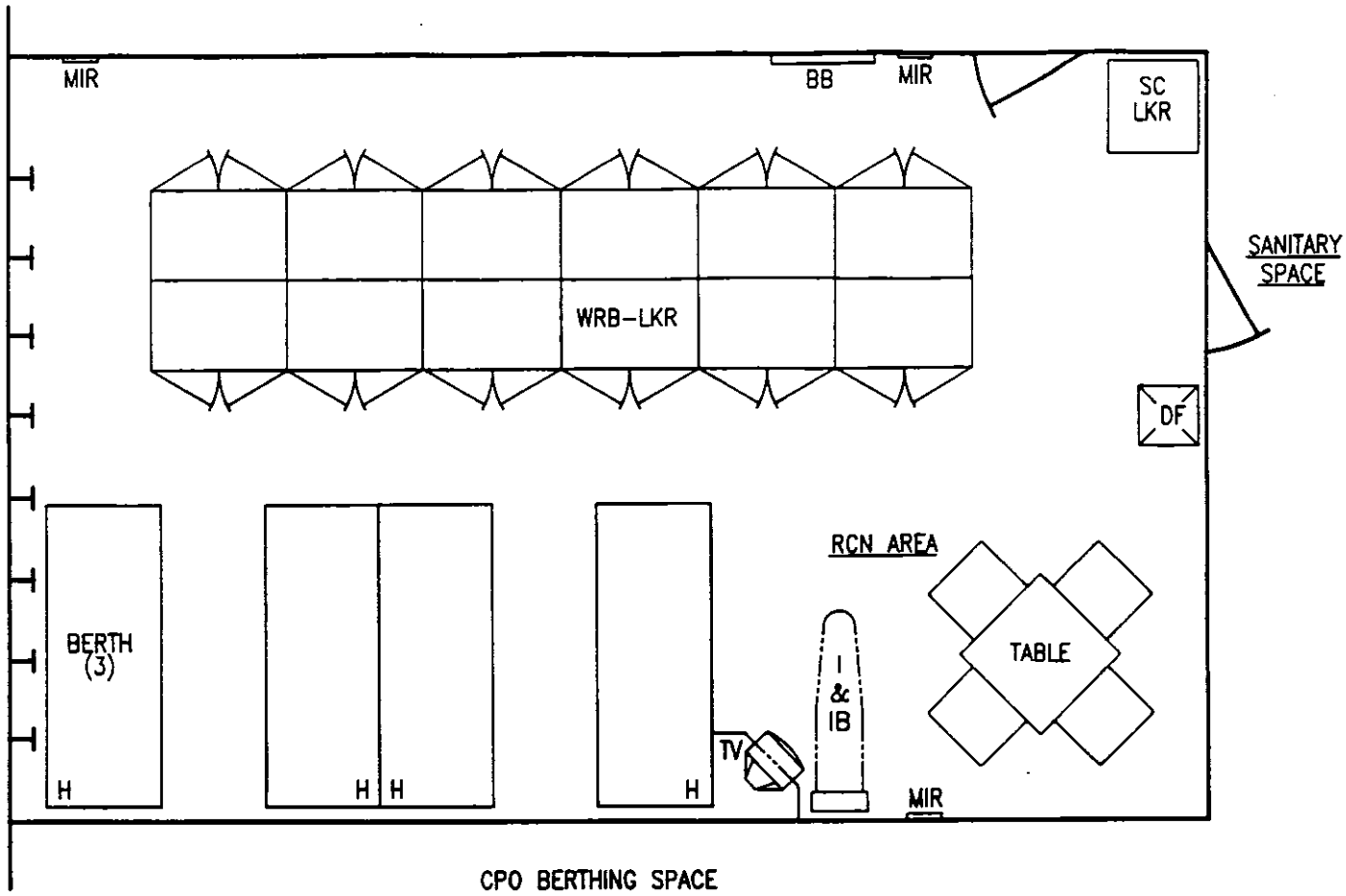
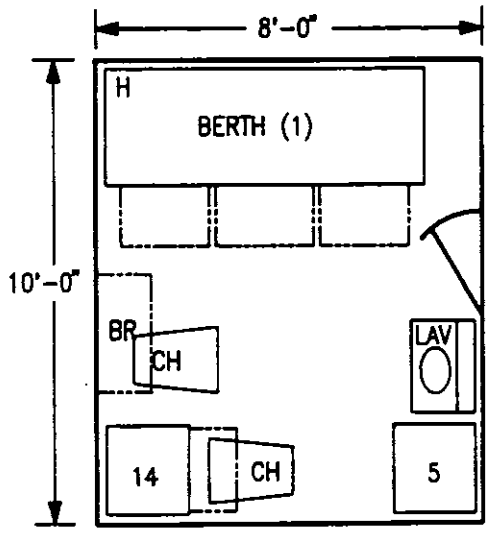


FIGURE 4–2
CPO BERTHING – 3 HIGH
TYPICAL SIX PERSON CUBICLE

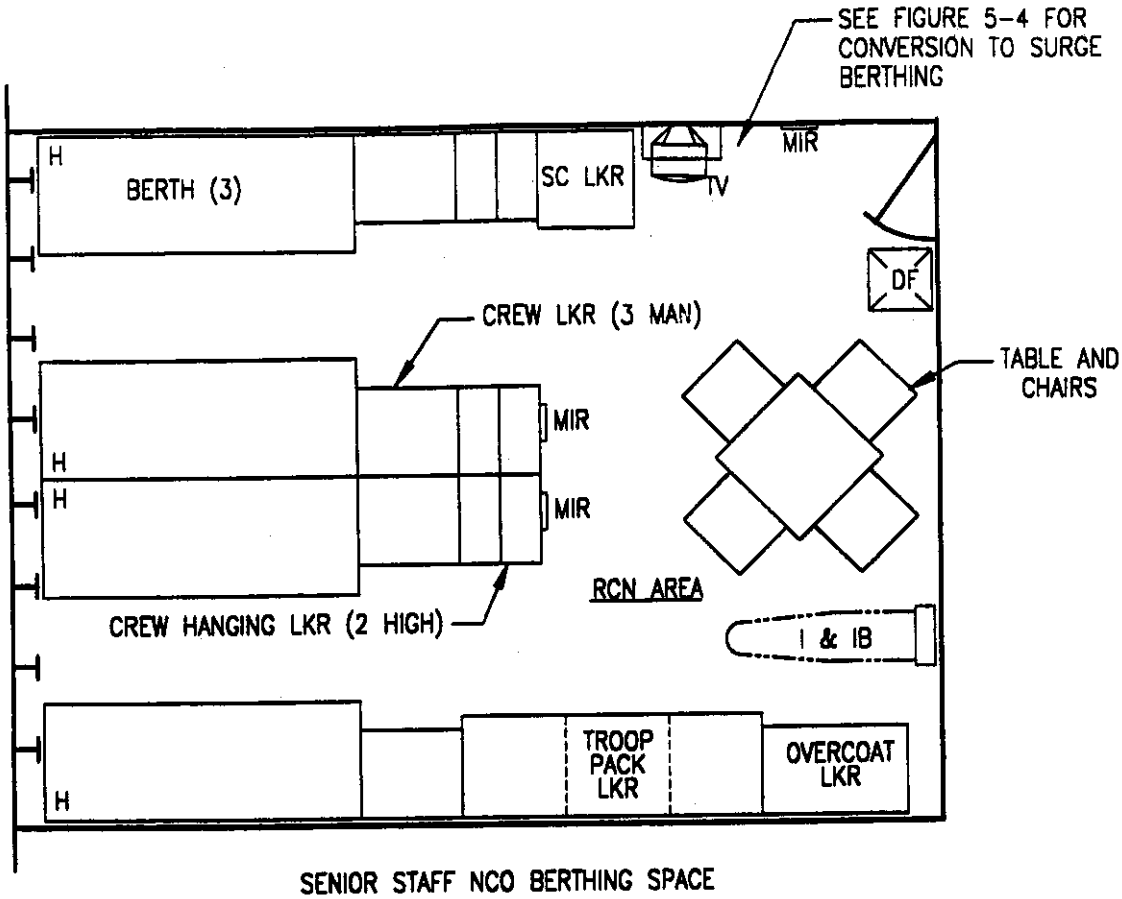


CPO BERTHING SPACE
12 CPO

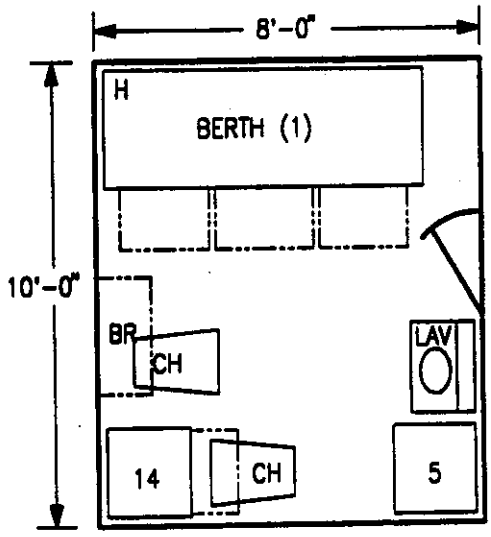


MASTER CPO STATEROOM

FIGURE 4-3
TYPICAL CPO LIVING SPACES



SENIOR STAFF NCO BERTHING SPACE
12 SNCO



SERGEANT MAJOR STATEROOM

FIGURE 4-4
TYPICAL SENIOR STAFF NCO LIVING SPACES

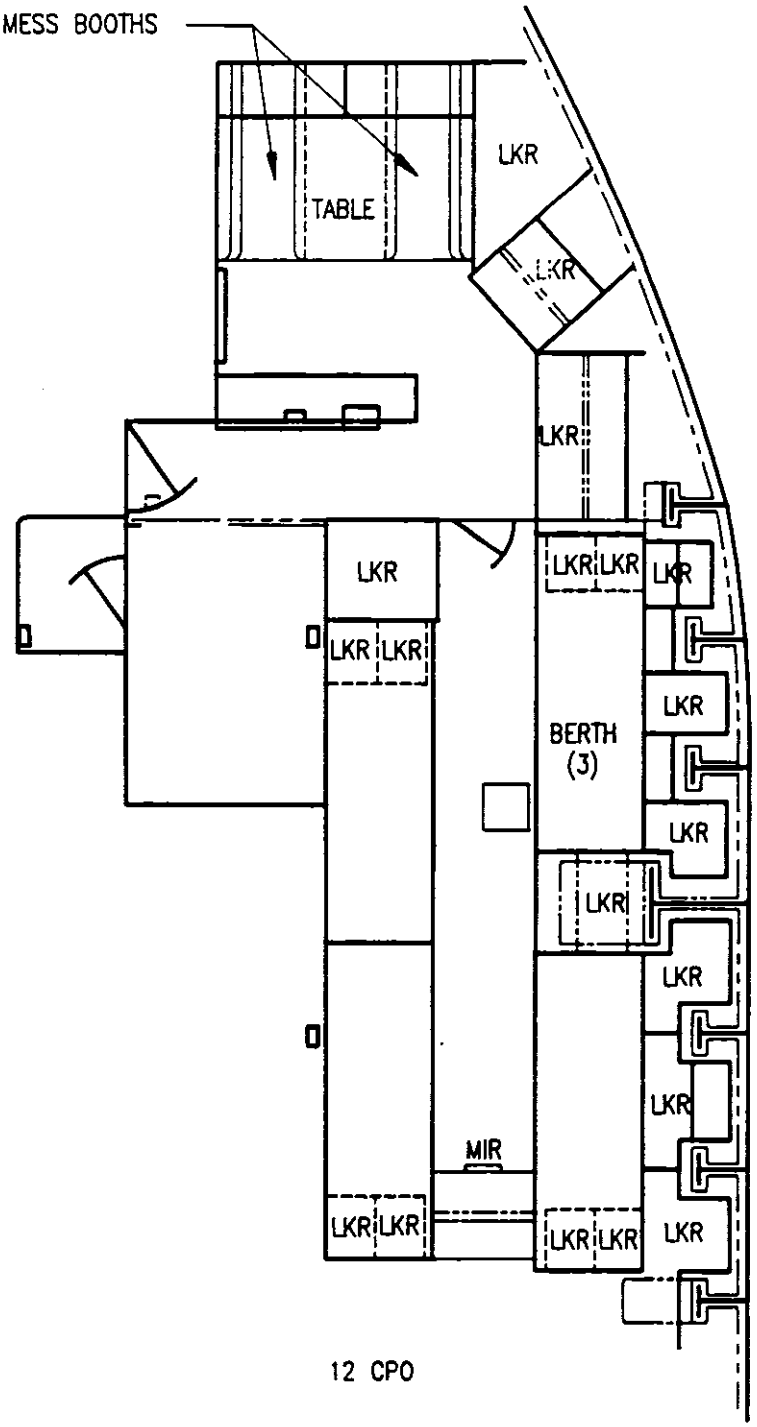


FIGURE 4-5
TYPICAL SUBMARINE CPO LIVING SPACE

5.0 CREW AND TROOP LIVING SPACES

5.1 General.

5.1.1 **Ratings.** The crew and troops are enlisted rates E1-E6.

5.1.2 **Number.** The crew typically constitute 80-88 percent of total ship's company accommodations. Troops typically constitute 83-91 percent of total Marine detachment. Crew and troop living spaces can vary in number of spaces per ship and number of accommodations per space depending on ship type.

5.1.3 **Distribution.** Ships prefer to berth crew personnel by division; however, general arrangement constraints usually preclude sizing living spaces to match divisional manning. A reasonable tradeoff is to avoid having large sized spaces and instead provide a mix of mid and small sized spaces evenly distributed throughout the ship.

5.1.4 **Location.**

5.1.4.1 Crew Living Spaces. - Berth crew as high up and near to amidships as is practicable. However, due to the large number of crew that must be accommodated, optimum locations for living spaces are not always available. Berth female crew members separately from their male counterparts. In surface combatants, divide crew accommodations fore and aft for better survivability.

5.1.4.2 Troop Living Spaces. - Berth troops to facilitate access to debarkation points. On ships designated as primary and secondary casualty receiving and treatment ships, berth troops adjacent to the medical ward to provide for casualty overflow berthing.

5.1.4.3 Access. - Provide at least two means of egress in living spaces with 21 or more personnel. Ensure that these accesses are widely separated. On ships with both males and females, provide privacy partitions or curtains around entrance doors to living spaces that are accessed from passages. Provide direct access between living and associated sanitary spaces.

5.1.5 **Enlisted Rates - E1 to E6.**

Ship's company
Staff (Flag, Group, Squadron, Unit)
Detachments (Air Wing, Helo, Marines)
Troops

5.1.6 **Functions.**

Sleeping
Dressing
Personal stowage

Recreation
General quarters station for troops

5.1.7 **Related Spaces.**

Recreation spaces/areas
Sanitary spaces (community)
Messroom
Baggage stowage
Cleaning gear lockers
Passages

5.2 **Outfit and Furnishings** (surface ships).

5.2.1 **Berth Cubicles** (Figure 5-1). Subdivide living spaces using berths and personal stowage lockers to form cubicles of not more than six persons per cubicle. The cubicle concept maximizes habitability features such as privacy, access to and security of personal belongings, and reduction of noise and light within a minimum amount of area. Ensure that an HVAC exhaust terminal is installed within each cubicle. Lockers shall not be installed within the berth cubicle.

5.2.1.1 Berths. - The standard berth configuration is typically three high using locker type berths for the two lower sleeping surfaces and a pan type berth for the top. The locker berths each contain 7.5 cu. ft. of stowage volume. The pan berth has no stowage and is accompanied by a separate deck mounted locker having 7.5 cu. ft. of stowage volume. Combinations of pan and locker berths other than the standard configuration are permitted to suit constraints in overhead clearance or available deck area. In general, locker berths are preferred for the lower and middle berths because they provide more efficient stowage space than deck mounted lockers. Pan berths are preferred for the top berth because a locker berth at this height is difficult to use and the heavy locker top is a potential safety hazard. Additional features and accessories include:

Built-in curtain/grab bar assembly
Built-in magazine rack, towel bar, and robe hooks
Built-in small security locker for valuables with locker berth
Built-in step for climbing into upper berth
EEBD stowage integral with locker berth
Emergency escape kick-out panel
Individually controlled ventilation fan for pulling air in to the berth. Provide only where HVAC terminal is not provided within the berth cubicle during a rearrangement project.
Lee strap for retaining occupant in rough weather. For small ships only.
Light located at the head end for reading/writing
Mattress, 26 inches wide, 3 inches thick, and 76 inches long (except that 10 percent of berths are sized for 80-inch long mattresses)

Privacy curtain in two sections along the accessible side
Privacy partitions on the other three sides except where adjoining a bulkhead, shell, or other structure that provides equivalent privacy
Provision for deck mounting (bottom berth can be made removable where berth is located over a manhole or other access fittings)

5.2.1.2 Locker (for locker type berth). - Provide a wardrobe hanging locker for each accommodation having a locker type berth. This locker is normally stacked two high. The locker provides 10 inches of short hanging space.

5.2.1.3 Locker (for pan type berth). - Provide a wardrobe locker for each accommodation having a pan type berth. The locker provides 10 inches of short hanging space and 7.5 cu. ft. of stowage volume.

5.2.2 **Accessory Furnishings**

Ash receiver
Bulletin board
Chairs
Coat hooks
Chin-up bar
Drinking fountain
Iron and ironing board
Locker, soiled clothes
Mailbox
Mirror, full length
Mirror, standard
Table, with game top
Table, w/game top and outrigger seating (small ships)
Television support

5.3 Arrangement Practices for Surface Ships.

5.3.1 **Crew Living Spaces** (Figure 5-2).

5.3.1.1 Cubicles. - Subdivide compartments into cubicles. Ensure that each cubicle contains not more than six persons. Main passages serving the cubicles must be not less than 36 inches wide.

5.3.1.2 Berths. - Locate berths away from main passages, sanitary spaces, ladders, recreation areas, and other noise sources. Locate heads of berths away from cubicle entrances. Orient berths primarily longitudinally; however athwartships orientation may be used for up to 30 percent of berths within a space where compartment arrangement is improved. In living spaces with 15 or more persons, 10 percent of berth tiers shall be sized to fit an 80-inch long mattress. All other berth tiers shall accommodate a 76-inch long mattress.

5.3.1.3 Shell. - To the extent practicable, avoid locating berths and lockers along the shell in order to have better access to shell structure and distributive systems for damage control.

5.3.1.4 Soiled clothes. - Place soiled clothes lockers next to sanitary spaces to take advantage of the negative air pressure within the heads which will help control odors.

5.3.1.5 Installation. - Position deck mounted furniture about 1-inch from bulkheads to ensure adequate clearance for welding. Group like furniture together as much as possible to simplify foundations and minimize deck covering cutouts.

5.3.1.6 Accessories. - Locate mirrors, drinking fountain, watch quarter and station bill panels, and irons and ironing boards outside of cubicles in places where their use does not cause personnel traffic congestion. Locate the full length mirrors near the primary compartment access.

5.3.1.7 Recreation. - Recreation spaces should be separate from living spaces; however, recreation areas that are located within living spaces should be adjacent to the sanitary space. This will help group potentially noisy areas and provide a waiting area for personnel during high use periods for the head. Configure recreation areas to permit easy conversion to berthing should additional accommodations be required in wartime. Use partitions and/or lockers to help isolate recreation areas from sleeping areas. Ensure that recreation areas have separate lighting circuits from berthing cubicles.

5.3.1.8 Sanitary space. - Where the access to the sanitary space is from within the living space, position the access so that a person entering the living space does not have to traverse a sleeping area to use the head.

5.3.1.9 Fan coil assemblies. - Where practicable, locate fan coil assemblies outside of living spaces. Where fan coil assemblies must be located within living spaces, position them away from sleeping areas. Ensure that adequate clearance is provided for servicing filters.

5.3.1.10 Accesses. - Enclose ladders entering living spaces and those that lead to other spaces above or below the living spaces, in order to provide privacy, to reduce noise, and to contain smoke in the event of a fire.

5.3.1.11 Sheathing. - Decorative sheathing or carpeting is not authorized.

5.3.2 **Troop Living Spaces.** Troops are Marines that are riding the ship either in an extended deployment mode or in a point-to-point mode. Their mission is usually linked to an amphibious assault. Extended deployment troops are considered

accommodations and are fully supported in terms of sanitary fixtures, food service facilities, provisions, potable water, and all other habitability considerations. Surge troops are unsupported except for a berth. Arrangement practices for crew living spaces apply with the following modifications.

5.3.2.1 Extended deployment troop living spaces (Figure 5-3). - Provide troops with living and sanitary spaces that are separate from crew living spaces. Troops have different stowage requirements than crew and receive different outfit and furnishings including stowage for field packs and rifles. Location of field pack and rifle stowage is dependent upon the ship mission; therefore, should be coordinated with the Marines during the design process. Ensure that furnishings for troop spaces are shock qualified since these spaces are occupied during general quarters.

5.3.2.2 Surge troop living spaces in ships with low deck heights (Figure 5-4). Berth surge troops in multipurpose spaces that function as recreation spaces or areas for extended deployment troops when surge are not on board. Ensure that these spaces are convertible from one arrangement mode to the other within 48 hours by ship's force. Select berths, normally four high, recreation tables, and chairs that can alternate between stowed and installed configurations, depending on which arrangement mode is in effect. Stowage for alternative mode equipment shall be located in the space and configured to least conflict with whatever mode is in effect. The stowage area shall serve as a common stowage area for equipment not in use. Do not use the cubicle concept for surge. Permanently installed lockers shall be in locations so as not to interfere with either arrangement mode. Since surge troops are on board for only short periods of time, they are provided fewer habitability considerations than their extended deployment counterparts. These spaces shall be provided with a conversion diagram showing the arrangement of furniture and equipment in each functional mode, including instructions for installation and stowage. The conversion diagram shall be installed in an unobstructed location within the space.

