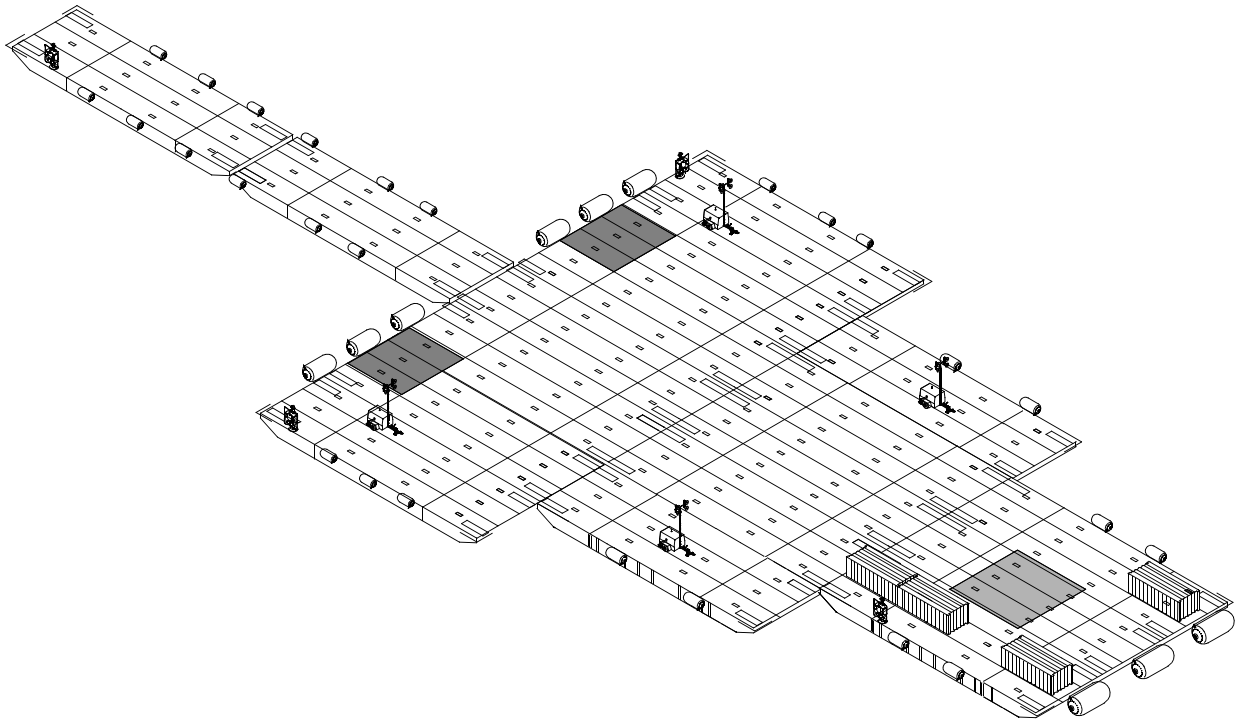


TM 55-1945-216-24

TECHNICAL MANUAL

UNIT, DIRECT SUPPORT AND GENERAL SUPPORT
MAINTENANCE MANUAL
FOR

**MODULAR CAUSEWAY SYSTEM (MCS)
ROLL-ON/ROLL-OFF DISCHARGE FACILITY (RRDF)
NSN 1945-01-497-7059**



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**HEADQUARTERS, DEPARTMENT OF THE ARMY
JUNE 2004**

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DEPARTMENT OF THE ARMY
WASHINGTON, D.C. 1 JUNE 2004

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**UNIT, DIRECT SUPPORT AND
GENERAL SUPPORT MAINTENANCE MANUAL
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NSN 1945-01-497-7059**

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this publication. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Submit your DA Form 2028 (Recommended Changes to Equipment Technical Publications), through the Internet, on the Army Electronic Product Support (AEPS) website. The Internet address is <http://aeprs.ria.army.mil>. If you need a password, scroll down and click on "ACCESS REQUEST FORM". The DA Form 2028 is located in the ONLINE FORMS PROCESSING section of the AEPS. Fill out the form and click on SUBMIT. Using this form on the AEPS will enable us to respond quicker to your comments and better manage the DA Form 2028 program. You may also mail, fax or email your letter or DA Form 2028 direct to: AMSTA-LC-CI / TECH PUBS, TACOM-RI, 1 Rock Island Arsenal, Rock Island, IL 61299-7630. The email address is TACOM-TECH-PUBS@ria.army.mil. The fax number is DSN 793-0726 or Commercial (309) 782-0726.

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HOW TO USE THIS MANUAL

This manual contains certain features to improve the convenience of using this manual and increase the user's efficiency. These features include:

a. Accessing Information

Information is accessed by referring to the Table of Contents, located in the front of this manual, or by looking in the Alphabetical Index, located in the back of this manual.

b. Illustrations

Various methods are used to locate and repair components. Locator illustrations in Controls and Indicator tables, PMCS tables, exploded views and cut-away diagrams make the information in the manual easier to understand and follow.

c. Using This Manual

When using this manual, read and understand the entire maintenance action before performing the task. Also, read and understand all warnings, cautions and notes as well as general safety precautions that apply to the task to be performed. The warning summary will inform personnel of hazards associated with the equipment to be worked on. However, the summary is not all inclusive and personnel should be aware at all times of hazardous conditions that may arise.