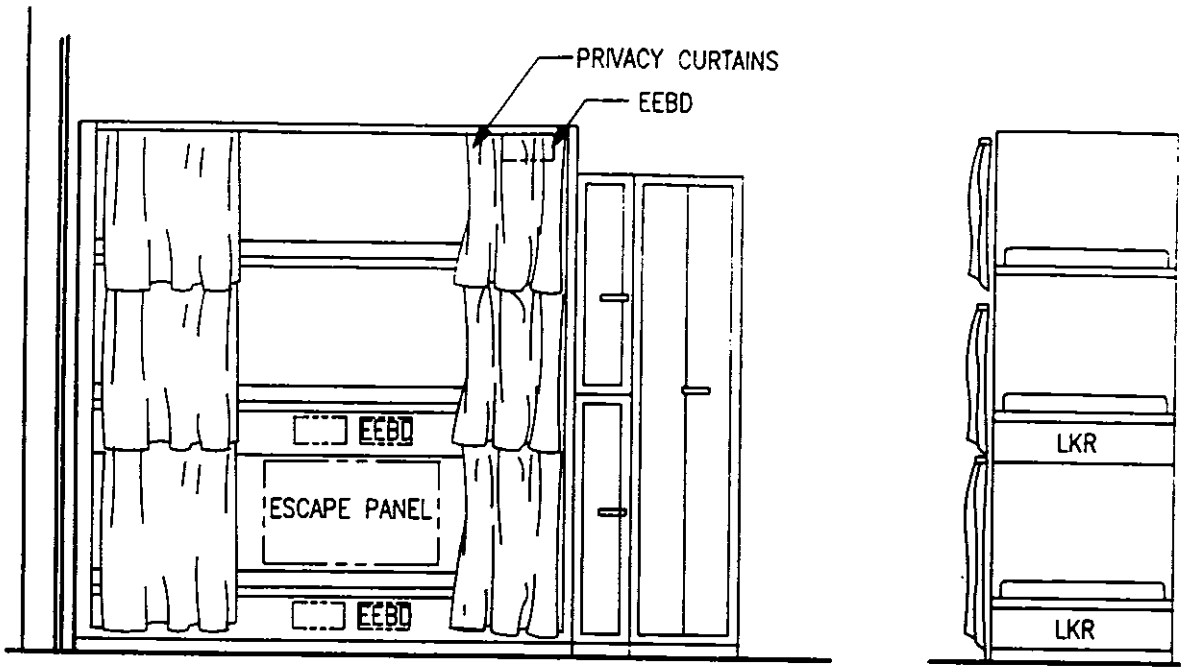
5.3.2.3 Surge troop living spaces in ships with high deck heights. Berth surge troops in troop living spaces above the uppermost berth of three high berth tiers. The surge berth is not provided with privacy curtains nor light.

5.4 Arrangement Practices for Submarines (Figure 5-5).

5.4.1 **Living Spaces.** In submarines, habitability area and volume is greatly reduced due to the necessity of maximizing use of available space. Berth crew in living spaces as in surface ships. Surface ship arrangement practices apply; however, cubicle size usually exceeds six persons and less area per person is provided than on surface ships.

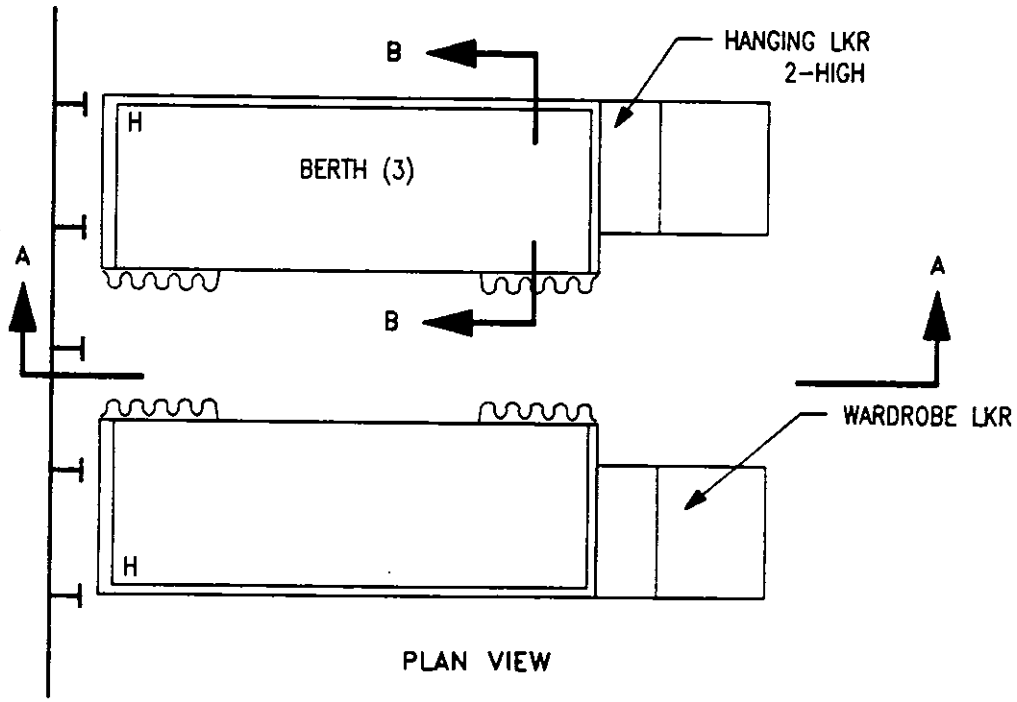
5.4.2 **Furnishings.** Furnishings for crew living spaces are frequently built-in to suit available space and designed to just meet the standards for stowage volume and hanging space. Berths are three high with the two lower having lockers under the sleeping surfaces. About 30 percent of berths are standard length for 76-inch mattresses and the remainder are reduced length for 73-inch mattresses. Many lockers are community type with shared ownership of the stowage volume. Minimum personal stowage volumes per person are as follows:

3-inches hanging space
3-cu. ft. locker volume



ELEVATION A–A

SECTION B–B



PLAN VIEW

FIGURE 5–1
CREW BERTHING – 3 HIGH
TYPICAL SIX PERSON CUBICLE

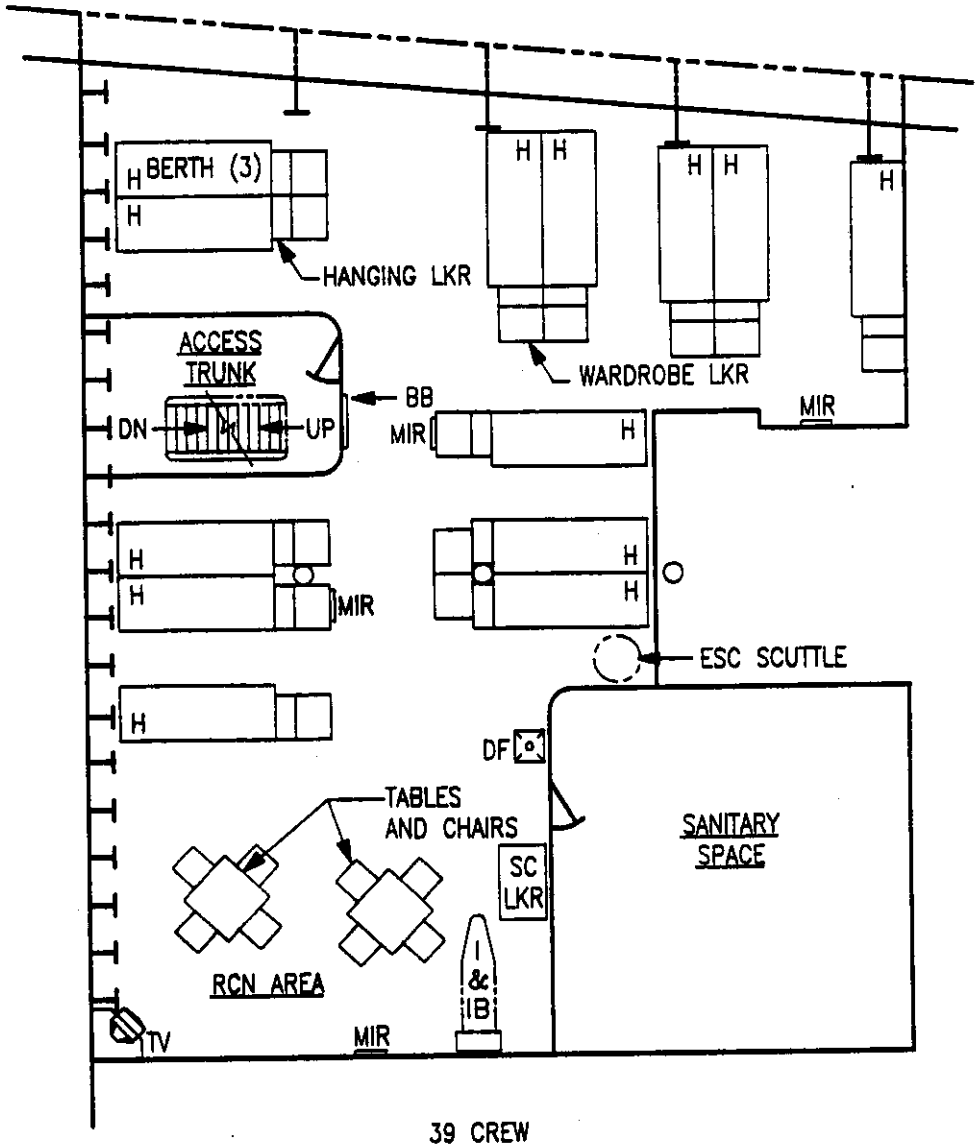
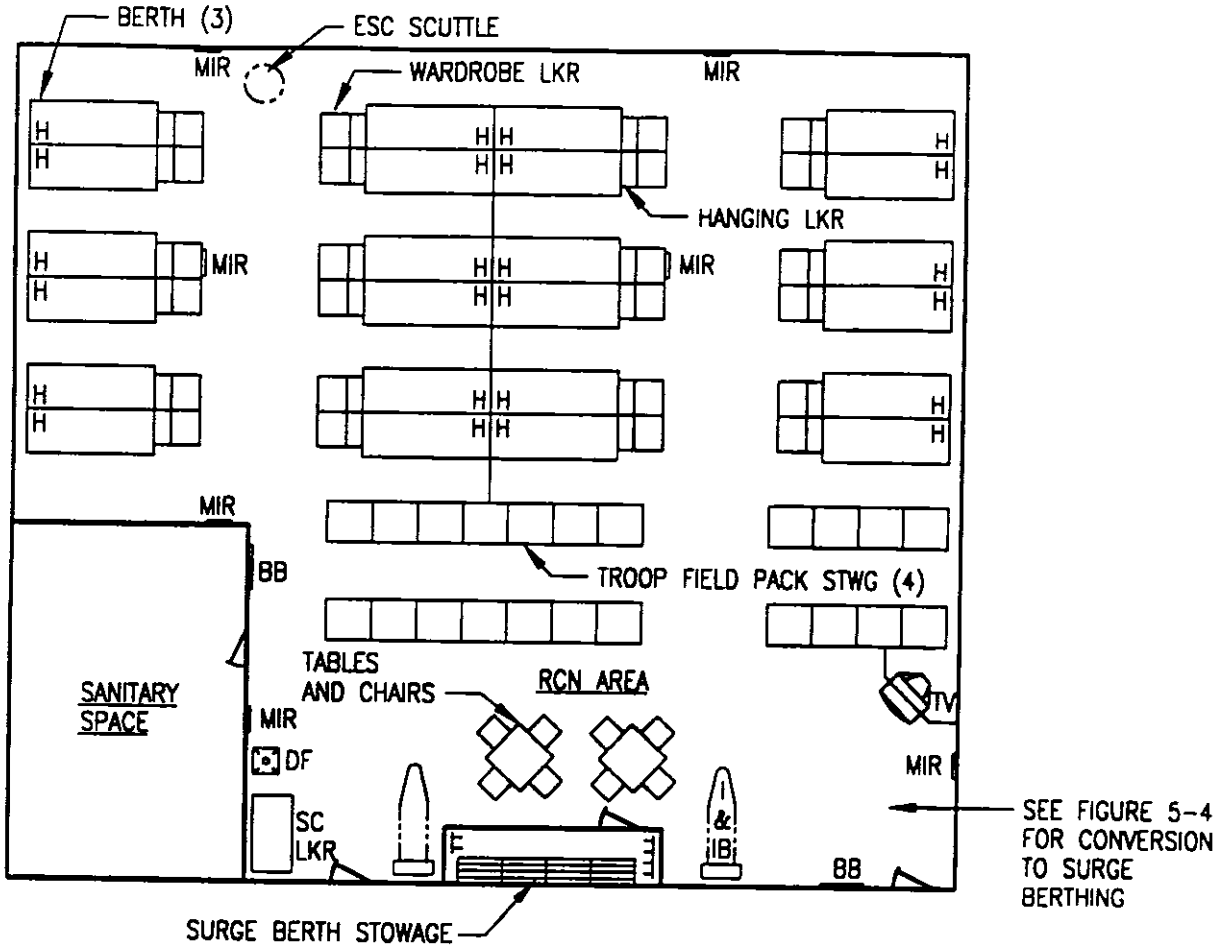
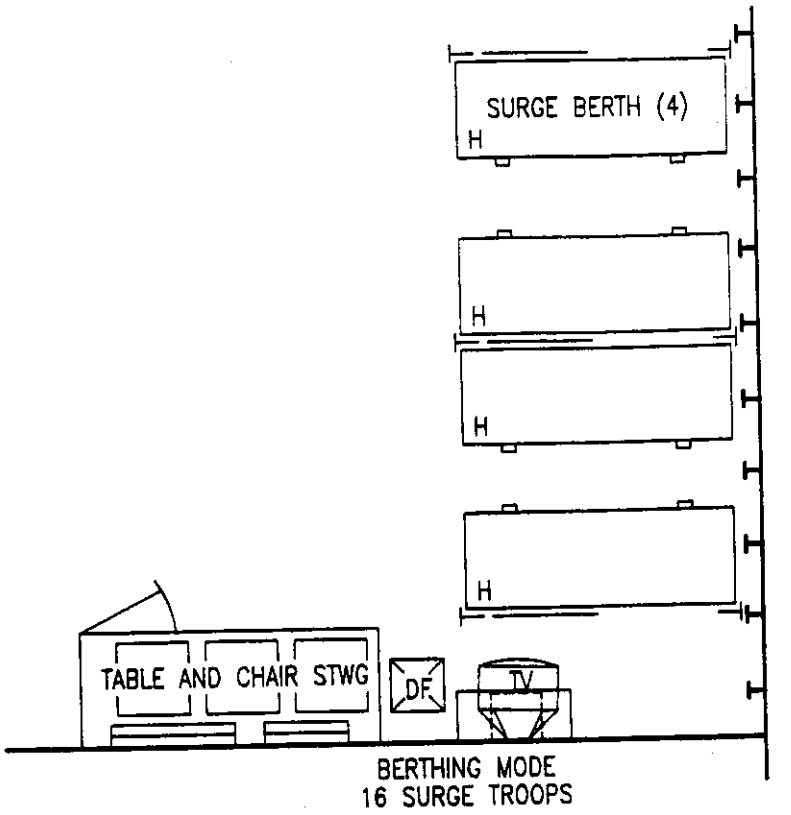


FIGURE 5-2
TYPICAL CREW LIVING SPACE

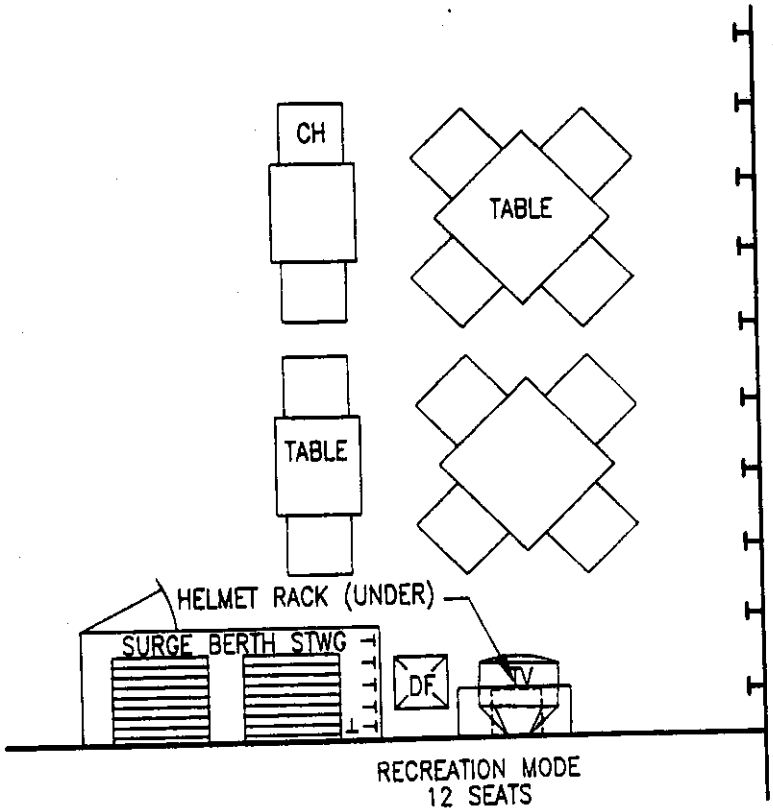


72 EXTENDED DEPLOYMENT TROOPS
16 SURGE TROOPS

FIGURE 5-3
TYPICAL TROOP LIVING SPACE
(LOW DECK HEIGHT)



BERTHING MODE
16 SURGE TROOPS



RECREATION MODE
12 SEATS

FIGURE 5-4
TYPICAL MULTIPURPOSE AREA
TROOP RECREATION/SURGE BERTHING

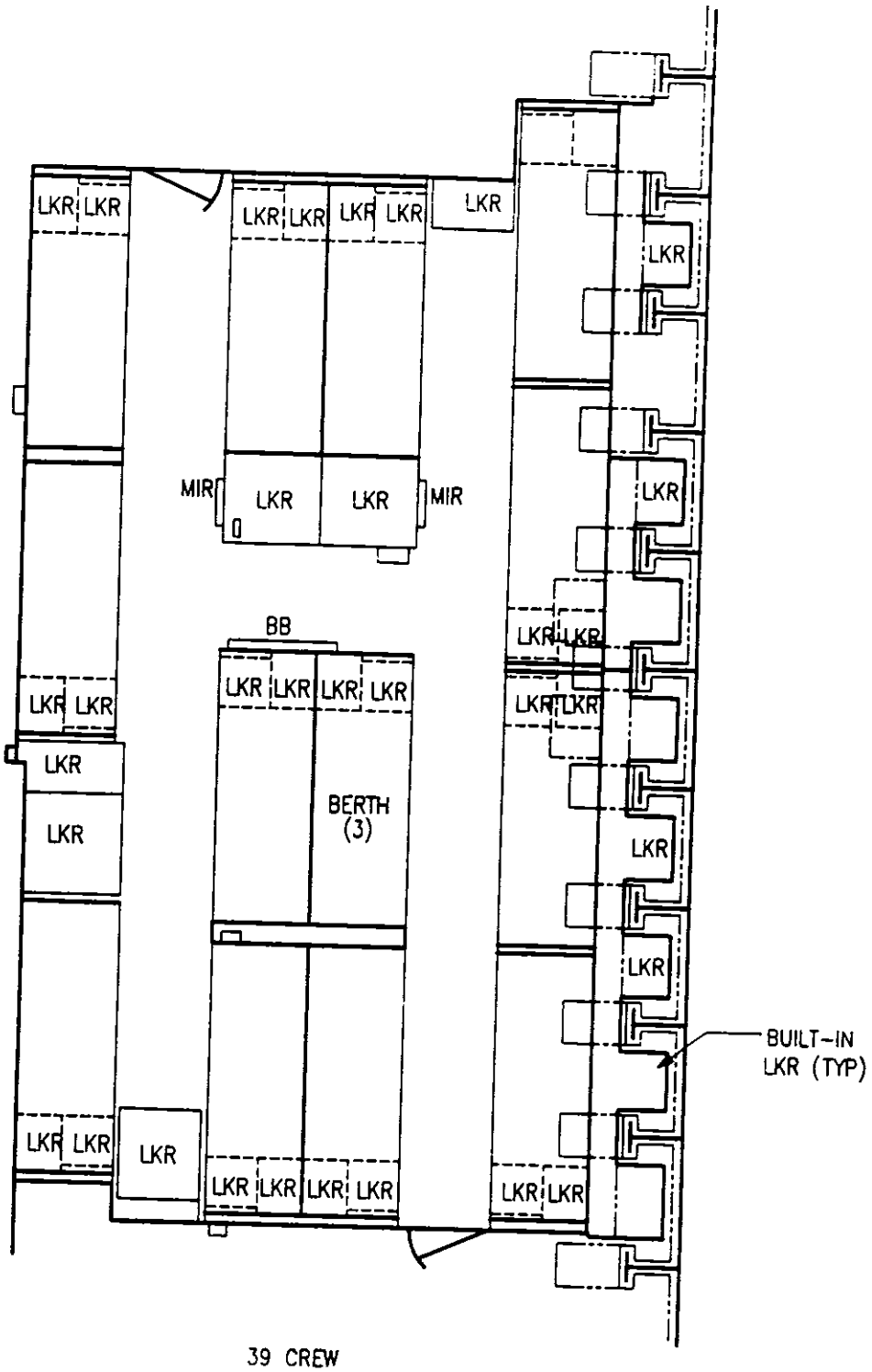


FIGURE 5-5
TYPICAL SUBMARINE CREW BERTHING

6.0 SANITARY SPACES

6.1 **General**. Sanitary spaces are also commonly referred to as heads.

6.1.1 Distribution.

6.1.1.1 Provide officers, CPO, and crew with separate sanitary spaces within their respective living spaces. If not possible, they shall be located immediately adjacent to and on the same deck as their berthing spaces. For sanitary spaces that are accessed from passages and the fixtures are visible from the passages, provide privacy partitions or curtains around the entrance doors.

6.1.1.2 Provide female personnel with sanitary spaces that are separate from those of their male counterparts.

6.1.1.3 Provide troop enlisted personnel with sanitary spaces that are separate from those of ship's company.

6.1.1.4 Provide additional facilities that are used by all personnel near work spaces.

6.1.2 Types.

6.1.2.1 Community Facilities.

Washroom, Water Closet, and Shower (WR, WC, & SH)
Deck Washroom and Water Closet (Deck WR & WC)
Visitor Washroom and Water Closet (Visitor WR & WC)
Ward Washroom, Water Closet, and Shower (Ward WR, WC, & SH)

6.1.2.2 Private and Semi-private Facilities.

Private Bath (Bath)
Semi-private Bath (Bath)
Quiet Room Bath
Toilet and Shower (T/S)

6.2 **Outfit and Furnishings**. Figures are provided showing plan and elevation views of major fixtures. Water closets, urinals, and showers are individual type units, although they may share common privacy partitions. Lavatories may be individual units or multiple units set in continuous countertops.

6.2.1 Water Closet (WC or toilet, Figure 6-1).

6.2.1.1 Design. - Install vitreous china WCs (except in brigs where CRES is used). Vitreous china, as compared to other materials, is durable, easily cleaned, and aesthetically superior and has seen satisfactory use in Navy ships since the

1950s. Provide shock mounts with WCs to avoid fractures caused by ship structural vibration and deflection.

6.2.1.2 Piping. - Supply flushing water from the firemain and install an individual flushometer and drain sewage to the Collection, Holding, and Transfer (CHT) System.

6.2.1.3 Orientation. - WCs shall face forward or aft to minimize the siphoning effect on traps due to ship roll.

6.2.1.4 Partitions. - In community and semi-private sanitary spaces serving more than two persons, enclose each WC with partitions for privacy. A standard enclosure is 30 inches wide and provides 30 inches knee room in front of the WC. Ensure partitions are corrosion resistant and smooth sided for durability and easy cleaning. Partitions should be entirely supported from the overhead and bulkheads to simplify deck maintenance.

6.2.1.5 WC Door. - For a standard enclosure, provide a single door opening inward. Locate the door at the end or side of the enclosure, as shown, and provide a spring loaded hinge set to hold it open except when latched from inside. Provide a coat hook on the inside of the door centered near the top. Where a standard enclosure cannot be provided, a double door may be installed.

6.2.1.6 Accessories.

Toilet paper holder
Toilet seat
Sanitary napkin dispenser (visitor WR/WC only)
Sanitary napkin disposal (female spaces only)

6.2.2 **Urinal** (male spaces only, Figure 6-2)

6.2.2.1 Design. - Install vitreous china urinals with shock mounts.

6.2.2.2 Piping. - Supply flushing water from the firemain and install an individual flushometer and drain sewage to the CHT system.

6.2.2.3 Orientation. - Urinals may be oriented in any direction; however, the forward and aft orientation is preferred, to enable personnel to better brace themselves against ship roll, and to minimize sanitation problems caused by users missing urinals due to ship roll.

6.2.2.4 Partitions. - Provide privacy partitions between adjacent urinals and at the ends of urinals, except where equivalent privacy is already provided by a bulkhead or other structure. Ensure partitions are corrosion resistant and smooth finished for durability and easy cleaning. Where a urinal cannot be flush mounted to a bulkhead, provide a back panel for mounting

the urinal. All partitions should be bulkhead mounted to avoid deck connections.

6.2.3 **Shower** (Figure 6-3).

6.2.3.1 Design. - Two shower designs are used, one for surface ships and one for submarines.

6.2.3.1.1 In surface ships, install the handheld, low flow shower (HHLFS) shown in Figure 6-3. The HHLFS is designed to ensure that users take a "Navy" shower - wet down, soap up, and rinse off. The unit conserves fresh water, conserves energy required to distill water, and reduces the amount of waste water that must be held by the CHT system.

6.2.3.1.2 In submarines, install the fixed arm, lever controlled, low flow, shower. Submarines have not adopted the hand-held shower because their water/energy problems are not as acute as surface ships and their distillers are more reliable due to having a more stable platform when underwater.

6.2.3.2 Piping. - Supply hot and cold fresh water from the potable water system to a manually operated mixing valve and drain waste water to the CHT system.

6.2.3.3 Orientation. - Not applicable.

6.2.3.4 Partitions. - Install CRES joiner bulkheads and CRES partitions to form individual shower stalls. Stalls in community sanitary facilities open to a common shower drying area. Stalls in private and semi-private sanitary spaces open to the compartment.

6.2.3.5 Accessories.

Curtain
Curtain rod
Grab rod
Soap and shampoo shelf
Towel hook or rack

6.2.4 **Lavatory** (Figure 6-4).

6.2.4.1 Design. - Two lavatory designs are used, a vanity type lavatory for private sanitary spaces and officer staterooms and a countertop lavatory for community sanitary spaces. The vanity type lavatory is a single-bowl unit. The countertop lavatory may have one or more bowls depending on the number of persons served. Both lavatories feature CRES bowls, self-closing faucets, mirrors, fluorescent lighting fixtures, and auxiliary electrical outlets. The vanity type lavatory also features a built-in cabinet behind the mirror and another below the bowl. The countertop lavatory has a continuous countertop and full width mirror to serve as many persons as possible during peak periods.

6.2.4.2 Piping. - Supply hot and cold fresh water from the potable water system to the faucet and drain waste water to the CHT system. Piping to a countertop lavatory is exposed below the countertop for easy access and maintenance.

6.2.4.3 Orientation. - Face lavatories forward or aft, where practicable, to enable personnel to better brace themselves and to reduce water slosh from bowls towards users as the ship rolls. Other orientations may be used where overall compartment arrangement is improved.

6.2.4.4 Accessories.

Electric hand dryer (submarines) (option for surface ships)
Paper towel dispenser (surface ships)
Soap dispenser
Towel hook or rack
Trash receptacle (surface ships)
Tumbler and toothbrush holder (private bath only)

6.3 Arrangement Practices for Surface Ships.

6.3.1 **WR, WC, & SH Facilities** (Figure 6-5). The goal is to efficiently use available space, provide privacy, control heat, humidity and odors, and ensure the sanitary space can be easily cleaned and maintained. The number of fixtures required is based on the number and type of accommodations locally served by the sanitary space. Approximate areas in square feet per person are as follows:

Officer	12
CPO	8
Crew	4

6.3.1.1 Sanitary space grouping. - In large living spaces with multiple sanitary spaces, group them together horizontally and align them vertically to simplify piping runs and collection of wastes. Where sanitary spaces are vertically stacked, align like fixtures where practicable.

6.3.1.2 Functional area grouping. - Within individual sanitary spaces, group like fixtures together into functional areas (i.e., WC area). This will help to minimize support system requirements such as piping and ventilation runs.

6.3.1.3 Access and arrangement. - Provide access to officer sanitary spaces from an officer country passage. Provide access to CPO and crew sanitary spaces directly from the living spaces served. CPO and crew shall not have to cross main passages or transit decks to reach their assigned sanitary space. Position lavatories and urinals, which are the most frequently used fixtures, close to the access of a space; position WCs and showers farthest from the access. Ensure that the access to

washing facilities avoid the need to pass through a WC area. Locate at least one urinal convenient to the shower area.

6.3.1.4 Clearances, spacing, and orientation. - See Figure 6-5 for fixture spacing and orientation guidelines. See Figure 6-6 for minimum clearances between fixtures in surface ships.

6.3.1.5 Bulkhead separation. - Where more than four WCs are required, separate the WR and WC areas by bulkheads to ensure better control of odors. Provide at least one lavatory within each WC area.

6.3.1.6 Cleaning and maintenance. - Sanitary spaces must be secured part time each day for cleaning and at irregular intervals for maintenance. In large sanitary spaces (with more than four WCs), arrange fixtures so that one part of the sanitary space can remain open while another part is being cleaned or repaired.

6.3.1.7 Fixtures for females. - In female sanitary spaces, substitute WCs for urinals. In male sanitary spaces that may be redesignated at some future time for female use (or if current male/female usage is unknown), provide adequate clearance at urinals for change-out to WCs.

6.3.1.8 Shower partitions and bulkheads. - With CRES partitions and bulkheads provide a separate shower compartment consisting of individual shower stall opening to a common shower drying area. Where space and weight permit, provide individual shower drying area for each shower stall. Use partitions between adjacent stalls and between stalls and drying area. Use bulkheads around the outer periphery of the stalls and drying area to keep shower heat and humidity from the rest of the sanitary space.

6.3.1.9 Shower door. - Provide a door at the access to the shower drying area to assist in controlling heat and humidity. Select door swing that will minimize interference with personnel traffic. Provide a ventilation opening at the bottom of the door to supply air to the shower.

6.3.1.10 Shell/weather bulkhead constraint. - Avoid locating showers adjacent to the shell or a weather bulkhead since the high humidity in showers will damage the thermal insulation and lead to excess sweating and potential corrosion problems.

6.3.1.11 Cleaning gear locker. - Provide a built-in cleaning gear locker with service sink in the washroom area of a sanitary space with more than three lavatories. Within the locker, install a swab and broom rack, soap dispenser, and paper towel dispenser. Mount dispensers over the service sink. Supply hot and cold fresh water to the service sink, and install a deck drain. In smaller sanitary spaces, install hot and cold, bib

type, self-closing faucets for filling buckets, at a convenient location within the washroom area, approximately 24 inches above the deck.

6.3.1.12 Water heaters. - Avoid locating water heaters within sanitary spaces to preclude additional heat and humidity being transmitted to the compartments. Water heaters shall be installed in vented and insulated compartments. Indicate water heater location on the arrangement drawing to avoid design encroachment later.

6.3.1.13 Towel hooks and racks. - Distribute towel hooks or racks evenly along shower drying area bulkheads and mount them high enough to preclude their being a safety hazard should a person fall against the bulkhead.

6.3.1.14 Ventilation. - Provide mechanical exhaust ventilation over WC areas to remove odors and over shower areas to remove heat and humidity. Install grilles in bulkheads separating sanitary spaces from berthing spaces or passages for natural supply ventilation. Locate grilles to suit HVAC system design.

6.3.1.15 Heating. - Provide bulkhead mounted convection heaters within sanitary spaces since natural supply ventilation requires supplemental heating.

6.3.1.16 Deck covering, coamings, and drains. - Sanitary spaces are considered wet spaces. Deck coverings in sanitary spaces must be flexible, durable, easily cleaned and maintained, have good slip resistance, and be aesthetically pleasing. Install deck drains within sanitary spaces and ensure deck covering is sloped to the drains. Provide bulkheads surrounding sanitary spaces with a 6-inch CRES coaming and provide doors to sanitary spaces with a 9-inch sill. Ceramic tile is the preferred deck covering for sanitary spaces.

6.3.1.17 Corrosion protection. - Aluminum flame spray structural steel bulkheads and overheads prior to applying other surface treatments in order to maximize corrosion protection.

6.3.2 **Deck WR & WC** (Figure 6-7). Deck WR & WC is a generic name for a sanitary space accessed from a passage and serving a nearby work space. It serves both male and female officer and enlisted personnel. Provide a minimum of one WC and one countertop lavatory unit in each deck WR & WC space. Deck WR & WC, with several fixtures of each type, shall be modified to include two separate facilities, one for males and one for females, with fixtures distributed proportionally. However, if there are two Deck WR & WCs in close proximity, one shall be designated for males and the other for females.

6.3.3 **Visitor WR/WC** (Figure 6-7). This space is used by visitors and is provided in destroyer size and larger ships. Locate the space on a passage near the wardroom or enlisted

personnel messrooms. Provide two or more spaces in ships with more than 1000 accommodations. In addition to its primary purpose as a WR/WC, it serves visitors as a dressing and grooming area.

6.3.4 **Ward WR, WC, & SH.** - This facility serves the medical ward and is outfitted as a Crew WR, WC, & SH. Access is directly from the ward. The number of fixtures is determined by the number of berths in the ward. In addition, provide a Sitz or whirlpool bath within the ward bath.

6.3.5 **Private Bath** (Figure 6-8). Provide private baths for senior officers whose staterooms have adjoining cabins. Locate access to the bath from the stateroom. Also, in cases where there is no adjoining cabin, provide a private bath for the CO in all ships, and for the XO in destroyer size and larger ships. An alternate arrangement to the one shown locates the three major fixtures side by side. Privacy partitions are not required for the WC, nor is a shower drying area necessary, since the bath is used by only one person at a time.

6.3.6 **Semi-private Bath** (Figure 6-8). Semi-private baths are located between two adjacent officer staterooms and typically serve two to four persons. They contain only a WC and shower since there is a lavatory provided in each stateroom. Semi-private baths serving only two persons can omit the water closet enclosure in which case the space serves one person at a time. Semi-private baths are normally provided where officer country is fragmented and community type facilities would be impractical, or where facilities are required for varying numbers of female officers.

6.3.7 **Quiet Room Bath.** This facility serves the Quiet Room in the medical complex. Outfit and arrange similar to a private bath, except provide bed pan cleaning unit, hamper, and install a patient call system.

6.3.8 **Brig.** Fixtures for brigs must meet special requirements to ensure protection of prisoners and guards. Provide and arrange brig sanitary fixtures in accordance with drawing NAVSEA No. 803-5959213.

6.4 Arrangement Practices for Submarines.

6.4.1 **WR, WC & SH Facilities** (Figure 6-9). Provide separate community sanitary spaces for officers, CPO, and crew. Arrangement practices for surface ships apply to submarines, except as noted below.

6.4.1.1 Fixture selection. - Urinals are normally not provided since WCs are more versatile and space is at a premium. Submarine accommodation numbers per fixture are different from surface ships due to the amount of space available.

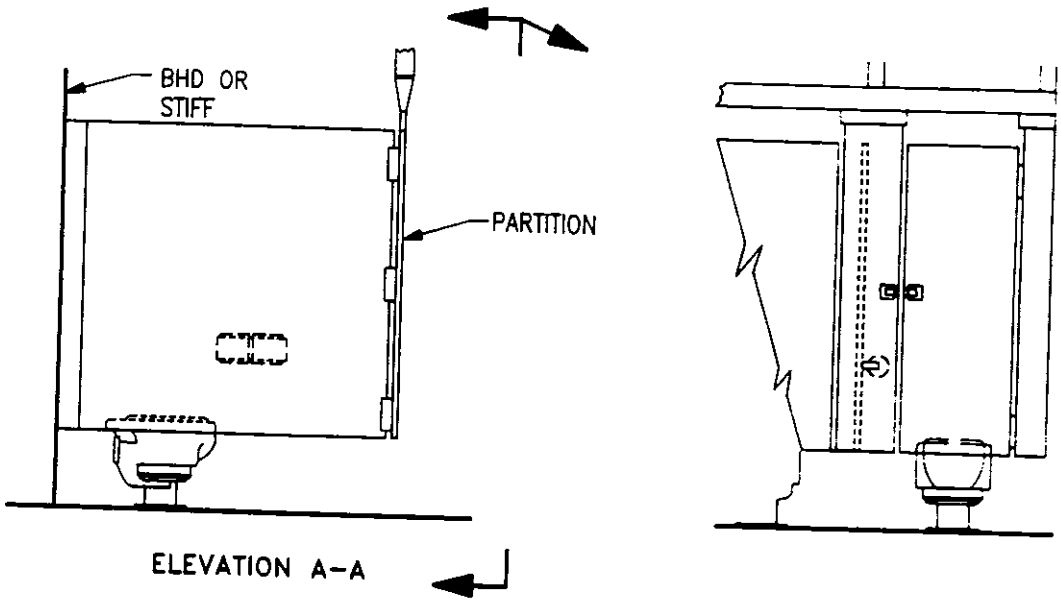
6.4.1.2 Fixture clearances. - Fixture clearances shown in Figure 6-6 are design goals.

6.4.1.3 Fixture orientation. - Fixture orientation guidelines may be relaxed in submarines since there is less ship motion when underwater.

6.4.1.4 Hand drying. - Provide electric hand dryers instead of paper towel dispensers and trash receptacles since electricity is readily available and paper towels for dispensers would consume vital stowage space. Mount hand dryers on a bulkhead convenient to the lavatories.

6.4.2 **Work Space Facilities.** Provide a WC and lavatory, with accessories, in the engineering compartment for use by watchstanders.

6.4.3 **Semi-private Facilities.** Provide a semi-private bath for the CO which is typically shared with the XO and another officer.



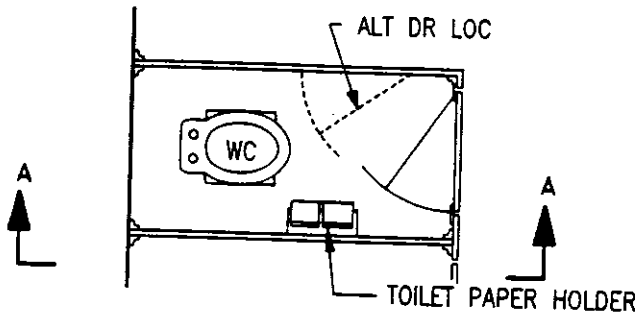
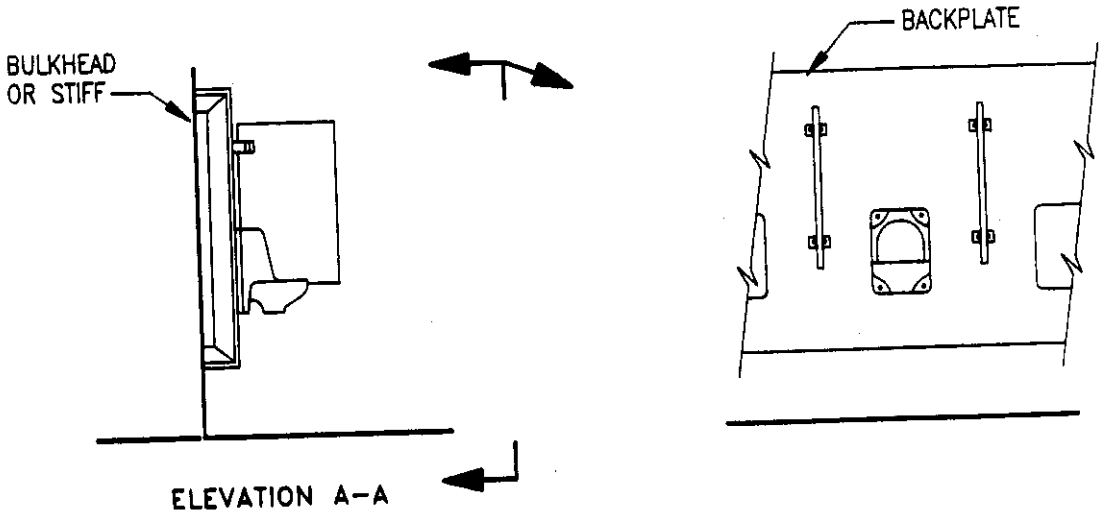
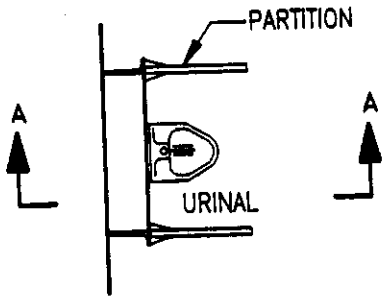


FIGURE 6–1
WATER CLOSET AND PARTITION





PLAN VIEW

FIGURE 6–2
URINAL AND PARTITION

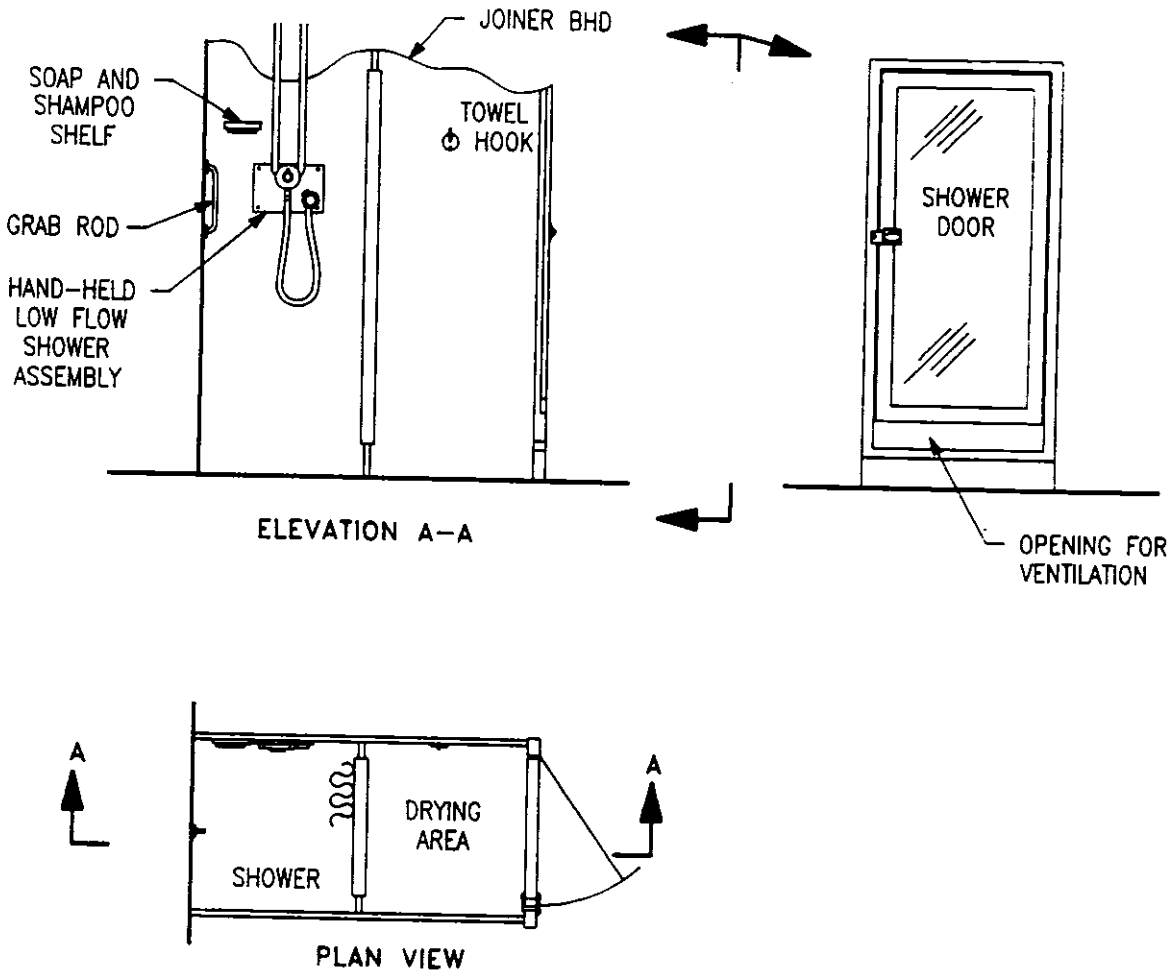
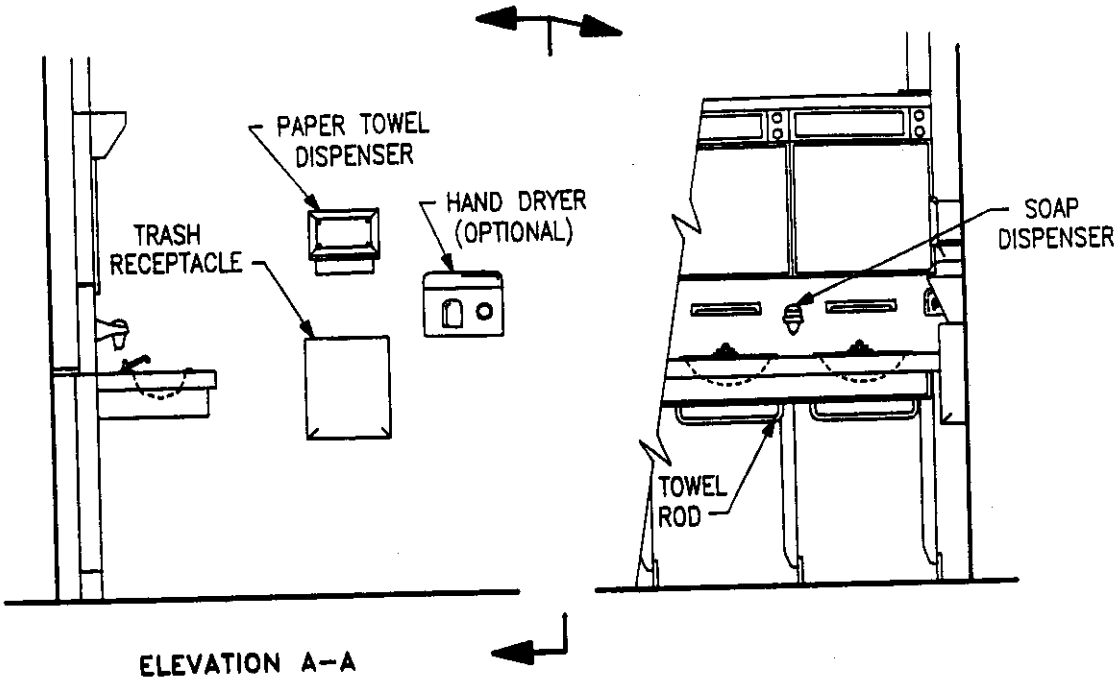