Prior to starting the procedures in this manual, the initial setup requirements are located directly above each procedure. The information is given to ensure all materials, expendables, tools and any other equipment necessary are readily available for use. The initial setup will be accomplished prior to starting the actual steps of each maintenance procedure.

Locating Major Components

Obtain the manual for the system to be worked on. Open to the Table of Contents located in the front of this manual. Find Chapter 1, *Description and Theory of Operation*. Under the chapter title you will find the work package titled *Location and Description of Major Components*. Turn to the work package indicated. This work package will give a brief description of the major components, and show an illustration of what the component looks like and its location.

The Alphabetical Index, located in the back of this manual, contains an alphabetical list of all sections of this manual. *Location and Description of Major Components* is found in section L. The work package is found on the right side of the title where the *Location and Description of Major Components* is located. Turn to the work package indicated to find the description and location of each component.

Troubleshooting Procedures

The Table of Contents or Alphabetical Index may be used to locate sections within this manual. To locate a particular troubleshooting procedure, open the manual to the Table of Contents located in the front of this manual. Find Chapter 2, *Troubleshooting Procedures*. Under this section, find a work package titled *Troubleshooting Index*. Turn to the work package indicated, which lists all of the troubleshooting procedures. Look down the list until you find the appropriate work package for the problem you are trying to solve. To the right side of the procedure will be a work package number. Turn to the work package indicated and follow the steps to complete the troubleshooting procedure. The procedures list the malfunction, symptom and the corrective action. The corrective action will indicate which maintenance procedure to go to for the repair of the symptom or what level of maintenance is capable of repair of the problem. Follow the procedures indicated to complete the task. At the top of the task you will have a section called INITIAL SETUP. There are five basic headings listed under INITIAL SETUP.

Test Equipment: Lists all test equipment (standard or special) required to troubleshoot, test and inspect the equipment covered in this manual. The test equipment is identified with an item number and work package number from the *Tool Identification List* located in Chapter 4, *Supporting Information*.

Tools: Lists all tools (standard or special) required to perform the task. Tools are identified with an item number and work package number from the *Tool Identification List* located in Chapter 4, *Supporting Information*.

Personnel Required: Lists all personnel necessary to perform the task.

Equipment Condition: Notes the conditions that must exist before starting the task. The equipment condition will also include any prerequisite maintenance tasks to be performed with reference to the work package number or to the TM number.

References: Includes any other manuals necessary to complete the task. When there are no references listed, all steps necessary to complete the task are contained within this manual. A listing of reference materials is contained in the work package *References* in Chapter 4, *Supporting Information*.

Maintenance Instructions

To locate a maintenance procedure, open the manual to the Table of Contents located in the front of this manual. Find Chapter 3, *Maintenance Instructions*. Look down the list and find the maintenance procedure to be accomplished. On the right side of the maintenance procedure will be a work package number. Turn to the work package indicated. Before beginning the maintenance task, look through the procedure to familiarize yourself with the entire maintenance procedure. At the top of the task you will have a section called INITIAL SETUP. There are six basic headings listed under INITIAL SETUP.

Tools: Lists all tools (standard or special) required to perform the task. Tools are identified with an item number and work package number from the *Tool Identification List* located in Chapter 4, *Supporting Information*.

Materials/Parts: Lists all parts or materials necessary to perform the task. Expendable and durables are identified with an item number from the applicable work package located in Chapter 4, *Supporting Information*.

Personnel Required: Lists all personnel necessary to perform the task.

References: Includes any other manuals necessary to complete the task. When there are no references listed, all steps necessary to complete the task are contained within this manual. A listing of reference materials is contained in the work package *References* in Chapter 4, *Supporting Information*.

Equipment Condition: Notes the conditions that must exist before starting the task. The equipment condition will also include any prerequisite maintenance tasks to be performed with reference to the work package number or to the TM number.

Test Equipment: Lists all test equipment (standard or special) required to troubleshoot, test and inspect the equipment covered in this manual. The test equipment is identified with an item number and work package number from the *Tool Identification List* located in Chapter 4, *Supporting Information*.

Repair Parts and Special Tools List

Refer to TM 55-1945-216-24P when requisitioning parts, special tools and equipment.

Identify the mandatory repair parts required to perform this task listed at the top of the work package in the INITIAL SETUP. Using the part number provided, refer to the part number index work package in TM 55-1945-216-24P. Look up the part number in the part number column and identify the figure and item number where the part is located. Turn to the figure and locate the item number listed. Verify that the item is correct.

**UNIT, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE
ROLL-ON/ROLL-OFF DISCHARGE FACILITY
GENERAL INFORMATION**

SCOPE

This manual contains descriptions and instructions for the Roll-On/Roll-Off Discharge Facility.

Type of Manual: Unit, Direct Support and General Support Maintenance.

Purpose of Equipment: The system provides the capability to move rolling cargo from a sealift vessel to lighters for movement ashore.

MAINTENANCE FORMS, RECORDS AND REPORTS

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 738-750, Functional Users Manual for The Army Maintenance Management System (TAMMS); and AR 700-138, Army Logistics Readiness and Sustainability.

REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR)

If any component in your system needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Put it on an SF 368, Product Quality Deficiency Report. Mail it to the address specified in DA PAM 738-750, or as specified by the contracting activity. We will send you a reply.

HAND RECEIPT (HR) MANUALS

This manual has a companion document with a TM number followed by "-HR" (which stands for Hand Receipt). TM 55-1945-216-10-HR consists of preprinted hand receipts that list end item related equipment (i.e., COEI, BII, and AAL) that must be accounted for. As an aid to property accountability, additional HR manuals may be requisitioned through normal publication channels.

CORROSION PREVENTION AND CONTROL (CPC)

CPC of Army materiel is a continuing concern. It is important that any corrosion problems with this item be reported so that the problem can be corrected and improvements can be made to prevent the problem in future items.

While corrosion is typically associated with rusting of metals, it can also include deterioration of other materials, such as rubber and plastic. Unusual cracking, softening, swelling or breaking of the materials may be a corrosion problem. If a corrosion problem is identified, it can be reported using an SF 368, Product Quality Deficiency Report. Use of key words, such as "corrosion", "rust", "deterioration" or "cracking", will ensure that the information is identified as a CPC problem. The form should be submitted to the address specified in DA PAM 738-750, Functional Users Manual for The Army Maintenance Management System (TAMMS).

OZONE DEPLETING SUBSTANCES (ODS)

The continued use of ODS has been prohibited by Executive Order 12856 of 3 August 1993.

DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE

The procedures for destruction of Army materiel to prevent enemy use are contained in TM 750-244-6.

PREPARATION FOR STORAGE OR SHIPMENT

Reference TM 55-1945-216-10 for preparation for storage or shipment of the RRDF system.

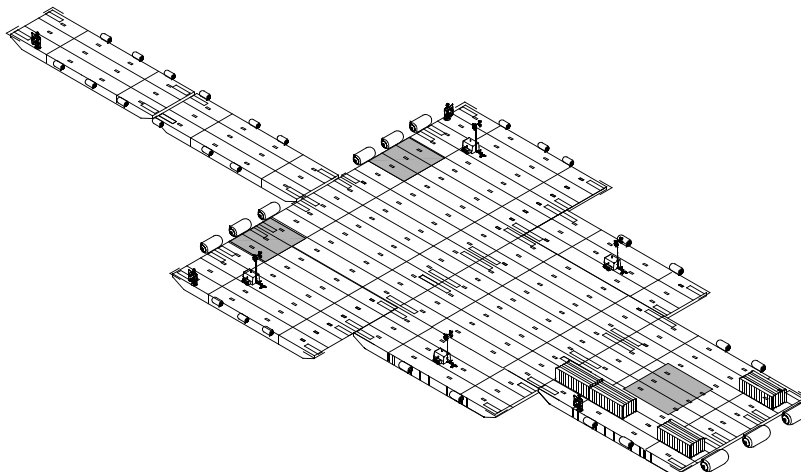
CHAPTER 1

DESCRIPTION AND THEORY OF OPERATION FOR MODULAR CAUSEWAY SYSTEM (MCS) ROLL-ON/ROLL-OFF DISCHARGE FACILITY (RRDF)

**UNIT, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE
ROLL-ON/ROLL-OFF DISCHARGE FACILITY
EQUIPMENT DESCRIPTION AND DATA**

EQUIPMENT CHARACTERISTICS, CAPABILITIES AND FEATURES

ROLL-ON/ROLL-OFF DISCHARGE FACILITY



The RRDF is a floating discharge platform for ocean-going Roll-on/Roll-off (Ro/Ro) capable sealift vessels to allow rolling cargo to be transferred to lighters for movement ashore.

A typical RRDF consists of seventeen intermediate sections, one Combination Beach/Sea End (CBSE) section, one generator container, one personnel shelter, one Emergency Anchor System (EASY) container, four light towers and required component equipment (fendering, mooring bitts and dunnage mats).

Four different configurations of the RRDF may be assembled based upon command decision: full side, full stern, force opening side and force opening stern. The force opening configurations do not include the CBSE, generator container, personnel shelter, EASY container and light towers.

The full side and full stern configured RRDF are capable of supporting the combined weight of the following equipment while operating through Sea State 2.