FIGURE 6-3
SHOWER AND PARTITION



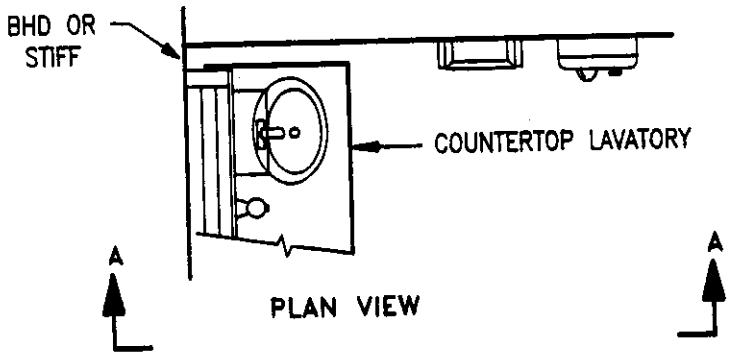


FIGURE 6–4
COUNTERTOP LAVATORY

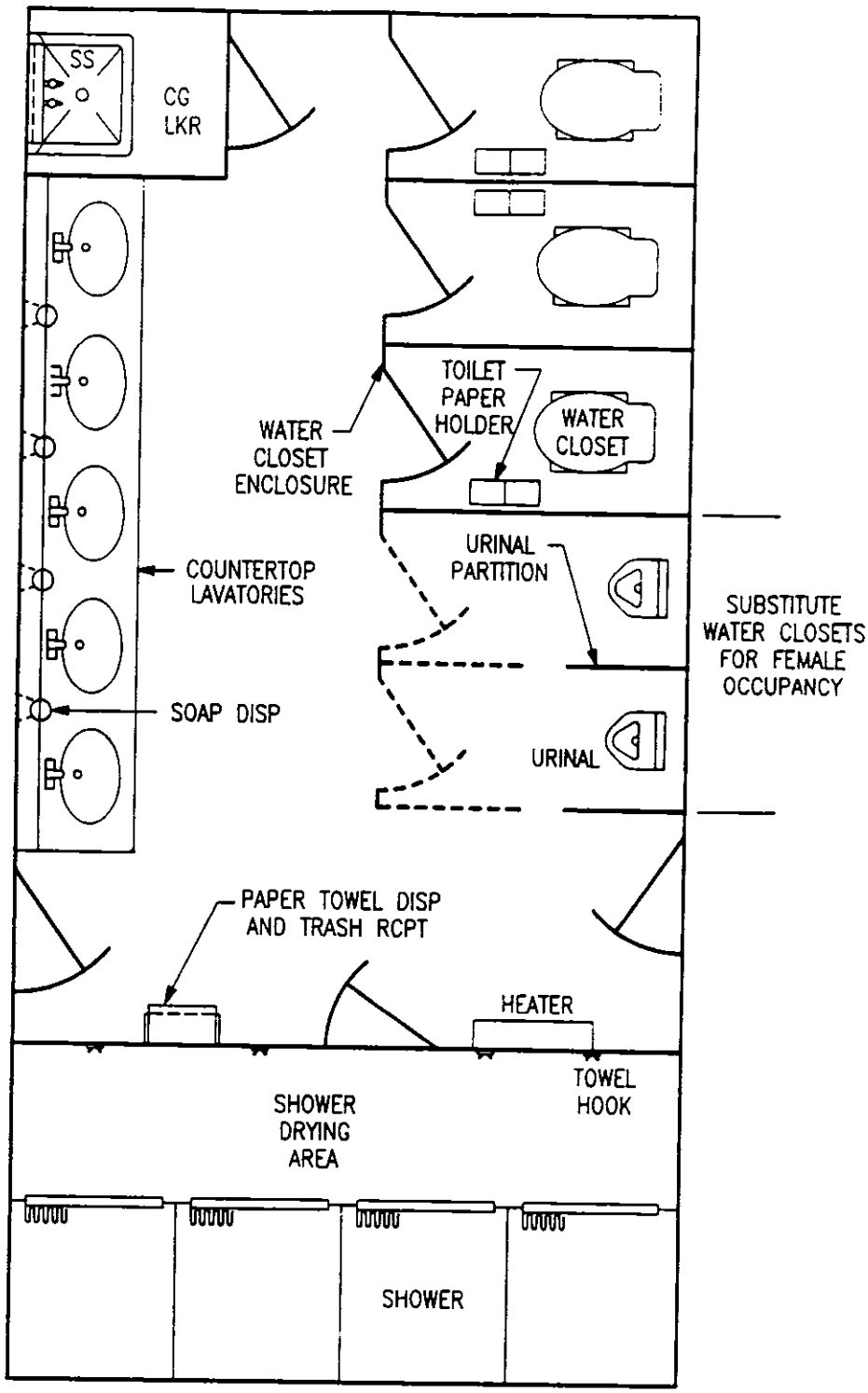


FIGURE 6-5
TYPICAL COMMUNITY SANITARY SPACE

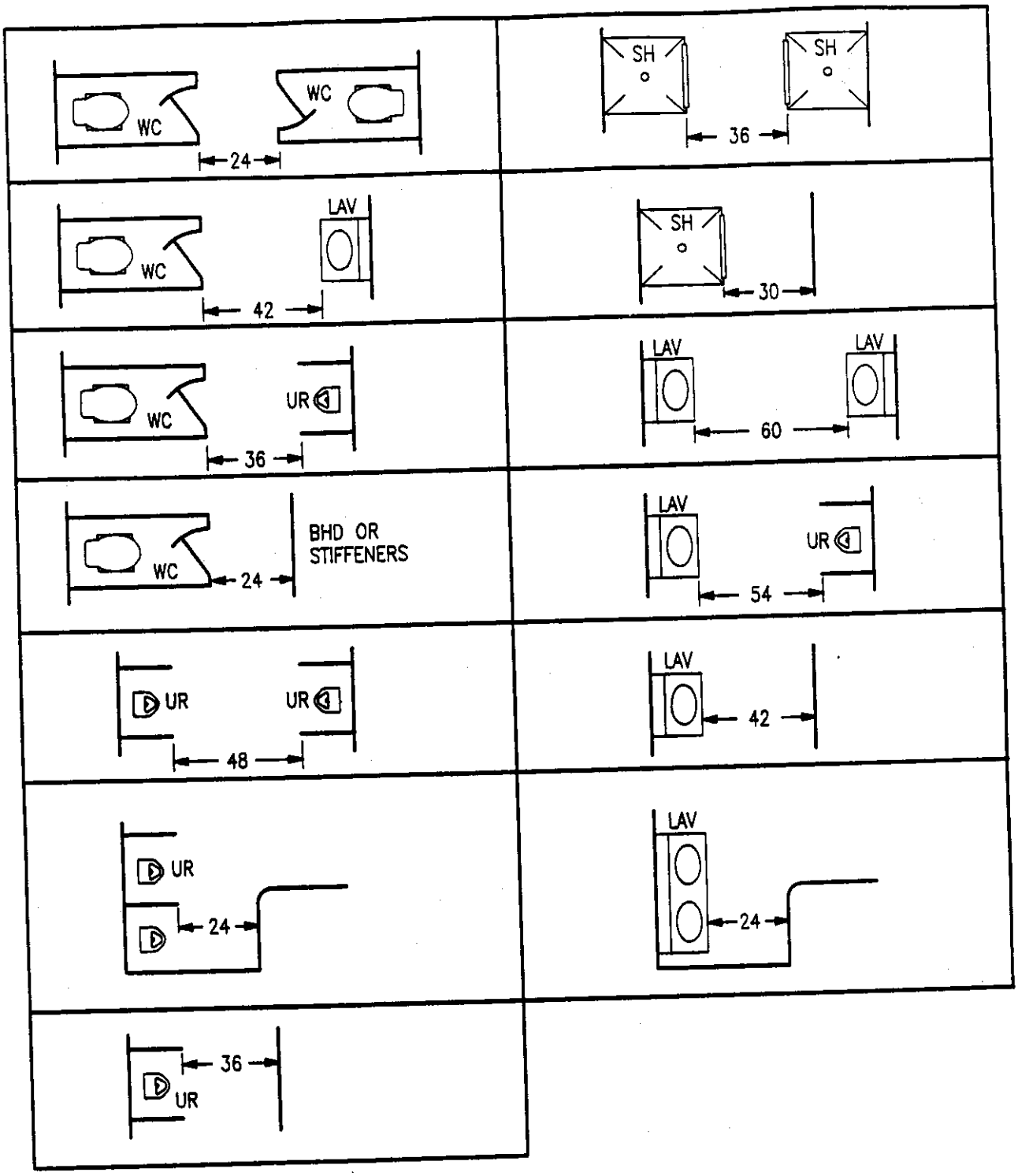
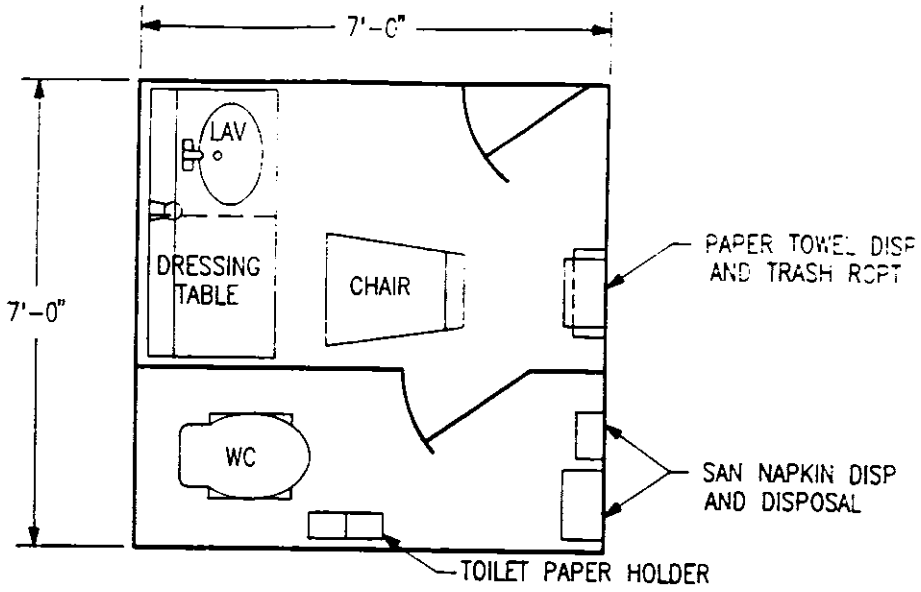
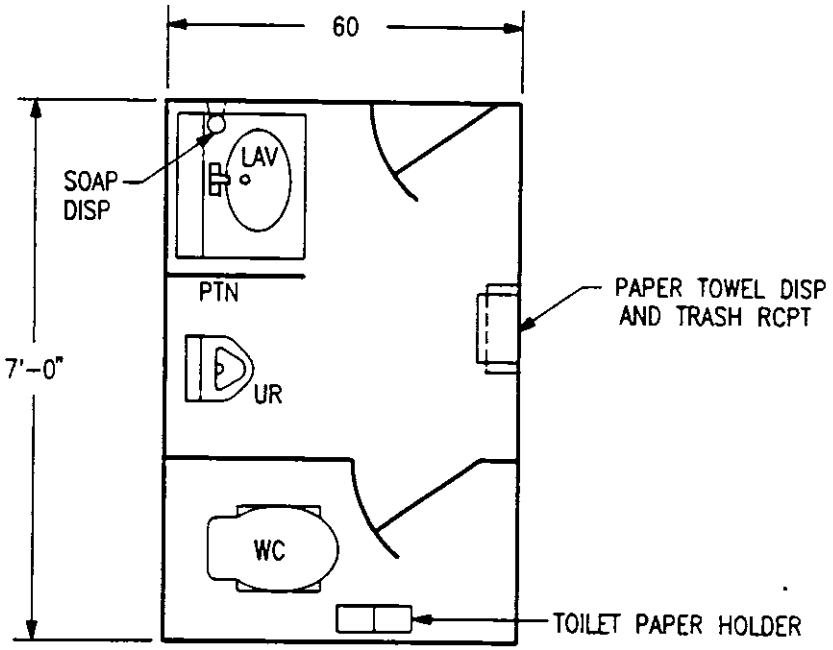


FIGURE 6-6
PLUMBING FIXTURE CLEARANCES

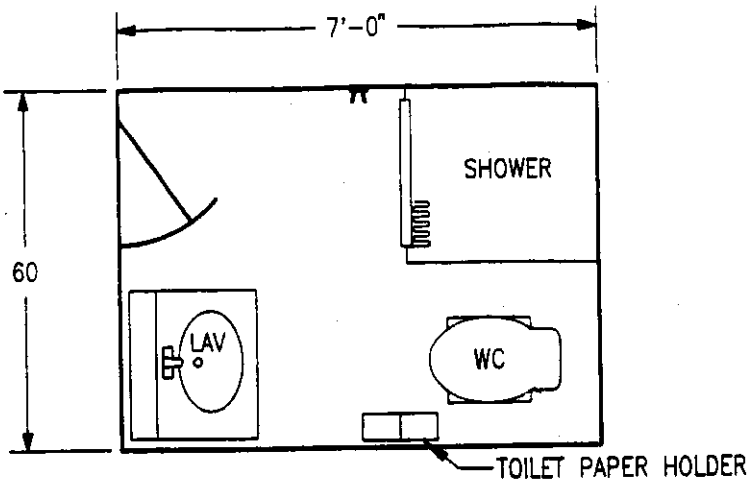


VISITOR WR AND WC

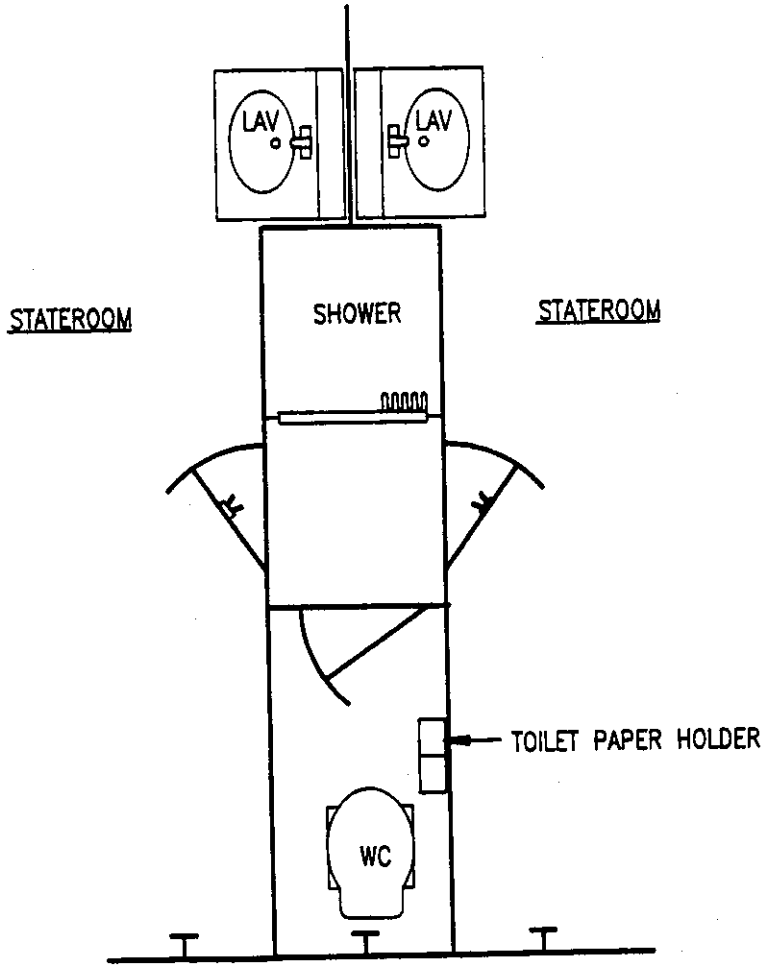


DECK WR AND WC

FIGURE 6-7
TYPICAL MISCELLANEOUS SANITARY FACILITIES



PRIVATE BATH



SEMI-PRIVATE BATH

FIGURE 6-8
TYPICAL PRIVATE/SEMI-PRIVATE SANITARY FACILITIES

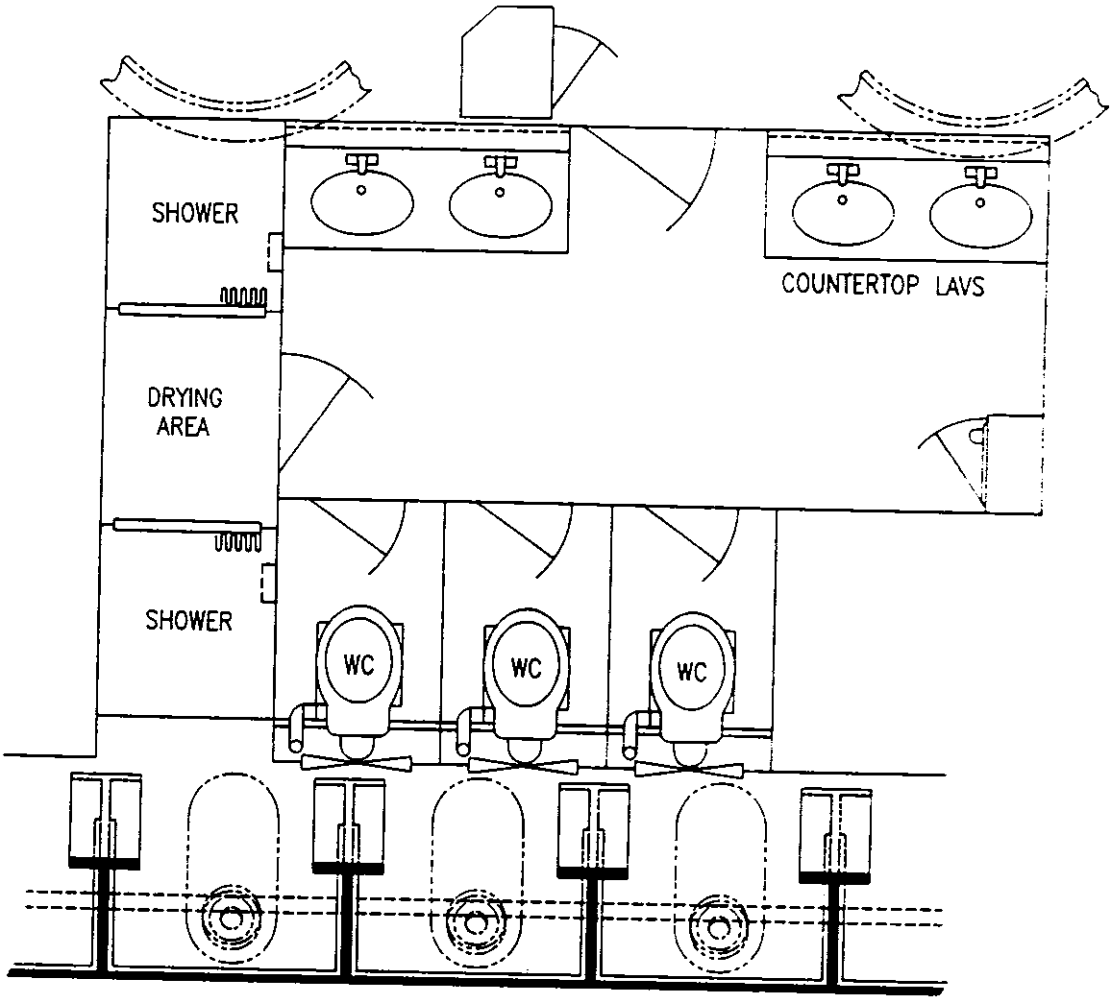


FIGURE 6-9
TYPICAL SUBMARINE SANITARY SPACE

7.0 LEISURE AND COMMUNITY SPACES

7.1 General. Leisure and community spaces include the chapel, library, physical fitness, lounge, recreation, and training spaces. The space configuration, types, quantities, and arrangement of equipment in some leisure and community spaces are under the cognizance of the following organizations:

Chapel - Chief of Chaplains
Library - Chief of Chaplains
Physical fitness - Bureau of Personnel (BUPERS)

NAVSEA 03H1 is responsible for other leisure and community spaces.

Standards for leisure and community spaces apply to a peacetime Navy. In wartime, these spaces would be converted for use as additional berthing, storerooms, or other purposes.

7.1.1 **Purpose.** To provide a change from watchstanding and working routine. A well-balanced program of shipboard and ashore recreational activities is provided promoting reenlistment. These activities can be effective in maintaining crew morale and in fighting drug and alcohol abuse.

7.1.1.1 Surface ship goal. - The goal is to provide space for 1/3 of the crew to participate simultaneously in some form of leisure or community activity. Figure 7-1 provides guidelines for allocating this area.

7.1.1.2 Submarine goal. - Due to the space constraints in submarine design, provision for leisure facilities must be considered on a case basis.