- a. The side ramp or stern ramp of the Large Medium Speed Ro/Ro vessel (LMSR) with one combat loaded Main Battle Tank (MBT).
- b. Two combat loaded MBTs on the RRDF simultaneously being positioned to board two Army watercraft of the Logistics Support Vessel (LSV) or Landing Craft Utility (LCU) 2000 class. One tank will be maneuvering to board one Army watercraft while the other tank is maneuvering to board the other watercraft. The two tanks will not be simultaneously placed on any one modular causeway systems section.
- c. The ramps of two Army LSV class watercraft while conducting cargo operations.

GENERATOR CONTAINER

The generator container is mounted on the deck of the RRDF and houses a skid mounted tactical quiet 10 kW diesel generator set which provides electrical power to the personnel shelter.

The generator container is equipped with fluorescent lighting, auxiliary Direct Current (DC) lighting system, ventilation system, fire suppression system, 1,000 gallon fuel system and accessories required to support operation of the personnel shelter for 90 days.

PERSONNEL SHELTER

The personnel shelter provides a weatherproof, temperature controlled environment for personnel on the RRDF.

The personnel shelter is outfitted with fluorescent lighting, tables, benches, heating/cooling unit, communications equipment, electrical outlets, emergency lighting and a rest room with an electrically powered incinerator toilet.

LIGHTING SYSTEM

The lighting equipment is provided to illuminate the deck of the RRDF and consists of four trailer-mounted light towers.

Each light tower is self-contained with its own diesel-fueled power source capable of providing an average of 30 foot-candles of illumination over the area of six sections.

EMERGENCY ANCHOR SYSTEM

The EASY is capable of mooring the RRDF in water depths up to 60 ft and remain secured through Sea State (SS) 4 and a controlled drift in Sea State 5 conditions.

The EASY is capable of being deployed in Sea State 3 and is retrievable with the Warping Tug (WT) in Sea State 2 conditions.

RIGID HULL INFLATABLE BOAT

The Rigid Hull Inflatable Boat (RHIB) is capable of supporting eight men and is propelled by a 70 Horsepower (HP) gasoline outboard motor.

The RHIB accompanies the RRDF during transport and is stored in its own 20 ft container.

COMMUNICATION EQUIPMENT

The communication equipment consists of four Very High Frequency/Frequency Modulation (VHF/FM) handheld transceivers powered by DC batteries.

A battery charging station for the transceivers is located in the personnel shelter.

FENDERS

There are four types of cylindrical fenders authorized for use on the RRDF: 6 ft by 12 ft, 5 ft by 10 ft, 4 ft by 12 ft and 3 ft by 5 ft.

The corner fenders provide protection to the corners of the RRDF platform.

MOORING BITTS

The mooring bitts are used for securing lines from other vessels and fenders to the RRDF and are mounted in the module guillotine connectors.

DECK MATTING

The deck matting protects the deck of the RRDF under the ramps of sealift and lighter vessels without interfering with their operations and are secured to the deck with fasteners.

DECK FITTINGS

The sections of the RRDF are provided with D-ring and deck cleat fittings to meet various operational needs.

TOWING BRIDLE AND TOWING INTERFACE

The towing bridle and towing interface allow the RRDF to be stern towed by commercial and military tugs when platform relocation is required.

BASIC ISSUE ITEMS CONTAINER

The Basic Issue Items (BII) container provides RRDF personnel with all the necessary tools and equipment required to assemble, operate and maintain the RRDF and its supporting equipment.

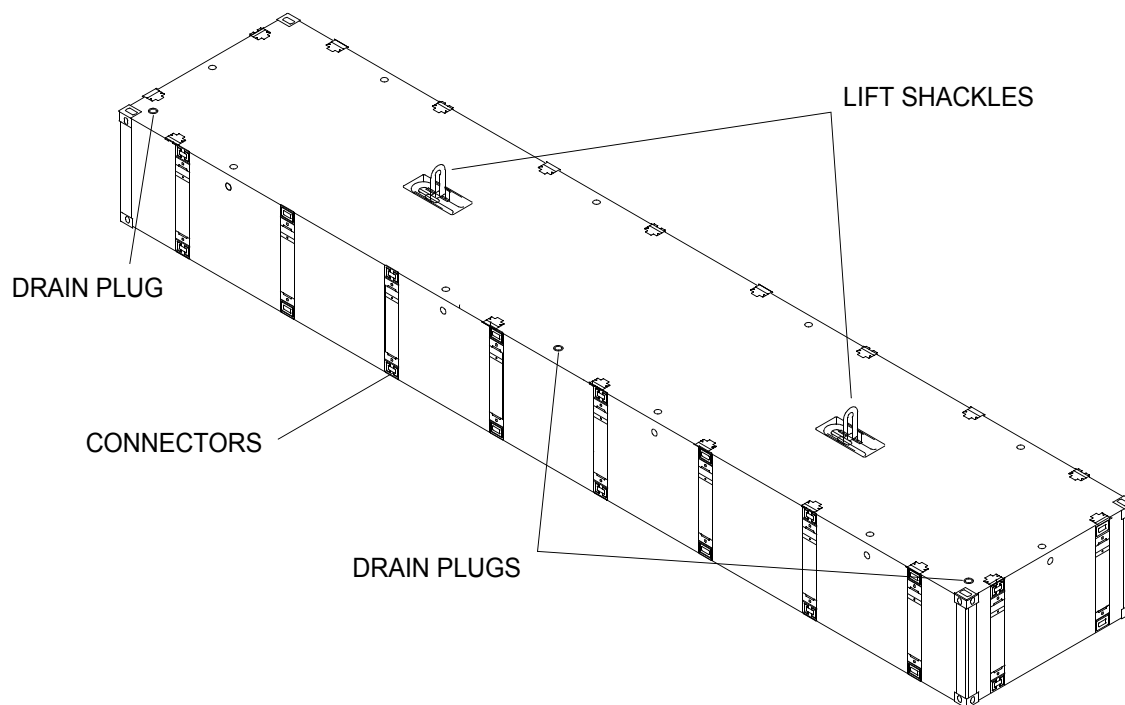
**UNIT, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE
ROLL-ON/ROLL-OFF DISCHARGE FACILITY
EQUIPMENT DESCRIPTION AND DATA**