7.1.2 **Types.** Provide a mix of leisure and community spaces, including areas for quiet, passive pursuits and personal entertainment, recreational areas for active social and competitive events, and an area for spiritual welfare.

7.1.2.1 Spaces for use by all personnel.

Chapel
Library
Physical Fitness Room
Training and Recreation Room

7.1.2.2 Spaces provided for each personnel group.

Lounge (officer, CPO, crew)
Recreation space (crew only)

7.1.3 **Function.**

7.1.3.1 Chapel. - Provides a place for special services, personal devotion, and group Bible study. It is the location for

regular weekly services. Large spaces, such as the hangar bay on aircraft carriers, are used for special services when a large number of personnel participate.

7.1.3.2 Library. - Provides a place for recreational reading and self study for improving job performance and for advancement in rank. Usually supervised by the chaplain.

7.1.3.3 Physical fitness space. - Provides a place for physical conditioning, including flexibility, strength, and aerobic training. The goal is to provide a sufficient number of exercise stations to permit each crewmember to have three, 30-minute exercise periods per week based on an equipment availability of 112 hours per week.

7.1.3.4 Lounge. - Provides a place for entertaining guests, reading, studying, writing, and listening to music. A crew lounge is provided where space permits.

7.1.3.5 Recreation space. - Provides a place for relaxing, watching TV, listening to music, playing games, studying, writing, and other activities.

7.1.3.6 Training and recreation space. - Provides a place for formal classroom training during normal working hours and after hours can be used for watching television, movies, lectures, and meetings.

7.2 Outfit and Furnishings.

7.2.1 **Chapel.** Provide altar, digital programmable organ/piano, chairs, arm chair for chaplain, pulpit, television support, and liturgical decoration. All chapel furnishings shall be portable to permit convertibility to alternate functions. Provide a storeroom with access directly into the chapel for stowage of furnishings when chapel is used for alternate functions. A religious literature locker shall be provided in the passage adjacent to the chapel.

7.2.2 **Library.** Provide customer service counter, librarian workstation, card catalog cabinet, library shelving, magazine rack, paperback book rack, chairs, and built-in book return. Provide tables for recreational reading, and study carrels with audio-visual equipment to enhance training.

7.2.3 **Physical Fitness Space.** Provide abdominal unit, arm stations, chest/shoulder machines, exercise support apparatus, latissimus/pulley machines, leg machines, scale, and chinning bar. Equipment metal frames should be corrosion resistant steel or have a durable baked enamel finish. Use compact equipment for maximum use of space. Specify equipment that is easy to repair and has readily available replacement parts. Provide a full-width, segmented mirror on one bulkhead for self evaluation of technical form in performing exercises. Additional portable

physical fitness equipment may be stowed in the athletic gear storeroom.

7.2.4 **Lounge.** Provide upholstered furniture, end, corner, and coffee tables with table lamps, magazine rack, TV monitor foundation, and built-in stowage for books, games, stereo system, and recordings. Avoid curved transoms, except in Flag officer living spaces, due to high fabrication costs. A trophy case for holding and displaying special honors, sporting trophies, and other mementos shall be provided as space permits. Where a lounge is not provided for the crew, some lounge furniture should be provided in the crew recreation space.

7.2.5 **Recreation Space.** Provide two- and four-person table seating consisting of portable stacking chairs on large ships and fixed outrigger type seating on small ships, TV monitor, magazine rack, trash receptacle, and ship's entertainment system loudspeaker. Recreation spaces are unsupervised and furnishings are subject to very rough treatment. Furnishings must be durable and easily maintained.

7.2.6 **Training Space.** Educational seating with tablet arms (fixed mount or stackable). Video monitor, marker board, portable lectern, and bulkhead mounted training aids.

7.3 Arrangement Practices for Surface Ships.

7.3.1 **Chapel** (Figure 7-2). Chapel seating is based on 1 percent of total accommodations, with a minimum seating capacity of 30 persons. Approximately 15 sq. ft. is needed per seat. A secondary egress is required, since the space holds more than 20 persons. Provide lockable storeroom with drawer, locker, and jackrod stowage aids for stowing all gear. Install a service sink in the storeroom for cleaning religious elements. Mount a movie screen in the overhead where it may be pulled down and used to show films. Install bulkhead and overhead sheathing and carpeting throughout. Provide incandescent lighting in the chapel with a separate circuit for the chancel area and spot lights for the altar and lectern. Provide power for the eternal light installed adjacent to the tabernacle.

7.3.1.1 Fully mobile arrangement. Altar, lectern and all seats are mobile. Locate altar and lectern for optimal viewing by all persons. Locate organ/piano so that operator can view the speaker.

7.3.1.2 Fixed Chancel arrangement. Altar and lectern are permanently mounted in a dedicated chancel area; seating remains portable. Other arrangement practices are similar to the fully mobile design.

7.3.2 **Library** (Figure 7-3). Size the library based on approximately 1 sq. ft. per four accommodations. Provide four areas - librarian's station, book stacks area, study area, and reading area.

7.3.2.1 Librarian's station. - Locate the librarian's station near the access to the space. Position furniture so that the operator can simultaneously serve customers and monitor the whole space. Provide a built-in book return from outside the library to the librarian's station so that books may be returned at any time.

7.3.2.2 Book stacks area. - Provide 1 lin. ft. of shelving per five accommodations on ships with less than 3000 accommodations. On ships with 3000 or more accommodations, provide 1 lin. ft. of shelving per seven accommodations. Orient shelving athwartship to help retain books as the ship rolls. Ensure that the card catalog is near the stacks area.

7.3.2.3 Study area. - Orient study carrels athwartships. Ensure that adequate clearance is provided for chairs. Provide electrical outlet to audiovisual carrels.

7.3.2.4 Reading area. - Locate the newspaper sticks, magazine rack, and paperback book display rack in or near the reading area. Orient reading table and chairs athwartship.

7.3.3 **Physical Fitness Space** (Figure 7-4). Provide a dedicated physical fitness space in ships with 200 or more accommodations. In smaller ships (and submarines) provide physical conditioning equipment in a multipurpose space where its use is compatible with other space functions.

7.3.3.1 Size the physical fitness space based on approximately 20 sq. ft. per exercise station plus an additional allowance for a warm-up area.

7.3.3.2 Locate physical fitness space near berthing concentrations. In ships with more than 1000 accommodations, provide multiple physical fitness spaces. Overall configuration of the space is not critical since physical fitness equipment comes in all shapes and sizes and equipment can be matched to the space. Provide adequate clearance around exercise stations for access and operation.

7.3.3.3 Provide a full length and width, segmented mirror on one bulkhead for self evaluation of technical form in performing exercises. In each crew berthing space, provide at least one chin-up bar.

7.3.3.4 Where practicable, use individual units rather than multi-station units to ensure having a high usage factor.

7.3.3.5 In small ships with few exercise stations, select equipment that has a small footprint and can train as many muscle groups as possible. In larger ships where space permits, provide special purpose units.

7.3.4 **Lounge** (Figure 7-5). Provide one seat per five accommodations in officer and CPO lounges; provide one seat per

30 accommodations in the crew lounge. Size lounges based on approximately 15 sq.ft. per seat. Seating orientations are not of concern, but should have an adequate view of the TV monitor. Seats may be portable. All other furnishings are normally permanently mounted.

7.3.4.1 Officer lounge. - Provide adjacent to, or as part of, the officer messroom. Arrange seats and end/corner/ coffee tables in groupings. Ensure that there is easy access to the magazine rack and coat and hat hooks. Locate the TV monitor where it affords the best view to the most seats. Where practicable, install the TV monitor in a multipurpose cabinet that also contains stowage for a stereo system, books, recordings, and games. Install bulkhead and overhead sheathing and ensure that cut-outs and quick-access panels are provided in the sheathing where necessary to access distributive system fittings. Provide carpeting throughout. Ship's force may select and install their own decorative accessories (i.e., pictures, plants, etc.).

7.3.4.2 CPO lounge. - Provide adjacent to, or as part of, the CPO messroom. All other arrangement practices are similar to the officer lounge.

7.3.4.3 Crew lounge. - Provide adjacent to, or in the vicinity of, the chapel or library. Sheathing and carpeting are not installed. Other arrangement practices are similar to the officer lounge, except that this space is often not used for TV viewing.

7.3.5 **Recreation Space** (Figure 7-5). Provide approximately one seat and writing surface per six accommodations in recreation spaces. Size recreation spaces based on approximately 15 sq.ft. per seat.

7.3.5.1 Alternate functions. - Arrange recreation spaces with consideration for their alternative functions as training areas and additional wartime surge berthing space. Recreation areas within living spaces should be as large as practicable and not fragmented throughout the living space. Figure 5-4 shows a typical recreation space/area in two functional modes. The lower view shows a normal recreation area while the upper view shows the same area with the recreational furnishings removed and the space outfitted for additional wartime surge berthing with minimal impact to other systems.

7.3.5.2 Noise abatement. - Recreation areas in living spaces are noisy and require partitions for isolating recreation areas from sleeping areas. Locate TV monitor for optimal viewing by as many personnel as possible and away from nearby berths.

7.3.6 **Training Space** . This space has two basic areas - the instruction area for the lecturer; and the seating area. In many instances the instructor may be a TV videotape. The goal is to provide an adequate instruction area and then maximize seating

in the remainder of the space. Provide a secondary egress if the space seats 21 or more persons.

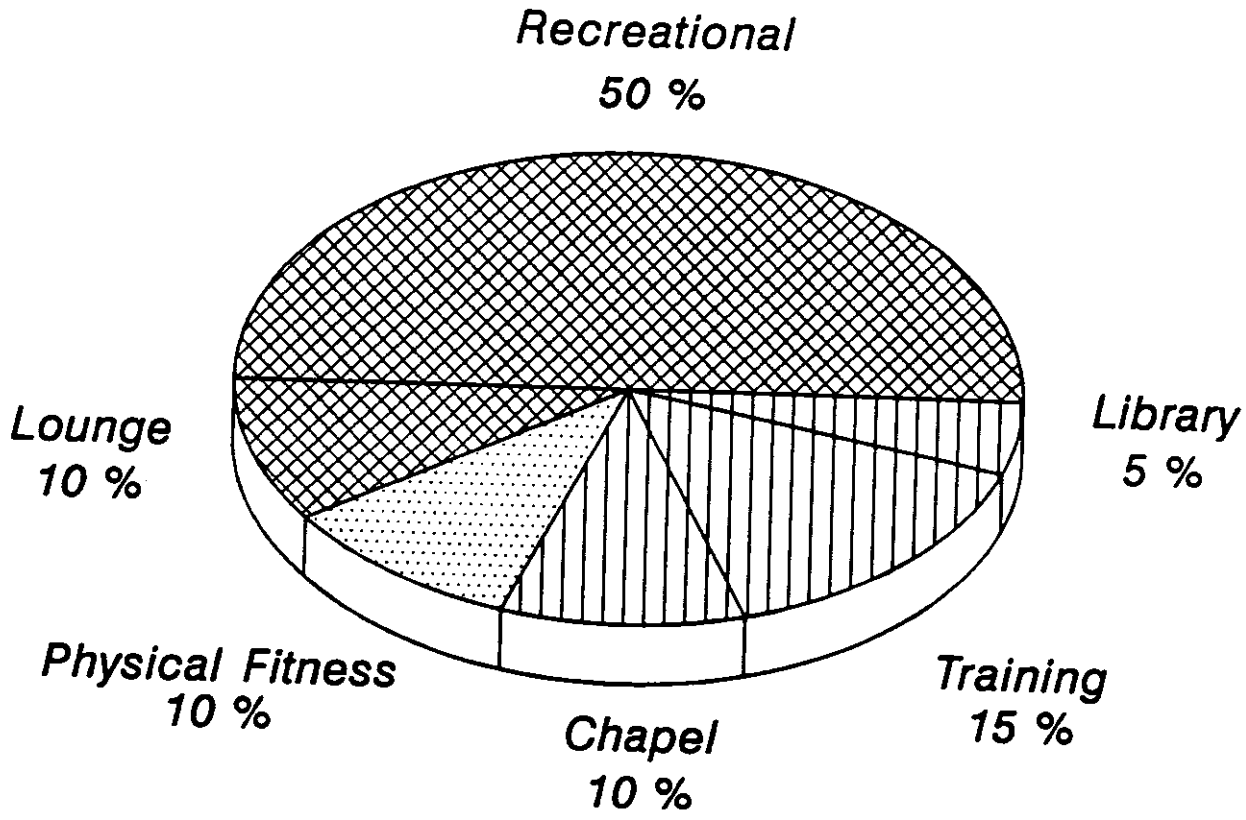
7.3.6.1 Instruction area. - Plan for a lectern, marker boards, TV monitor, and a small amount of walking area. Install large sized marker boards on bulkhead behind lectern and elsewhere, where practicable. Marker board may also be used as screen for viewing slides and view-graphs.

7.3.6.2 Seating area. - Orient seating facing forward or aft toward the instruction area. Mount appropriate training aids on bulkheads around the seating area.

7.4 **Arrangement Practices for Submarines**. Submarine space constraints preclude provision for most leisure and community spaces. In general the following is provided:

Minimal book stowage in the messrooms
Physical conditioning equipment in a multipurpose space (i.e., auxiliary machinery room); equipment selection is based on whatever fits
CPO lounge - consisting of a single four-person table surrounded with booth type seating and stowage under the seats

Other spiritual, recreational, and training needs are typically satisfied in the messrooms. Additionally, officers are provided with writing surfaces and seats in their quarters.



TOTAL AREA - APPROX 5 SQ. FT. / ACCOM
(LIKE SHADED SPACES MAY BE COMBINED)

FIGURE 7-1
LEISURE & COMMUNITY SPACE GUIDELINES

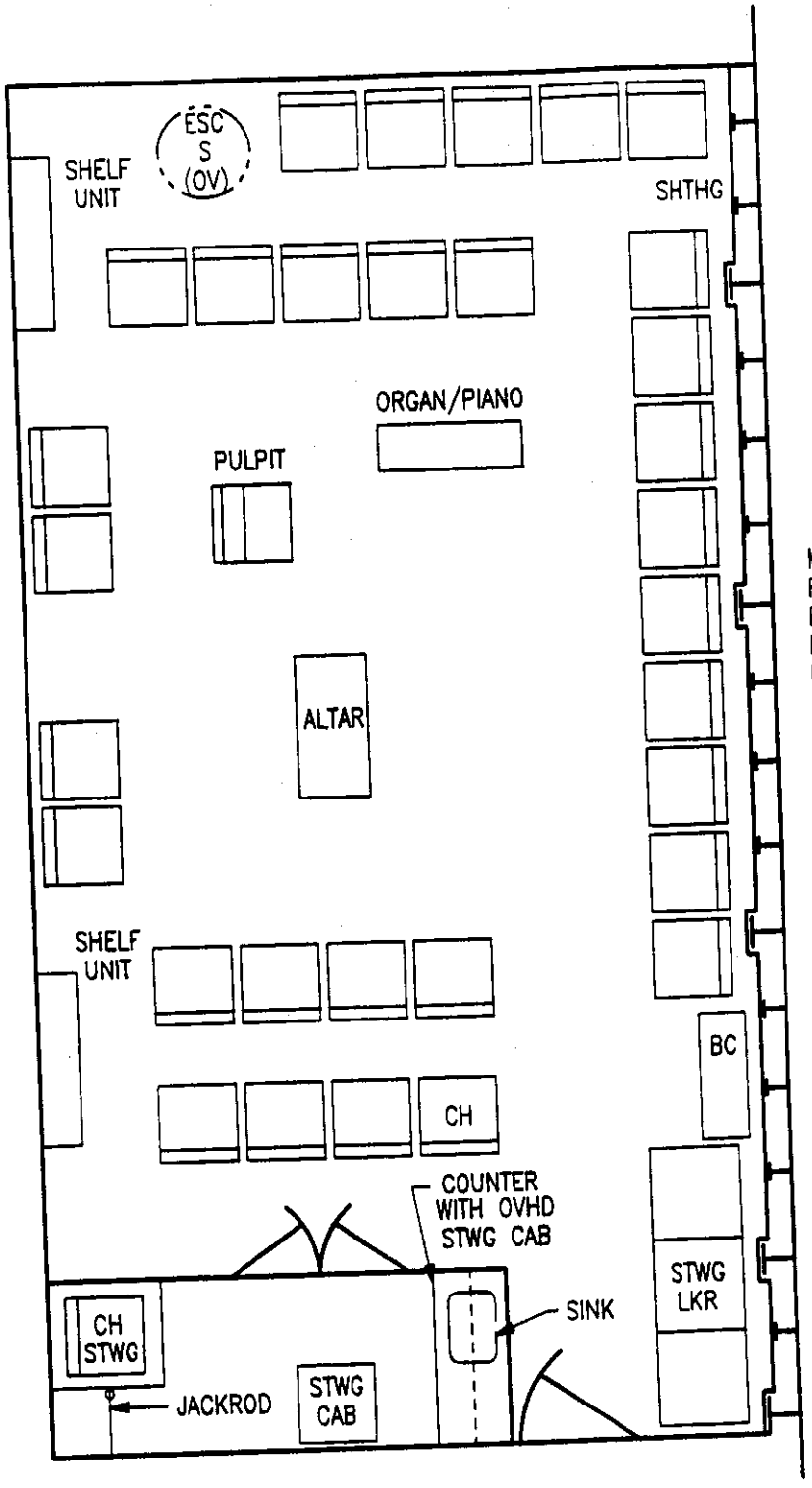


FIGURE 7-2
TYPICAL CHAPEL

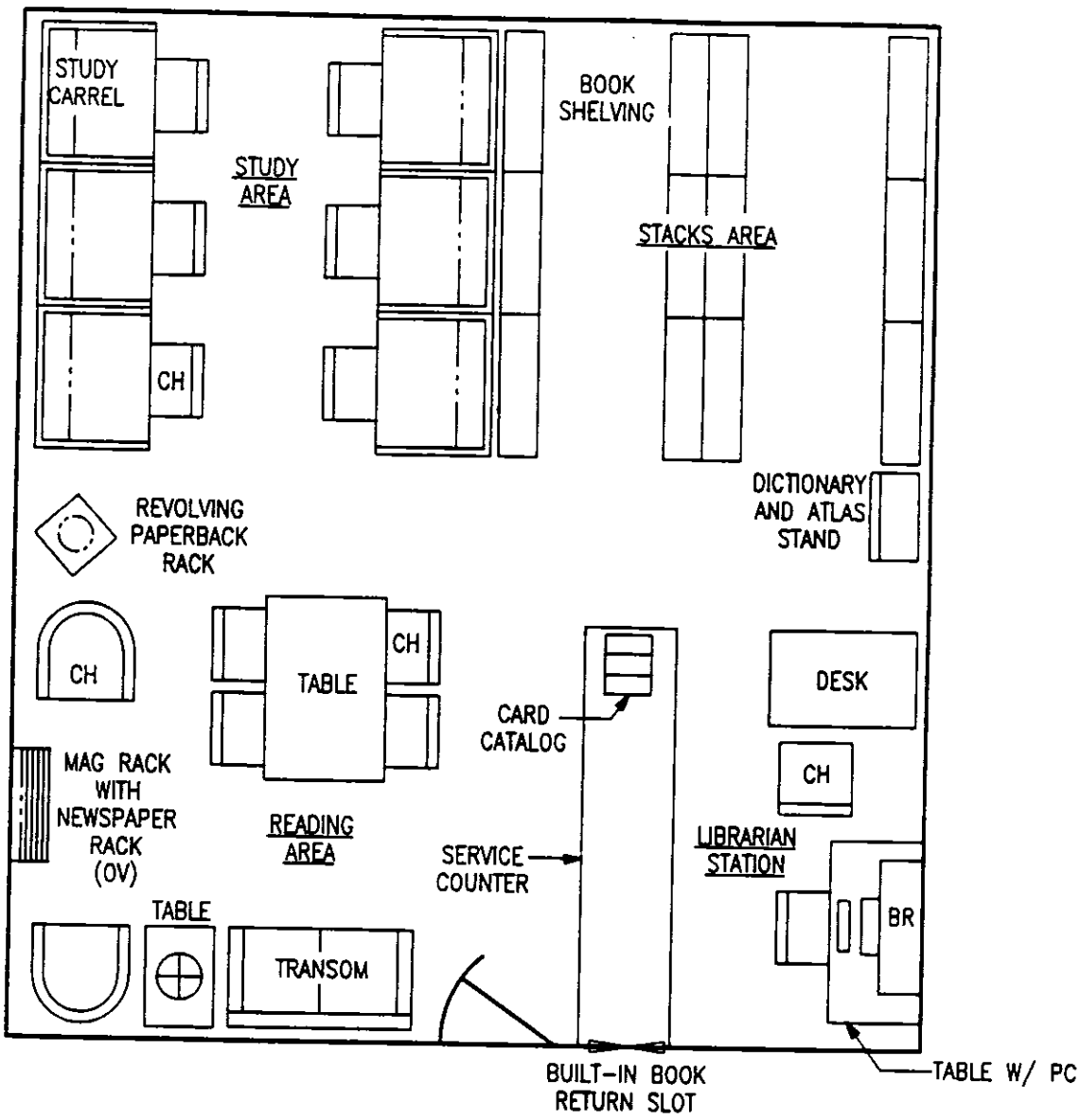


FIGURE 7-3
TYPICAL LIBRARY

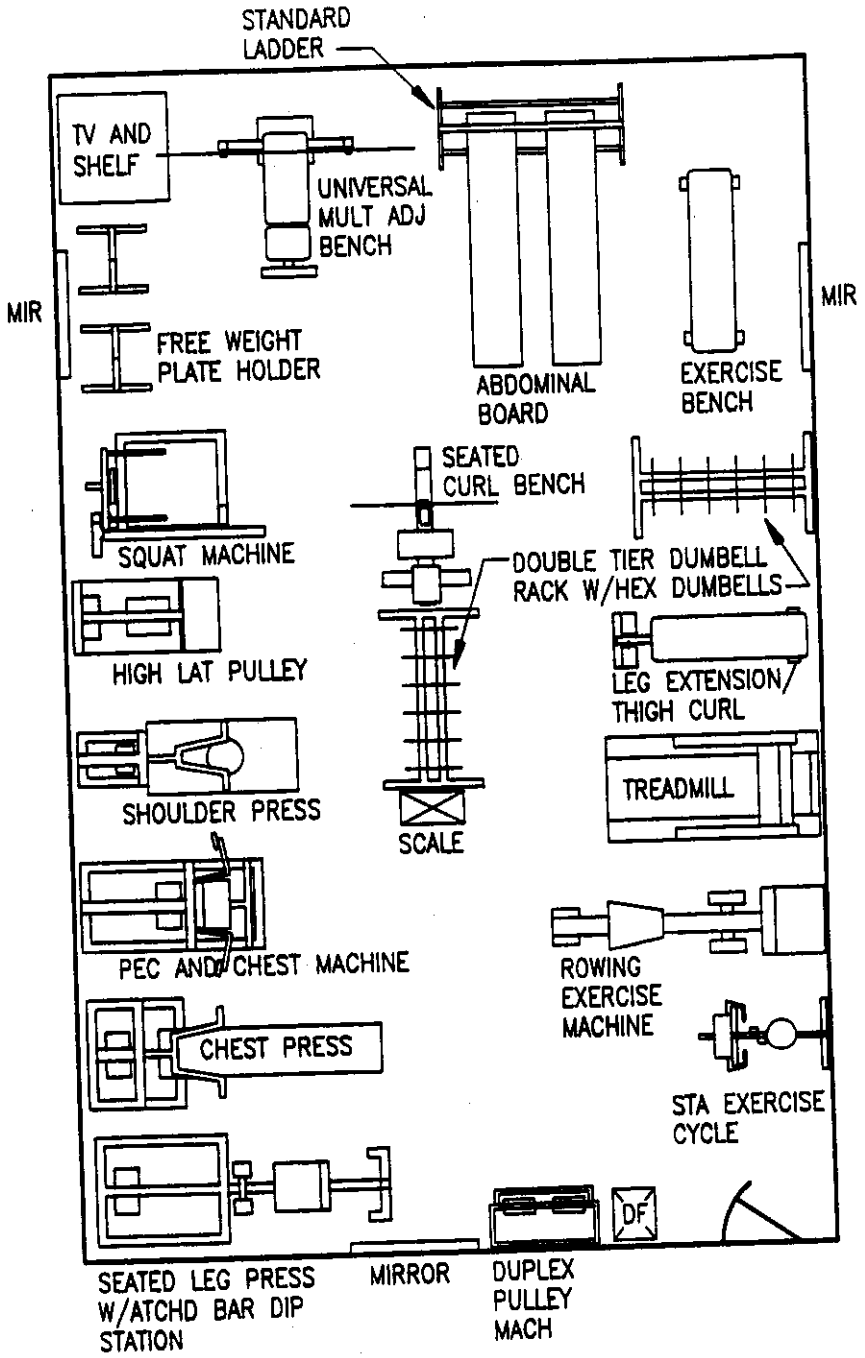
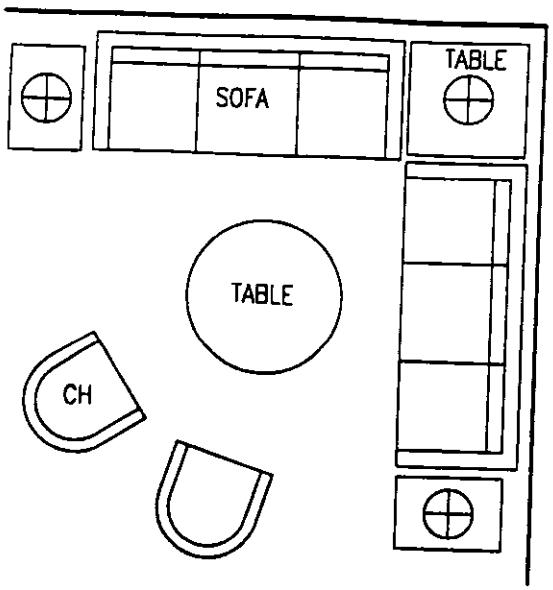
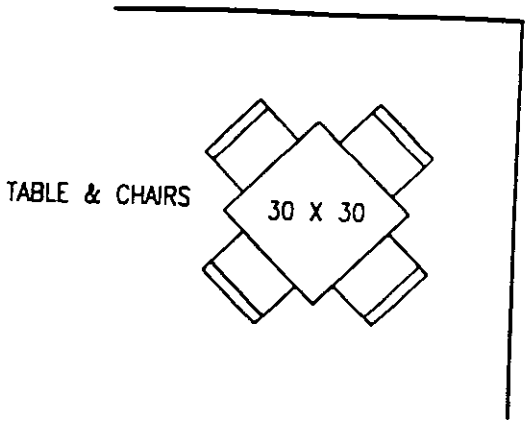
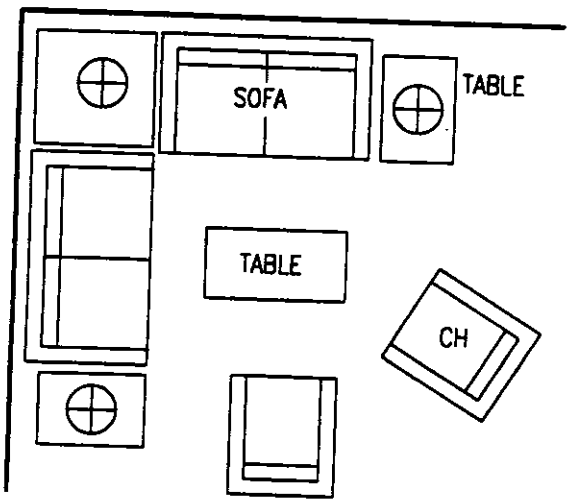


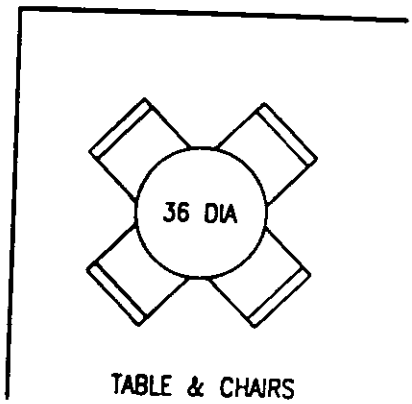
FIGURE 7-4
TYPICAL PHYSICAL FITNESS SPACE

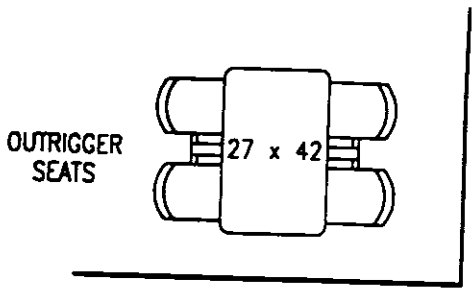






LOUNGE SEATING GROUPS





RECREATION SEATING GROUPS

FIGURE 7-5
TYPICAL LOUNGE AND RECREATION SEATING GROUPS

8.0 FOODSERVICE SPACES

8.1 General. The entire system of food service, which includes food handling, storage, preparation, serving, dining, mess gear sanitizing, and garbage disposal should be considered as an integrated unit. The space configurations should provide for the maximum functional relationship of these spaces. The space configuration, types and quantities of equipment, and arrangement of equipment, for all foodservice spaces except messroom seating, is under the cognizance of Naval Supply Command (NAVSUP) and Naval Food Service Systems Office (NAVFSSO). NAVSEA 03H1 is responsible for messroom seating. Foodservice spaces are identified in Table 8-1.

TABLE 8-1 FOODSERVICE SPACES (See Note)

Compartment	ACCOMMODATIONS			
	Less Than 200	200-799	800-3000	More Than 3000
CO/Flag Galley	-	X	X	X
Officer Galley	-	X	X	X
Officer Pantry	X	-	-	-
Officer Messroom	X	X	X	X
Officer Scullery	-	X	X	X
CPO Galley	-	X	X	X
CPO Messroom	X	X	X	X
CPO Scullery	-	X	X	X
Galley/Centralized Galley	X	X	X	X
Vegetable Prep Area	X	X	X	X
Meat Prep Area	X	X	X	X
Utensil Wash Area	X	X	X	X
Serving Annex	X	X	X	X
Crew Messroom	X	X	X	X
Extended Serve Line	X	X	X	X
Beverage Island	-	-	X	X
Crew Scullery	-	X	X	X
Provisions Issue Room	-	X	X	X
Thaw room	-	-	X	X
Bakery	-	-	X	X
Bread Room	-	X	X	X

Note: The centralized galley concept, and variations of the centralized galley concept, should be considered for all ship types.

8.1.1 **Galley Types**.

8.1.1.1 **Separate Galley.** A separate galley and messroom for officers, CPOs, and crew is the most common type.

8.1.1.2 **Centralized Galley** (Figure 8-1). The centralized galley is a one galley configuration. Food for all personnel is prepared in one galley. The centralized galley provides the type of service required to separate messrooms for officers, CPOs, and crew. The centralized galley reduces manning, weight, and cost. If a large enough space is not available to provide a full centralized galley, a single galley for CPOs and crew, and a separate galley for the officers, are recommended.

8.1.2 **Type Service**.

Officer - Traditional steward service, family style, buffet, and cafeteria
CPO - Buffet, and cafeteria
Crew - Cafeteria

8.1.3 **Location**. The area of the ship with the largest subdivision is generally best suited for foodservice spaces. Foodservice spaces should be in an area that is convenient to the personnel served and least affected by ship's motion and vibration. The galley should not be located over tanks or refrigerated storeroom. When selecting the location for foodservice spaces, consideration should be given to personnel access, including formation of mess lines in good and inclement weather, and access to freeze, chill, and dry provisions storerooms. The scullery location should be coordinated with the location of tables and traffic flow within the messroom. The preferred location for foodservice spaces is amidship on or above the damage control deck in order to provide maximum fore and aft access.

8.2 **Outfit and Furnishings**.

8.2.1 **Foodservice Spaces.** Foodservice equipment is specified by NAVFSSO. These spaces are provided with stainless steel bulkhead and overhead sheathing in accordance with NAVSEA drawings. Quarry tile is the preferred deck covering for foodservice spaces.

8.2.2 **Messroom.** Foodservice equipment, such as salad bars, beverage stands, ice dispensers, and beverage dispensers that are installed in the messrooms, are specified by NAVFSSO. Equipment other than foodservice equipment and the number of mess seats required is determined by NAVSEA 03H1. The following is provided as guidance in selecting equipment:

8.2.2.1 Officer Messroom. - Officers are provided arm chairs and 36-inch wide mess tables that provide 24 inches of

seating space per occupant. Sideboards are provided for stowage of flatware, linen, and condiments. Bulkheads and overheads are treated with decorative sheathing.

8.2.2.2 CPO Messroom. - CPOs are provided arm chairs and 36-inch wide tables that provide 24 inches of seating space per occupant. Bulkheads and overheads are treated with decorative sheathing.

8.2.2.3 Crew Messroom. - The crew is provided 27-inch wide tables with outrigger type seats on small ships, and tables with stacking chairs on large ships. Tables with booth/transom seating may also be provided on small and large ships. Tables shall provide 21 inches of seating space per occupant. Tables and chairs in messrooms which are designated for weapons handling shall be portable. Bulkheads and overheads are not treated with decorative sheathing.

8.3 **Arrangement Practices for Surface Ships**.

8.3.1 **Food Preparation Spaces.** Arrangement of equipment in food preparation spaces will vary with the number of accommodations served and the personnel category (officer, CPO, or crew) of these accommodations. Each space requires a different set of design principles which govern the arrangement, due to differing personnel category and method of food service. The arrangement of equipment is developed by NAVFSSO.

8.3.2 **Messrooms.** Arrangement of equipment in messrooms will vary with the number of accommodations served and the personnel category (officer, CPO, or crew) of these accommodations. Each space requires a different set of design principles which govern the arrangement, due to differing personnel category and method of food service.

Arrangement of tables in the officer and CPO messrooms should be coordinated with NAVFSSO, considering the type of service being provided by the galley. Arrangement of tables in the crew messroom should also be coordinated with NAVFSSO, considering the location of their extended serving line equipment. See Figure 8-2 for typical crew messroom arrangement.

8.4 **Arrangement Practices for Submarines**. Foodservice spaces on submarines are custom-built to fit the particular configuration and need. NAVFSSO will provide required data for location of spaces and arrangement of equipment.

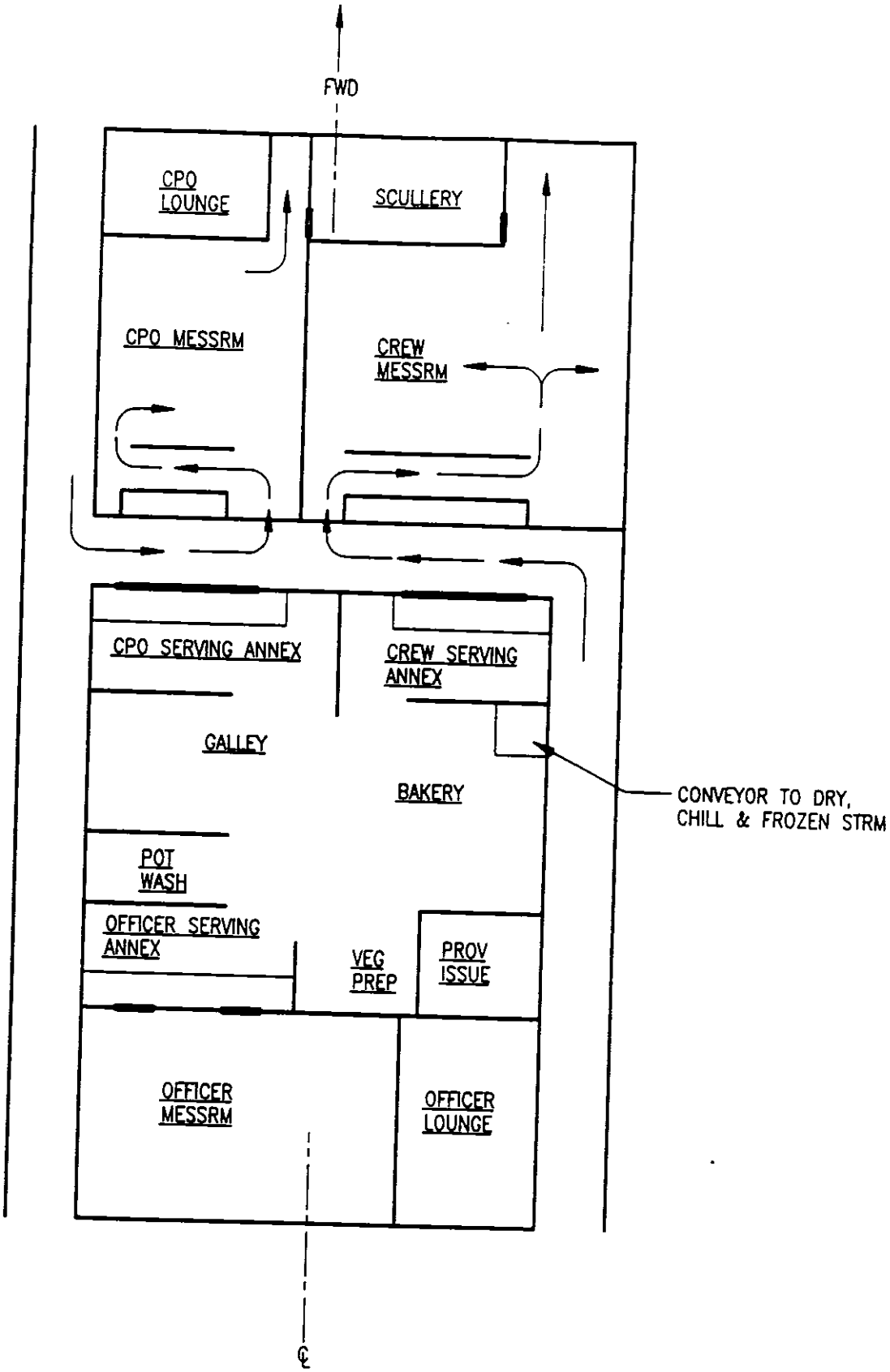


FIGURE 8-1
CENTRALIZED GALLEY CONCEPT

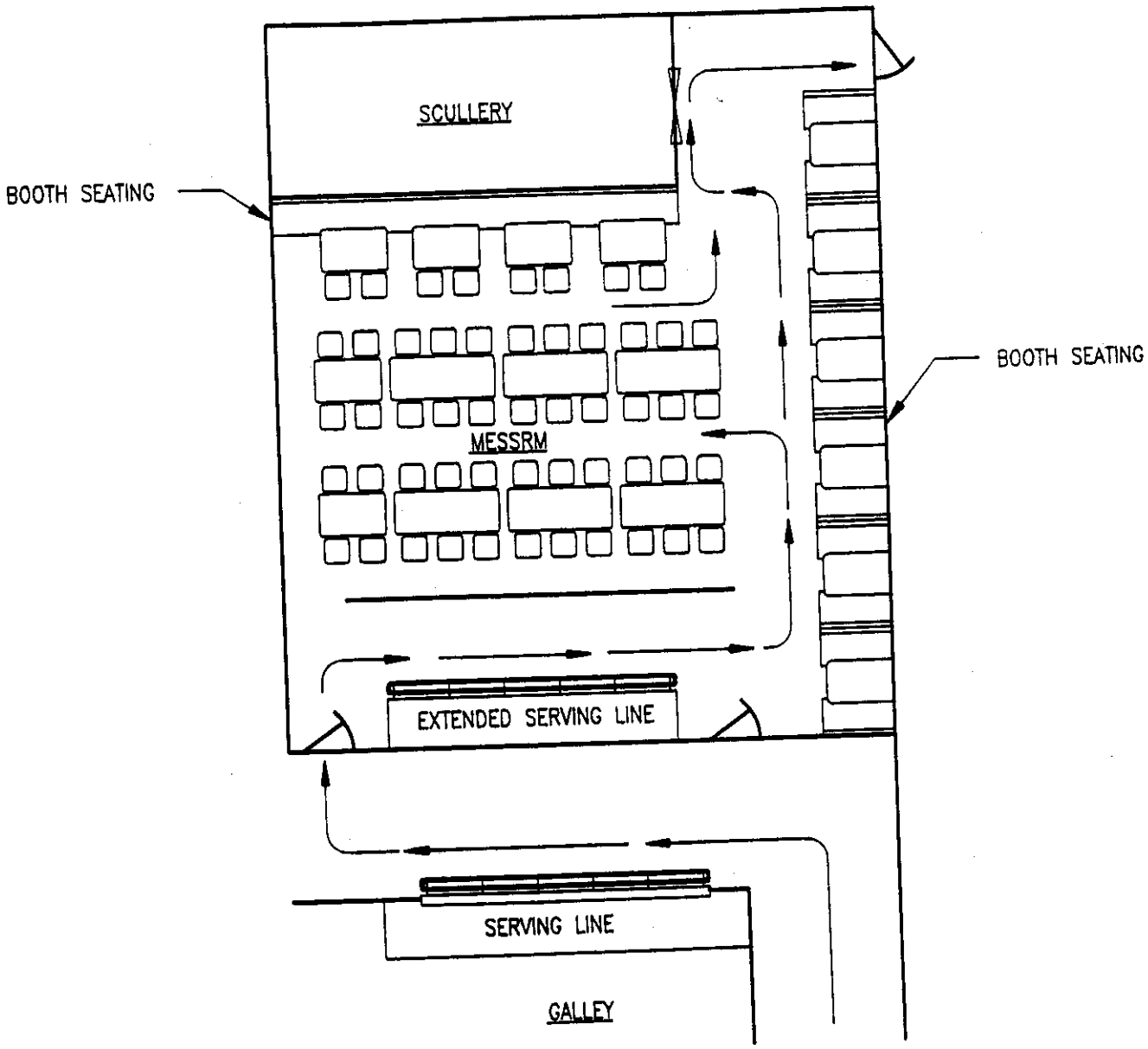


FIGURE 8-2
TYPICAL CREW MESSROOM

9.0 SERVICE SPACES

9.1 **General**. The space configuration, types and quantities of equipment, and arrangement of equipment in the service spaces (except for the brig) are under the cognizance of NAVSUP and Naval Exchange Command (NEXCOM). BUPERS is responsible for the brig.

9.1.1 **Types**. Service spaces include the barber shop, ship store, snack bar, electronic game machines space, vending machines area, and brig, They serve all ship personnel.

9.1.1.1 Barber shop. - Provide all ships with either portable barber facilities or barber shop as required by the OPNAV Habitability Standards.

9.1.1.2 Ship store. - Two types of ship stores are provided in surface ships: walk-in store and window service store. The walk-in store can handle several shoppers at once inside the store, while the window service store serves one person at a time across a counter.

9.1.1.2.1 Walk-in store. Provide a walk-in store in ships having more than 300 accommodations. Walk-in stores have demonstrated significantly higher sales than window service stores because they permit a more effective display of merchandise, allow customers the opportunity to examine the merchandise, and stimulate impulse buying.

9.1.1.2.2 Window service store. - Provide a window service store, also called an over-the-counter store, in surface ships having less than 300 accommodations and in ships with more than 1000 accommodations, to augment the walk-in store.

9.1.1.3 Snack bar. - Provide snack bars in ships having more than 500 accommodations. Snack bars are window service type facilities.

9.1.1.4 Electronic game machines space. - Provide a secure space and allow for weight of electronic game machines in all surface ships.

9.1.1.5 Vending machines area. - Provide space and weight for candy, canned drink, and snack vending machines in all surface ships.

9.1.1.6 Brig. - Provide brig facilities on ships specified by BUPERS. The number of cells required is based on the number of accommodations for ships requiring brig facilities.

9.1.2 **Location**. Service spaces, except the brig, may be grouped together in a complex or separately distributed through the ship.

9.1.2.1 Barber shop. - Locate aft of amidships to improve barber performance by minimizing ship motion effects.

9.1.2.2 Ship store. - Locate near general ship activity; avoid out-of-the-way locations due to the lower expectation of sales and increased security risk.

9.1.2.3 Snack bar. - Locate in the vicinity of the crew messroom; ensure that the location does not interfere with the foodservice operation.

9.1.2.4 Electronic game machines. - Locate electronic game machines in a space that can be secured. Avoid unsupervised, remote locations where it may be difficult to provide security.

9.1.2.5 Vending machines area. - Locate near concentrations of living and work spaces. Machines may be located in passages where their use does not interfere with ship traffic. Ensure space reservation on general arrangement drawings to avoid passage clearance violations later in the design process. Avoid locating machines high in the ship due to weight of the machines and remote location of associated storerooms.

9.1.2.6 Brig. - Locate in easily accessible remote area of the ship, preferably below the damage control deck but above CHT overflow heights, away from excessive noise and heat.

9.1.3 **Operation.**

9.1.3.1 Barber shop. - Hours of operation are based on providing each crewmember with a regulation haircut about every 2 weeks at about 15 minutes per haircut. Ship servicemen are trained to cut hair for both males and females.