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS**CENTER MODULE****Location**

The center modules are located between and attached to the end rake modules.

Description

The center module is a hollow structure. Each center module has two 25 ton capacity lifting shackles, which are flush mounted in the deck. The textured deck and smooth bottom are free of any protrusions that might obstruct packing. Access for internal leak detection of each compartment is provided by three recessed threaded plugs located on the top of the module. Alternating male and female connectors are equally spaced along both sides and ends of the module. These lock assemblies are stowed flush with the surface and, when deployed, they connect modules with minimum clearance.

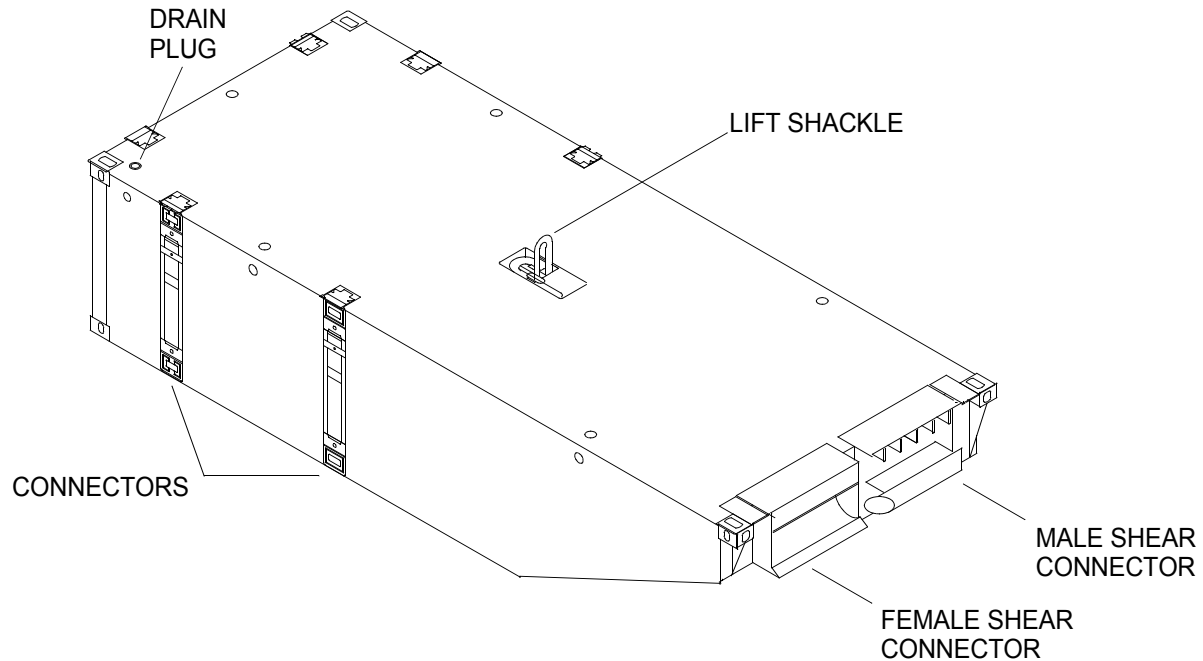


CENTER END RAKE MODULE**Location**

The center end rake modules are attached to the center module.

Description

The center end rake module is a hollow structure. Each center end rake module has one 25 ton capacity lifting shackle, which is flush mounted in the deck. The textured deck and smooth bottom are free of any protrusions that might obstruct packing. Access for internal leak detection of each compartment is provided by a recessed threaded plug located on the top of the module.



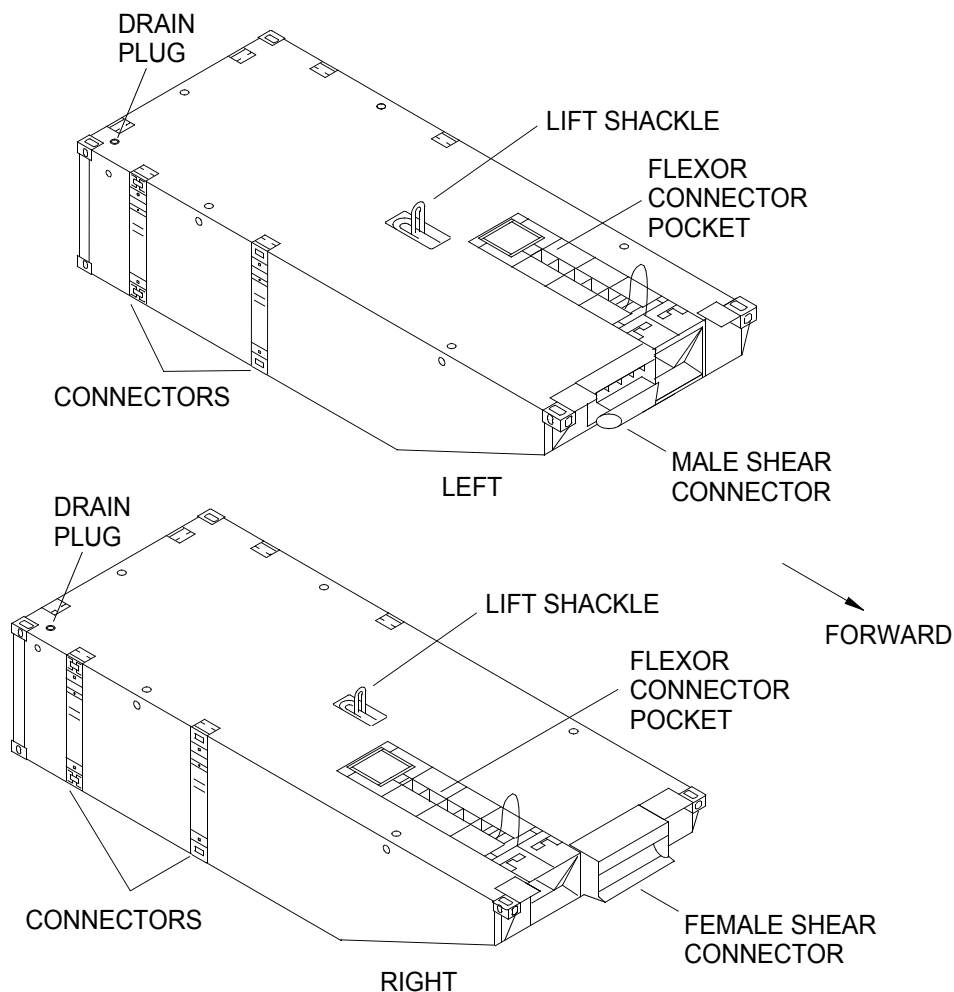
LEFT AND RIGHT END RAKE MODULES

Location

The left and right end rake modules are attached to the center modules.

Description

The left and right end rake modules are hollow structures. Each left and right end rake module has one 25 ton capacity lifting shackle, which is flush mounted in the deck. The textured deck and smooth bottom are free of any protrusions that might obstruct packing. Access for internal leak detection of each compartment is provided by a recessed threaded plug located on the top of the module. The left end rake has a flexor connector pocket for flexor connector installation in the outboard forward corner of the module. The right end rake has a flexor connector pocket for flexor connector installation in the outboard forward corner of the module. The left end rake has a male shear connector and the right end rake has a female shear connector. These are used as a mating device during assembly and act as a hinge during operation.