9.1.3.2 Ship store. - Sells snacks, clothing, uniform accessories, personal hygiene products, and some luxury items (watches, cameras, audio, and video equipment). Profits go to the ship's morale, welfare, and recreation fund which supports activities such as movies, parties, sporting events, tours in foreign ports, and many other recreational activities. These profits are important to crew morale.

9.1.3.3 Snack bar. - Sells fast food items, drink, and snacks, such as candy, soda, ice cream, and popcorn.

9.1.3.4 Electronic game machines space. - Electronic game machines usually have posted hours of access and the activity usually is partly or totally supervised. Electronic games are very popular and highly profitable. Profits go to the ship's morale, welfare, and recreation fund.

9.1.3.5 Vending machines area. - Most food and drink vending machines are continuously available.

9.1.3.6 Brig. - Chief-Master-at-Arms personnel operate the brig. Personnel are sent to the brig for minor infractions and generally serve 2 or 3 days.

9.2 **Outfit and Furnishings.**

9.2.1 **Barber Shop.** Barber shops are outfitted with: counter with sink and mirror, barber chairs, waiting chairs, supply cabinet, magazine rack, and coat/hat rack.

9.2.2 **Ship Store.** There are two types of ship stores: walk-in type and window-service type. Walk-in stores have two areas: display area containing display shelving, peg-boards, jackrods, and gondolas; and the operator's area containing showcases, cash and wrap counter, cash register, stool, and a limited amount of display shelving. Shopping baskets shall also be provided. Window-service stores shall be provided with display case units around the periphery of the store to advertise the merchandise and assist customers in determining their purchases prior to being served. Locate a price list bulletin board in the passage outside the store or within the store where it may be readily viewed by customers.

9.2.3 **Snack Bar.** Compartment size is variable depending on type of ship. The essential core of outfit items includes the top loading freezer/chiller, display shelving, popcorn machine, dresser with sink, cash register, and counter.

9.2.4 **Electronic Game Machines and Vending Machines.** Electronic game machines and vending machines are typically units that are provided by NEXCOM and selected by a ship with assistance from NEXCOM. Electronic game machines and vending machines shall pass through existing doors and hatches. Cold drink, candy, and snack vending machines are the most common units. Dollar bill changers may be provided if space and weight permit.

9.2.5 **Brig.** Brigs are outfitted with tamper proof equipment and furnishings. Each cell is provided with berths and a combination water closet, lavatory, and bubbler unit. The sentry is provided with a desk and controls for locking and unlocking electric operated cell doors. Brig outfitting and construction requirements are in accordance with drawing NAVSEA No. 804-5959213.

9.3 **Arrangement Practices for Surface Ships.** Most service spaces, except the brig, require space for customers to wait in line before being served. Provide wide passages or alcoves outside these spaces so that customers will not interfere with general ship traffic.

9.3.1 **Barber Shop** (Figure 9-1). Provide approximately 60 sq. ft. per barber chair. The barber shop has two distinct areas: the working area and the waiting area. The working area includes the barber chairs, standing mats, cabinets, lockers, and

counters. The waiting area contains the customer waiting chairs, magazine rack and coat/hat rack. In large ships with multiple barber shops, arrange and outfit all shops the same.

9.3.1.1 Barber chairs have two clearance circles - a turning circle determined by the rotation of the chair and a working circle which includes clearance for the barber. Ensure that both turning and working circles are clear of obstructions. Working circles of adjacent barber chairs may overlap each other to conserve space.

9.3.1.2 Orient barber counters that contain a sink athwartship to minimize splash due to ship roll. Orient other items of outfit to best suit the arrangement.

9.3.2 **Walk-in Ship Store** (Figure 9-2). Base walk-in store size on approximately 0.6 sq. ft. per accommodation for mid-size ships and approximately 0.3 sq. ft. per person for larger ships such as carriers. Limit maximum store size to approximately 1100 sq. ft. to maintain effective operator supervision. Provide multiple stores in large ships including a window service store for high volume sales items.

9.3.2.1 Traffic flow. - Arrangement should promote unidirectional traffic flow from the entrance through the displays to the checkout counter and out the exit. Where practicable, provide separate entrance and exit doors. Provide enough passageway clearance to ensure traffic does not become congested when persons stop to examine merchandize.

9.3.2.2 Shopping baskets. - Provide shopping baskets and stand near the entrance to the store.

9.3.2.3 Store front. - Provide laminated safety glass display windows for adding visual interest to the store to promote impulse buying.

9.3.2.4 Door. - Provide laminated safety glass ship store doors for adding visual interest to the store and for monitoring the store when it is secured.

9.3.2.5 Security. - Install an intruder alarm and security gate at the store display windows and door. Install convex surveillance mirrors where needed so that the operator may view all parts of the store from operator's station.

9.3.2.6 Display area. - Maximize use of display shelving, gondolas, and feature end units within the display area while maintaining adequate aisle clearances. Orient units so that the store operator may monitor as many as possible without convex mirrors. Where standard length display shelving does not fit, provide pegboard or jackrod to suit.

9.3.2.7 Showcases. - Provide showcase units for high priced items, such as cameras and electronics equipment, at the

operators station to ensure close supervision of these items and so the operator may assist customers.

9.3.2.8 Cash register. - Locate the cash register at the operator's station on the cash and wrap counter so that operator may continue to monitor the store and customers while making a transaction. Secure the cash register to the counter.

9.3.2.9 Magazines. - Provide a magazine display unit near the customer check out area.

9.3.2.10 Case breakout. - Where practical, provide a ship store storeroom adjacent to the store for case breakout and resupply. Designate special stowage for ship store flammables.

9.3.3 **Window Service Ship Store** (Figure 9-3). Base store size on approximately 0.3 sq. ft. per accommodation up to a maximum size of approximately 120 sq. ft.

9.3.3.1 Service window. - Provide a service window with CRES roller curtain closure for serving customers. Provide a counter in way of the service window.

9.3.3.2 Cash register. - Locate the cash register so that it is inaccessible to patrons. Secure the cash register to the counter.

9.3.3.3 Orientation. - Arrange the cash register, stock shelves and display cases for convenient use by the operator and orient them athwartship, where practicable, to improve operator performance by minimizing ship roll effects.

9.3.3.4 Security. - Install an intruder alarm and security gate at the store door and provide a security gate to cover the service window when the store is not in use. In large ships where security is a greater problem, provide security gate in front of all display case units.

9.3.3.5 Trash. - Install a bulkhead mounted, trash receptacle in the passage outside the ship store.

9.3.4 **Snack Bar** (Figure 9-4). Provide an area of approximately 80 sq. ft. Most arrangement practices for window service ship stores apply to the snack bars with a few modifications.

9.3.4.1 Display cases. - Display case units are not required; instead, provide a large service window with display shelving behind the counter.

9.3.4.2 Security. - An intruder alarm and security gate are normally not required for the snack bar due to the relatively low value of the stock; standard high security padlocks are used.

9.3.5 **Electronic Game Machines Space.** - A dedicated electronic game machines space shall be provided when more than five machines are installed. Where less than six machines are installed, an area which does not impede traffic flow may be used. Provide approximately 15 sq. ft. per machine.

9.3.5.1 Installation. - Ensure machines are provided with electrical outlets and proper lighting. Also arrangement shall allow clearance for maintenance.

9.3.5.2 Security. - Install electronic game machines in a space or area that can be secured. If a secure space is not provided, a security grill shall be installed to protect the machines.

9.3.6 **Vending Machines Area**

9.3.6.1 Groups. - Group vending machines together to simplify resupply. Each group should contain a mix of different machines. In large ships with multiple units of each type, provide several vending areas.

9.3.6.2 Stowage. - Where practicable, provide a small ship store storeroom near vending machine areas for resupplying the machines.

9.3.6.3 Clearance. - Ensure doors to machines can be fully opened for service and maintenance.

9.3.6.4 Trash. - Provide a bulkhead mounted, trash receptacle in the vending machine area.

9.3.7 **Brig.** Provide an arrangement that permits the sentry direct visual access into all cells from the sentry vestibule. Detention cells shall be arranged such that prisoners in one cell cannot observe prisoners in any other cell where practicable. Each brig shall be provided with an emergency escape located in the cell lobby. Brig arrangement requirements shall be in accordance with drawing NAVSEA No. 804-5959213.

9.4 **Arrangement Practices for Submarines.** Submarines do not have dedicated service spaces due to their tight space constraints. Provision is made only for portable barber equipment which is stowed in a locker and used in a multipurpose space.

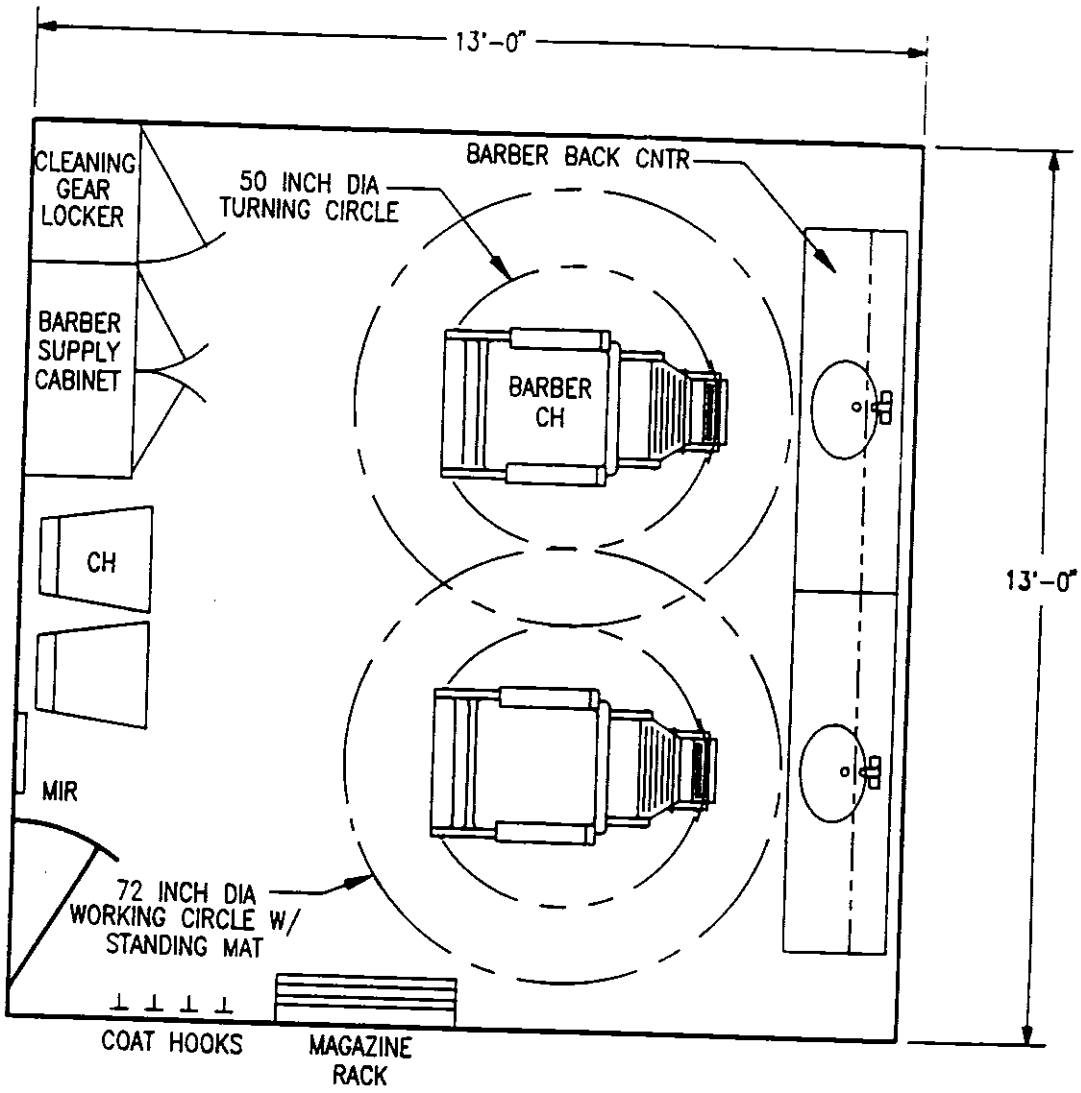


FIGURE 9-1
TYPICAL BARBER SHOP

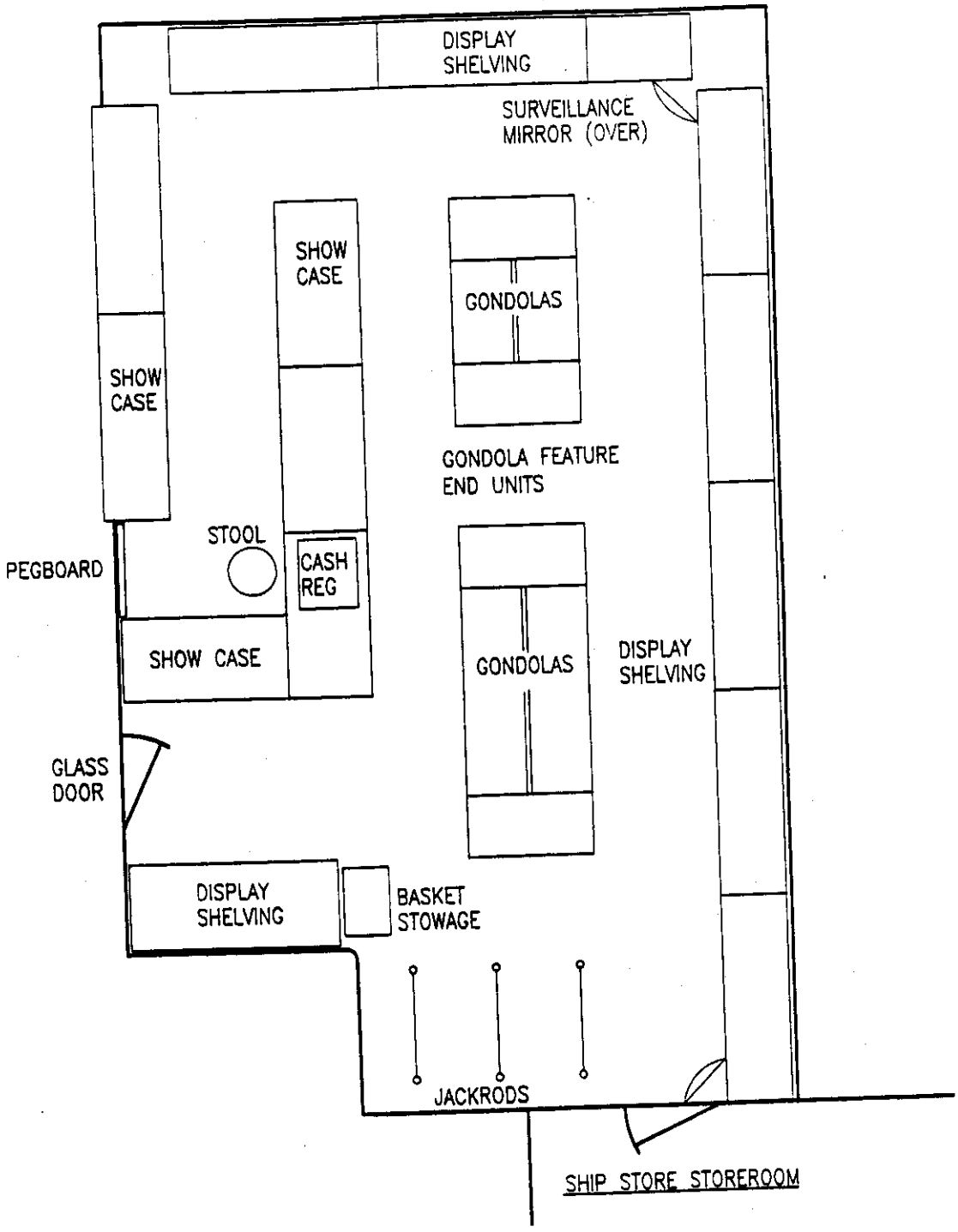


FIGURE 9-2
TYPICAL WALK-IN SHIP STORE

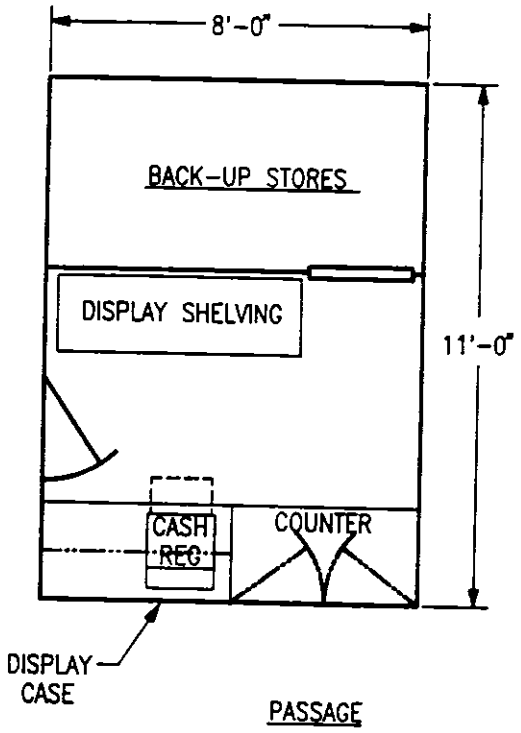


FIGURE 9-3
TYPICAL WINDOW SERVICE SHIP STORE

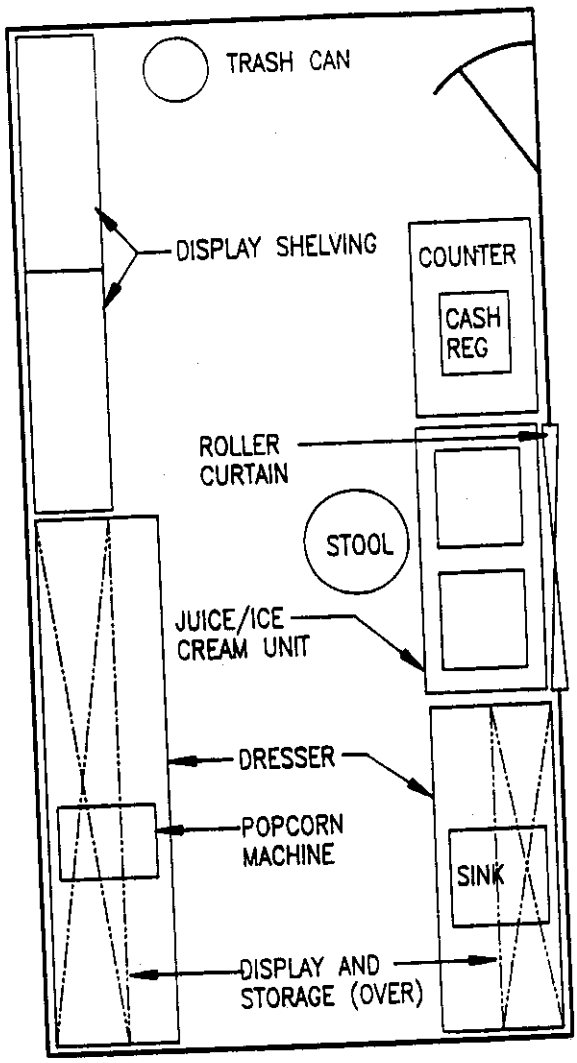


FIGURE 9-4
TYPICAL SNACK BAR

10.0 LAUNDRY AND DRY CLEANING SPACES

10.1 **General**. The space configuration, types and quantities of equipment, and arrangement of equipment in the laundry and dry cleaning spaces is under the cognizance of NAVSUP and NEXCOM.

10.1.1 **Types.** A manned or a self-service laundry space is required for all surface ships and submarines. Laundry and dry cleaning facilities clean, sanitize, deodorize, and restore the appearance of wool, cotton, and synthetic clothing and linens.

10.1.1.1 Manned laundry. - Provide surface ships having more than 100 accommodations with a manned laundry. This facility is responsible for maintaining fabrics that can be processed in aqueous cleaning solutions and subsequently dried or finish pressed with heat and pressure.

10.1.1.2 Self-service laundry. - Provide ships having less than 100 accommodations and submarines with a self-service laundry.

10.1.1.3 Dry cleaning. - Provide ships having more than 1500 accommodations, including troops, with dry cleaning facilities. These facilities are responsible for cleaning woolens and other fabrics that deteriorate in aqueous laundering solutions. Dry cleanable fabrics are processed using a non-flammable, toxic solvent called perchloroethylene (PCE) and are pressed in a completely dry state at low heat and pressure.

10.1.2 **Location.**

10.1.2.1 Manned laundry. - Locate near concentrations of crew living spaces, where practicable, since 85 percent of the laundry is generated by the crew. Ensure that the location minimizes structural access cuts for washer-extractors which require dedicated shipping routes. Avoid locations with excessive ship motion and vibration in order to prolong the life of the equipment and improve operator efficiency. Service piping and ventilation considerations generally will keep laundries at third deck or above.

10.1.2.2 Self-service laundry. - Locate near user living spaces. In order to ensure reliable operation, the self-service laundry must be supervised by manned laundry personnel if ship has a manned laundry.

10.1.2.3 Dry cleaning. - Locate in the vicinity of the laundry. This space requires dedicated exhaust ventilation to the weather and dry cleaning fluid fill piping from the weather in order to safeguard personnel from toxic PCE fumes.

10.1.3 **Operation.**

10.1.3.1 Laundries. - Figure 10-1 shows the workflow in a manned laundry. Self-service laundries are similar, but on a

smaller scale and finishing work is usually done in the living spaces with hand irons. Manned laundries must also handle wool garments. Although the laundry is not equipped with a dry cleaning machine, wool garments can be subjected to local spot removal techniques and then finish pressed to revitalize the clothing.

10.2 Outfit and Furnishings.

10.2.1 General.

10.2.1.1 Commercial equipment. - The Navy uses upgraded, commercial laundry and dry cleaning equipment that is modified for shipboard use. Equipment that is not modified for shipboard use is generally unsuitable due to its inability to operate for sustained periods at full capacity on a rolling and vibrating platform with frequent variations in service conditions.

10.2.1.2 Utility equipment. - General purpose, utility type equipment is installed. The use of high production rate, special purpose equipment has generally been unsatisfactory in Navy ships due to the impracticality of providing requisite personnel training within the constraints of a rotating, unskilled labor pool.

10.2.2 **Equipment Selection** (manned laundry). - Approved equipment is identified in reference 8. This optimizes equipment availability and minimizes maintenance, supply support, and training needs while providing adequate service to all customers.