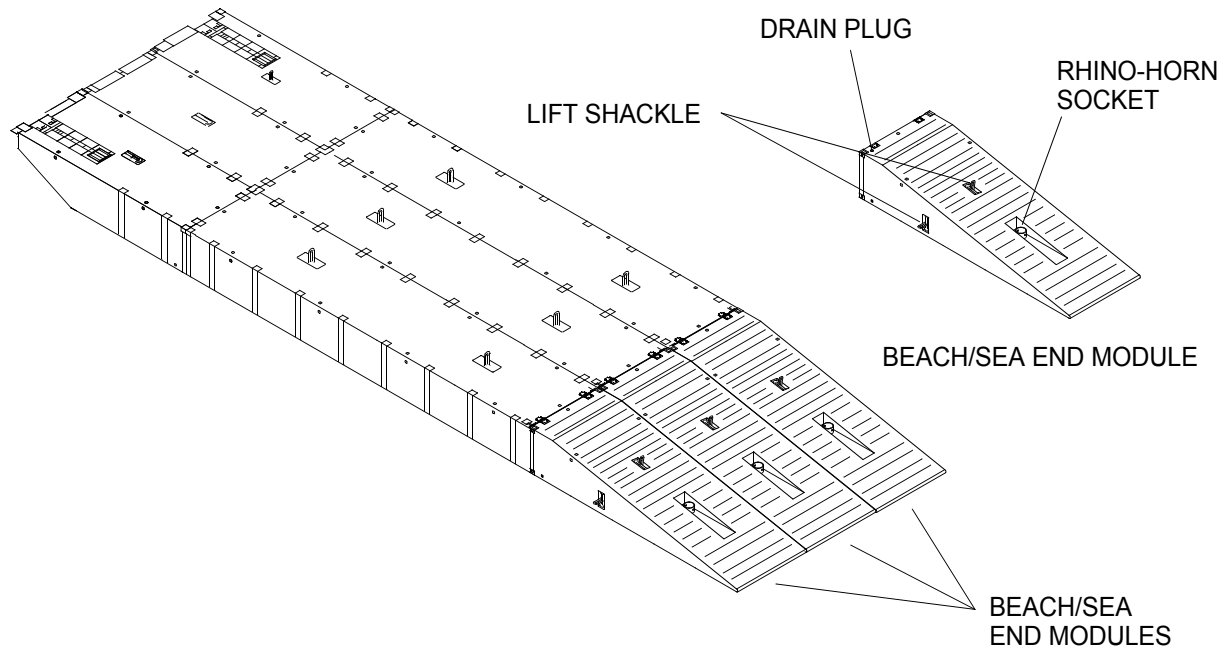


COMBINATION BEACH/SEA END MODULE**Location**

The combination beach/sea end modules may be attached to the RRDF for off loading of rolling stock to small lighters that are unable to load from the deck of the RRDF.

Description

The combination beach/sea end module is a hollow structure with a ramp slope of 10°. Each CBSE has two 25 ton lifting padeyes, which are flush mounted one per side. Access for internal leak detection of each compartment is provided by a recessed threaded plug located on the top of the module.



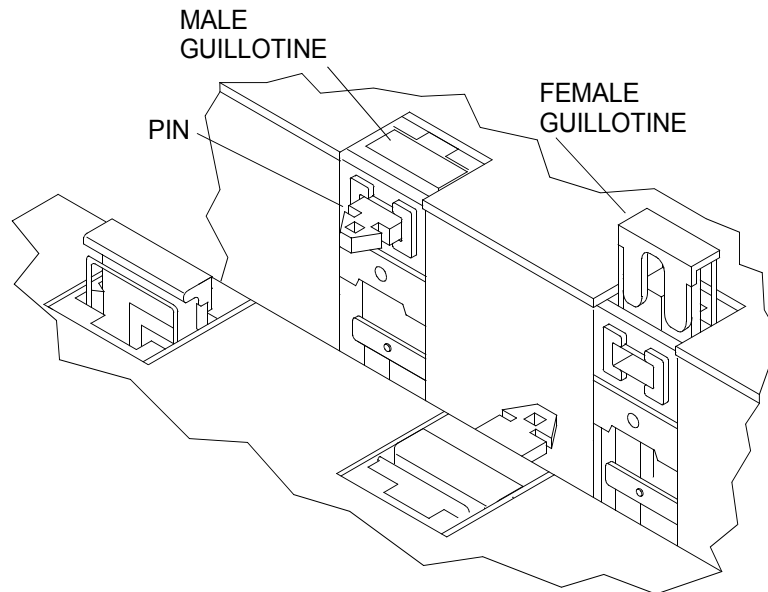
INTERCONNECT GUILLOTINES AND FLEXOR CONNECTORS**Location**

The interconnect guillotines are mounted to the sides and ends of the modules.

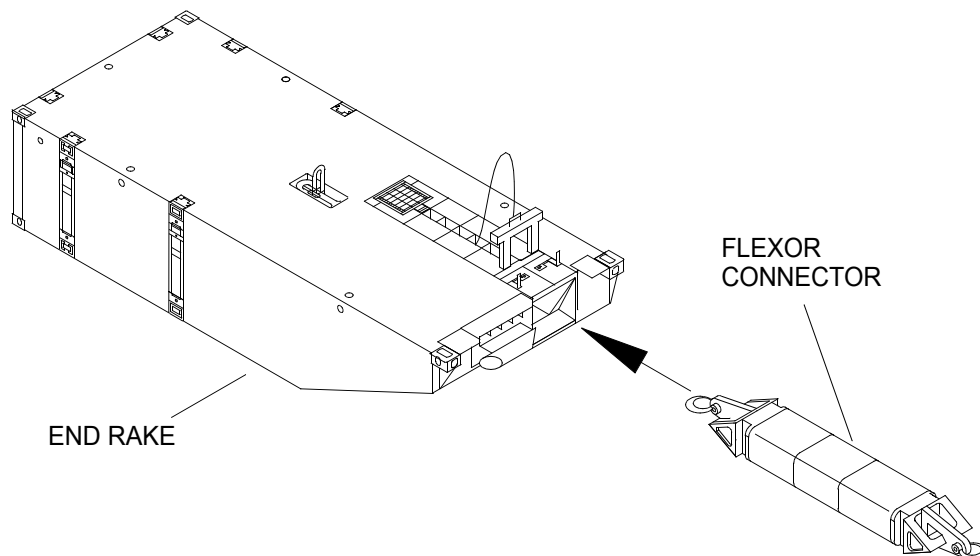
The flexor connectors are stowed in the left end rake modules.