10.2.2.1 Laundry equipment. - In addition to large capacity washers, provide at least one small capacity unit to efficiently handle small loads such as the CO's laundry. Roughly 70 percent of the wash load goes to the dryers; the remainder consisting of flatwork and officer and CPO uniforms goes directly to presses. Although dryers see a lesser load and drying cycles are as fast as the washers, match washing and drying capacities as closely as possible to assure a smooth workflow. Provide a service sink or stationary tub to pre-process particularly dirty clothing and for compartment cleanup.

10.2.2.2 Steam/electric power. - Most major laundry equipment operates on either steam or electric power. Ships without steam propulsion systems should consider using electric equipment to avoid the need for auxiliary steam systems. However, steam equipment is about 50 percent more efficient than electric equipment due to more efficient heat transfer.

10.2.2.3 Dry cleaning equipment. - Small ships are not equipped with a dry cleaning machine since the risk associated with carrying and using PCE outweighs the need for the service. For these ships, provide a dry cleaning utility press in the laundry, which is used with local spot removal techniques to handle most needs. Laundered garments can be pressed on a dry cleaning press if thoroughly dried first; however, dry cleaned

garments cannot be pressed on laundry presses since their relatively high operating temperatures and pressures would cause fabric damage.

10.2.3 **Accessory Equipment** (manned laundries). - Manned laundries are generally provided with the following equipment:

Air vacuum
Chair and/or stool
Damp box
Detergent chemical bin
Drinking fountain
Eye/face bath
Hand irons and ironing boards
Jackrods
Laundry baskets
Ready service stores
Receiving and issue counters
Scale
Soiled bag and clean bag stowage
Sorting bins
Spray gun
Work tables

10.2.4 **Equipment Selection** (self-service). - Select equipment as required, in coordination with NEXCOM.

10.3 **Arrangement Practices for Surface Ships** (Figure 10-2). The objective in laundry arrangements is to permit work to flow smoothly from station to station, with minimal cross traffic, from the time it is received until it is issued.

10.3.1 **Manned Laundry.** The laundry is roughly made up of three areas: the wash area which contains the washer-extractors, dryers, and related equipment; the press area which contains the presses and finishing equipment; and the receiving/issue area where clothing is checked in and out and held in temporary stowage. In large ships these areas may be separated by bulkheads or may even be stacked on different decks, while in small ships they are generally all within one compartment. Also in large ships, arrangement concerns may dictate that the receiving and issue area be divided into separate areas.

10.3.1.1 Orientation. - Orient equipment having a rotating cylinder, such as the washer-extractor and tumbler dryer, so that the equipment cylinder axis is parallel to the ship's longitudinal centerline in order to minimize wear on bearings from roll of the ship.

10.3.1.2 Wash area. - Group washer-extractors and dryers. Where practicable, arrange washer-extractors and dryers facing each other to facilitate the transfer of clothing. Orient equipment as discussed above, and provide required service and maintenance clearances. Avoid locating equipment and systems in way of shipping routes. Also, avoid locating washer-extractors

over fuel oil tanks, because if hotwork is needed for foundations during equipment replacement, expensive safety precautions will have to be taken within the tanks.

10.3.1.3 Coaming. - Install a coaming around the washer-extractors, individually or grouped, and around service sink or stationary tub to contain spills. Ensure that the coaming does not present a tripping hazard and allows for the movement of laundry baskets.

10.3.1.4 Wash area accessories. - Install scales near washer-extractors for weighing wash loads and equalizing individual machine pocket loads. Provide detergent/chemical bins adjacent to washer-extractors. Install an eye/face bath for providing first aid to chemical injuries.

10.3.1.5 Water heaters. - Where located within the laundry, install water heaters near the washer-extractors (inside the coaming) and provide them with thermal insulation to minimize heat transfer to the compartment.

10.3.1.6 Dryer side clearance. - Dryers have no side clearance requirement and may abut each other to minimize heat transfer to the compartment and improve drying efficiency. Dryers require access to a lint screen that is installed in the ventilation exhaust duct connected to the rear of the unit.

10.3.1.7 Utility presses. - Group utility presses in two- or three-unit sets that are conveniently arranged for use by one operator in "V" or "U" shapes, respectively. In the three-unit set, the large class C presses make up the sides of the "U" and the Class B press is the base. Presses may be at right angles for ease in installation, but should not touch each other in order to localize vibration effects. In using a utility press set the operator works two or three garments at once, each on a different press. The operator moves from press to press and while one garment is pressed the operator is positioning another garment at the next press.

10.3.1.8 Spray gun. - Provide a spray gun mounted in a rack above each utility press set, where it can reach each press buck and is used to dampen garments.

10.3.1.9 Damp box. - In laundries with more than one utility press set, provide a damp box adjacent to each group for receiving laundered garments. Damp boxes are not required for single press sets, nor for flatwork ironers where standard laundry baskets normally serve this purpose.

10.3.1.10 Work tables. - Provide a work table for each linen press set and flatwork ironer for folding finished linens. Work tables shall be provided at utility press sets where space permits. Ensure that legs of work tables allow for laundry baskets to be stowed under the tables.

10.3.1.11 Jackrods. - Provide two-high jackrods next to each press set for holding finished garments on hangers. Space jackrods a minimum of 40 inches apart vertically, the lowest shall be 42 inches above the deck.

10.3.1.12 Receiving and issue area. - Locate the receiving and issue area near the primary access to the space. This access should be fitted with a dutch door for passing large laundry bags in and out. Near the access provide separate stowage areas designated for soiled and clean laundry bags.

10.3.1.13 Customer service. - Provide a counter in the receiving and issue area for use with laundry check-in, inspection, lot assembling, and check-out. Install a passing window over the counter for customer service. Within view of the passing window, install a scale for weighing laundry bags.

10.3.1.14 Finished garment stowage. - Provide sorting bins in the receiving and issue area for holding assembled lots of officer and CPO clothing. Also, provide jackrods, one- and two-high, for holding coats, uniforms, and other articles of clothing that are hung rather than folded.

10.3.1.15 Drinking fountain. - Provide a drinking fountain in a readily accessible, central location.

10.3.1.16 Laundry basket clearance. - Passages within the laundry should permit ready movement of both skid and caster type, standard, laundry baskets.

10.3.1.17 Ready service stores. - Provide stowage within the laundry for as much ready service stores as practicable.

10.3.1.18 Detergent bins. - Provide detergent/chemical bins within the coaming between the washer-extractors.

10.3.2 **Self-Service Laundry.** Most arrangement practices for full service laundries apply to self-service laundries. If space permits, provide a waiting area with chairs. In lieu of the large deck mounted chemical bin, provide a bulkhead mounted, commercial, coin operated, detergent dispenser.

10.3.3 **Dry Cleaning.** Provide the same basic three areas as the laundry: wash area containing dry cleaning machine and dry cleaning fluid storage tank; press area containing finishing equipment; and receiving and issue area. Where practical, the laundry and dry cleaning receiving and issue areas may be combined, thus conserving space and manpower. The arrangement practices for laundries apply to dry cleaning with a few modifications and additions.

10.3.3.1 Coaming. - Provide a coaming around the dry cleaning machine. Size the coaming to contain a PCE spill equal to the capacity of the machine. Deck area within coaming should be watertight with no drains.

10.3.3.2 Ventilation. - PCE fumes are toxic and heavier than air. Install an exhaust ventilation terminal 9 inches above the deck adjacent to the dry cleaning machine. Provide electrical safety interlock between the ventilation system and the dry cleaning machine that will ensure the ventilation system is working in order for the machine to operate.

10.3.3.3 PCE storage. - Provide a dry cleaning fluid storage tank mounted in the overhead near the dry cleaning machine. Install a dedicated fill piping system from the weather deck to the tank and from the tank to the machine. Additional PCE, if required, is carried in 55 gallon drums mounted in racks and stowed in the weather.

10.3.3.4 Air vacuum. - The dry cleaning press and spotting board operate by forcing steam through a garment to revitalize the fabric. To improve operating efficiency, connect these units to an air vacuum whose size is based on the number of units served. Deck mount air vacuums next to the machines they are serving and provide drain piping to remove water that collects in air vacuums from condensed steam.

10.3.3.5 Spray gun. - Dry cleanable garments are always handled in a completely dry state; therefore, there is no requirement for a spray gun with any finishing equipment.

10.4 **Arrangement Practices for Submarines**. Submarine laundry needs are less than those of surface ships due to the submarine's different mission and jumpsuit type uniform which does not require as much processing. Submarine laundries typically contain one small, front loading washer-extractor with a small dryer stacked above. Large submarines may be provided with two stacked units if space permits. Touch up work, if necessary, is done with hand irons in the living spaces. Submarine laundry equipment is electrically powered and must meet size and noise design restrictions specified in applicable military specifications. Avoid locating adjacent to (over or under) a control systems sonar control space - due to severe noise restriction requirements for sonar operations.

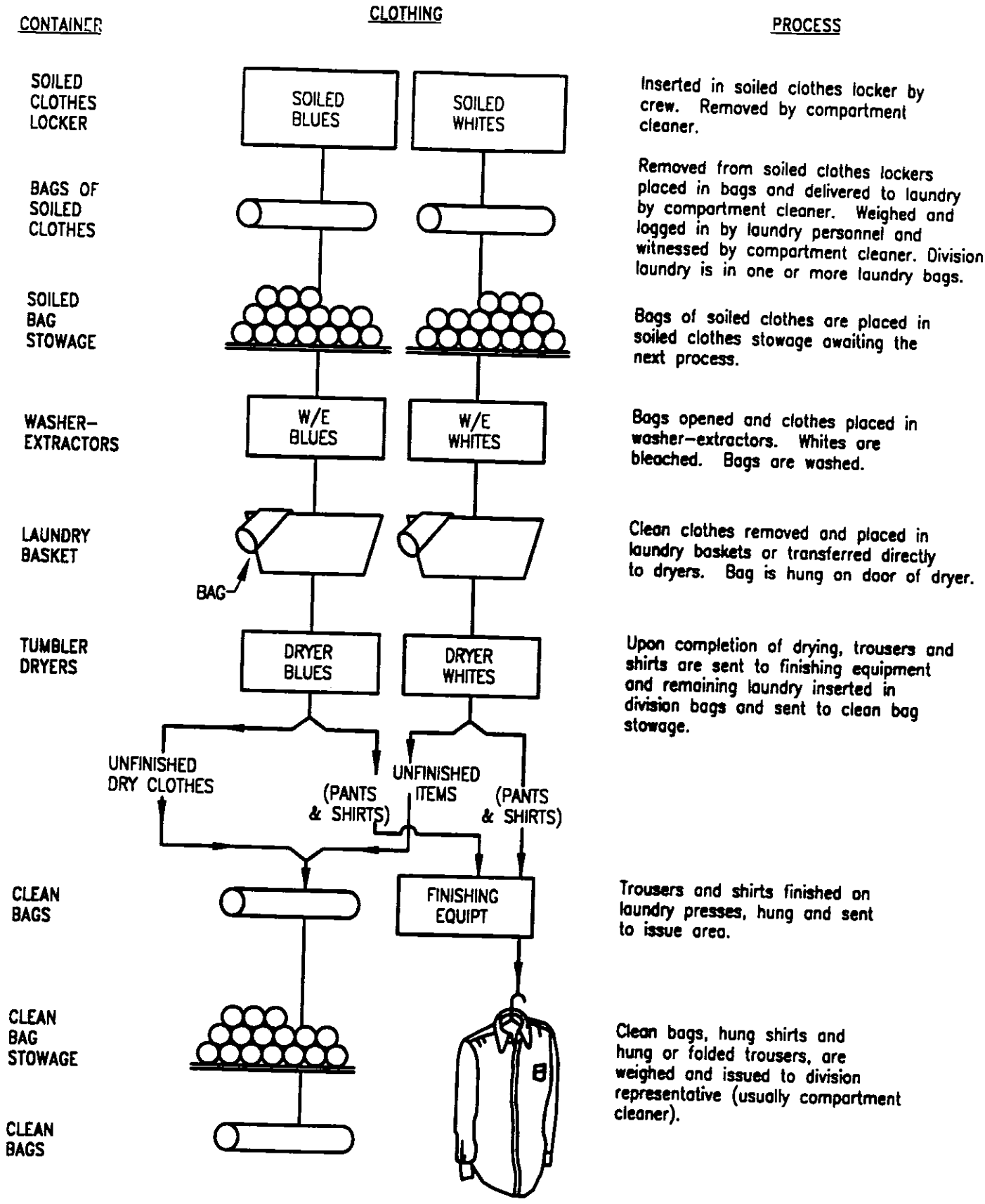


FIGURE 10–1
TYPICAL LAUNDRY WORKFLOW

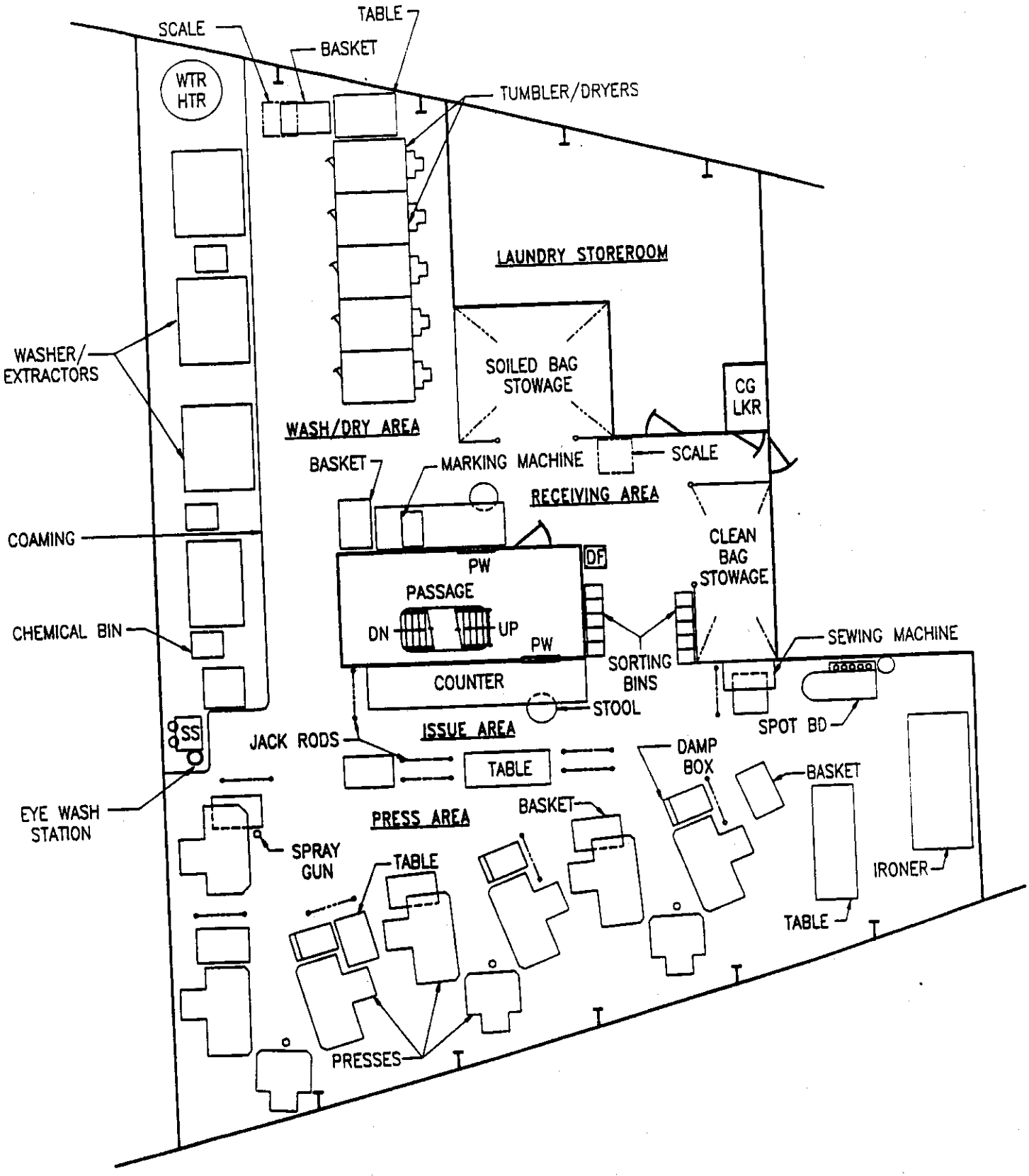


FIGURE 10-2
TYPICAL LAUNDRY

REFERENCES

1. **CHANGES, REPAIR, AND MAINTENANCE TO NUCLEAR POWERED SHIPS, NAVSEA INSTRUCTION C9210.4A**

   Emphasizes for nuclear powered ships, that personnel-related spaces (e.g., living and working), which are located in the vicinity of a reactor space, shall be evaluated and location approved by appropriate authority at NAVSEA Headquarters.

2. **FEDERAL STANDARD COLORS, FED-STD-595b**

   Assigns identification numbers to standard color chips. Nine color families are shown: browns, reds, oranges, yellows, greens, blues, grays, miscellaneous, and fluorescent. Select semigloss colors for shipboard paints to ensure proper reflectance and ease in cleaning.

3. **FIRE PERFORMANCE REQUIREMENTS AND APPROVED SPECIFICATIONS FOR INTERIOR FINISH MATERIALS AND FURNISHINGS (NAVAL SHIPBOARD USE), MIL-STD 1623**

   Identifies fire tests and test limits for habitability materials including bulkhead and overhead sheathing, furniture upholstery, cushioning, plastic laminates, curtains, draperies, deck coverings, and thermal insulation.

4. **GENERAL OVERHAUL SPECIFICATIONS FOR DEEP DIVING SSBN/SSN SUBMARINES, NAVSEA 0902-018-2010**

   Identifies general design requirements by system, in terms of equipment, installation, and testing, for existing submarines.

5. **GENERAL SPECIFICATIONS FOR OVERHAUL OF SURFACE SHIPS, NAVSEA S9AAO-AB-GOS-010/GSO**

   Identifies general design guidance by system, in terms of equipment, installation, and testing, for existing surface ships.

6. **GENERAL SPECIFICATIONS FOR SHIPS OF THE US NAVY, NAVSEA S9AAO-AA-SPN-010/GEN-SPEC**

   Identifies general ship design guidance by system, in terms of equipment, installation, and testing, for all new construction surface ships and submarines.

7. **HABITABILITY MATERIALS LIST, REV J, NAVSEA LTR 9640 SER 05M1/146 DTD 10 MAY 1989**

Identifies approved habitability materials including: bulkhead and overhead sheathing and finish materials, deck coverings, furniture upholstery, cushioning and plastic laminates, draperies, curtains, paints, and adhesives. Provides material specification number, intended use, manufacturer, and ordering nomenclature.

8. **HEATING, VENTILATION & AIR CONDITIONING, DESIGN PRACTICES MANUAL FOR SURFACE SHIPS OF THE US NAVY, NAVSEA 0938-LP-018-0010**

Provides heating, ventilation, and air conditioning design requirements for all ship spaces.

9. **HUMAN ENGINEERING DESIGN FOR MARINE SYSTEMS, EQUIPMENT, AND FACILITIES, ASTM F 1166**

Provides general practices for design of displays and controls, labeling, anthropometry, workspace design, environment, design for maintainability, and standardization.

10. **LIGHTING ON NAVAL SHIPS, DOD-HDBK-289**

Provides lighting requirements and specifies illumination levels for all ship spaces.

11. **MANUAL OF NAVAL PREVENTIVE MEDICINE, NAVMED P-5010**

Provides preventive medicine procedures for living, sanitary, recreation, foodservice, and laundry facilities. Describes procedures for ensuring clean potable water supply.

12. **NAVAL SHIPBOARD FOODSERVICE EQUIPMENT CATALOG, S6161-Q5-CAT-010**

Identifies approved shipboard foodservice equipment, and provides applicable equipment specification number, manufacturer, model number, size, weight, service requirements, stock number, APL number, technical manual number, installation notes, and ordering instructions.

13. **NAVAL SHIPS TECHNICAL MANUAL, COMMISSARY EQUIPMENT, CHAPTER 9340, NAVSEA 0901-LP-340-0001**

Describes foodservice equipment, outfitting, and supplies. It is oriented towards the installer, operator, and maintainer. Discusses safety precautions and sanitation.

14. **NAVAL SHIPS TECHNICAL MANUAL, DECK COVERING, CHAPTER 634, NAVSEA S9086-VG-STM-010**

Provides installation, repair, and maintenance instructions for deck coverings.

15. **NAVAL SHIPS TECHNICAL MANUAL, LAUNDRY, CHAPTER 655, SP086-V4-STM-000**

Describes laundry equipment, fabrics, stain removal techniques, laundering agents, and supplies. It is oriented towards the installer, operator, and maintainer.

16. **NAVSEA DESIGN PRACTICES AND CRITERIA MANUAL FOR GENERAL ARRANGEMENTS DESIGN, NAVSEA T9070-AB-PRO-010 REV A**

Establishes criteria which the design must meet and then demonstrates the general arrangements practices used to apply and integrate these criteria into a total ship system.

17. **NAVY OCCUPATION SAFETY AND HEALTH PROGRAM MANUAL FOR FORCES AFLOAT, OPNAVINST 5100.19B**

Chapters C-19 and C-20 identify safety precautions for laundry and foodservice facilities and equipment.

18. **SHIPBOARD HABITABILITY PROGRAM, OPNAVINST 9640.1**

Identifies CNO's Habitability Program policy and responsibilities, provides environmental control and habitability facility standards for both new construction and existing ships.

19. **SHIPBOARD LAUNDRY AND DRY CLEANING EQUIPMENT CATALOG, NAVSEA S6152-B1-CAT-010**

Identifies approved shipboard laundry and dry cleaning equipment, and provides applicable equipment specification number, manufacturer, model number, size, weight, service requirements, clearances, APL and stock numbers, bolting pattern, installation notes, and ordering instructions.

20. **US NAVY SHIPBOARD COLOR COORDINATION GUIDANCE MANUAL, NAVSEA 0929-002-7010**

Provides criteria for creating desired psychological conditions insofar as color is concerned and provides examples of appropriate color schemes designed to illustrate how the various principles apply when they are used to select paints, deck coverings, and other materials.

21. **US NAVY SHIPBOARD FURNITURE CATALOG, NAVSEA S9600-AD-GTP-010**

Identifies approved shipboard furniture, and provides applicable furniture drawing or specification number, manufacturer, model number, size, weight, stock number, installation notes, and ordering instructions.