Description

The interconnect guillotines secure the sides of modules together during assembly of the RRDF platform. The female guillotine interlocks with the male guillotine connecting pin and lock when the guillotines are flush with the deck.



The flexor connectors secure the end rake modules together during assembly of the RRDF platform.

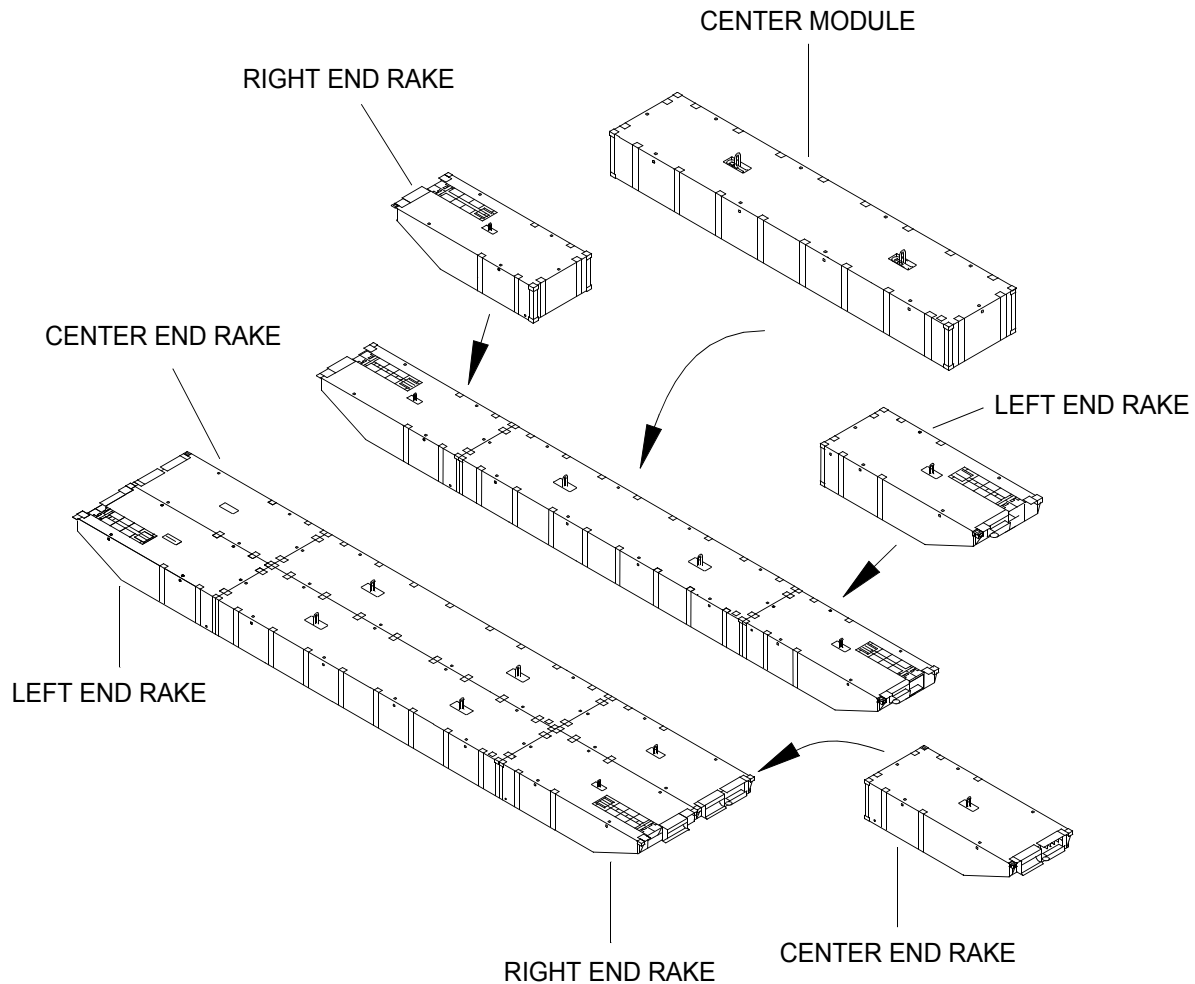


RRDF STRING**Location**

The module string is attached to other strings to make up an intermediate section.

Description

The module string may be assembled in five different configurations: a center module with two center end rake modules, a center module with one left and one right end rake module, a center module with a center end rake and a combination beach/sea end module, a center module with a left end rake and a combination beach/sea end module or a center module with a right end and a combination beach/sea end module.



RRDF INTERMEDIATE SECTION**Location**

The intermediate section is attached to other intermediate sections to construct an RRDF segment.

Description

An intermediate section is composed of three strings: two outboard strings and a center string. The two outboard strings consist of a center module, left end rake module and right end rake module. The center string consists of a center module and two center end rake modules. Strings are connected using male and female connectors.

