U.S. Department of
Homeland Security

**United States
Coast Guard**

ELECTRONICS MANUAL

May 2007
COMDTINST M10550.25B

U.S. Department of Homeland Security
United States Coast Guard

Commandant
United States Coast Guard

2100 Second Street, SW
Washington, DC 20593-0001
Staff Symbol: CG-643
Phone: 202-475-3634
FAX: 202-475-3935

COMDTINST M10550.25B
MAY 3, 2007

COMMANDANT INSTRUCTION M10550.25B

Subj: ELECTRONICS MANUAL

1. PURPOSE. This Manual promulgates Coast Guard electronic life cycle policy and selected procedures. This includes guidance on procuring, installing, maintaining, and managing supported electronic equipment within the Coast Guard. This Manual also provides guidance for safety information and professional development for the Coast Guard's Electronics Technician.

2. ACTION. Area, district and sector commanders, commanders of maintenance and logistics commands, commanding officers of integrated support commands, commanding officers of headquarters units, assistant commandants for directorates, Judge Advocate General and special staff elements at Headquarters shall ensure compliance with the provisions of this Instruction. Internet release authorized.

3. DIRECTIVES AFFECTED. Electronics Manual, COMDTINST M10550.25A, is cancelled.

4. CHANGES. This Manual will be updated as appropriate to accommodate changes in the policies, standards, processes, and developing goals of the electronics program. All personnel are encouraged to recommend changes or comments to this Manual. A CG Central microsite "Electronics Manual, COMDTINST M10550.25" has been established to provide a communications conduit with the users of this Manual. In addition, recommended changes may be submitted in writing to Commandant (CG-643).

5. ENVIRONMENTAL ASPECT AND IMPACT CONSIDERATIONS. Environmental considerations were examined in the development of this Instruction and have been determined to be not applicable.

DISTRIBUTION – SDL No. 146

	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
A	3	3	2		2	1	1	1	1	1			1	1	1	1					1					
B		2	4	1	4	2			2		2	1	3	2	1	1		3	3		1	2		1	3	
C	1	1		1	1	1	1		1		2	2		1		2	1					2	2	2		
D	1							1	1				1							3						
E				1				2						1												
F																										
G			1	1	1																					
H																										

NON-STANDARD DISTRIBUTION: N/A

6. FORMS/REPORTS. The forms called for in this Manual are available in USCG Electronics Forms on the Standard Workstation or on the Internet: http://www.uscg.mil/ccs/cit/cim/forms1/welcome.htm or Intranet: http://cgweb2.comdt.uscg.mil/CGFORMS/Welcome.htm. USCG Serviceable/Unserviceable Material Tag, CG-5236, stock number 7530-01-GF2-9270, may be ordered through the Engineering Logistics Center, Baltimore. DOD Single Line Item Requisition System Document (Manual) Milstrip, DD-1348, stock number 0102-LF-0001-3481, and, Resistance Test Record, NAVSHIP-531, no stock number, may be ordered through the Navy.

C.S. JOHNSON, JR. /s/
Captain, U.S. Coast Guard
Acting Assistant Commandant for Command, Control,
Communications, Computers and Information Technology

Electronics Manual — Table of Contents

Continued on next page

Electronics Manual — Table of Contents, Continued

Continued on next page

Electronics Manual — Table of Contents, Continued

Continued on next page

Electronics Manual — Table of Contents, Continued

Continued on next page

Electronics Manual — Table of Contents, Continued

Continued on next page

Electronics Manual — Table of Contents, Continued

Continued on next page

Electronics Manual — Table of Contents, Continued

1.0 About This Manual

Table of Contents

1.0 About This Manual

Overview

1.01 Scope

This part introduces the reader to the Electronics Manual. It describes the Electronics Program mission and purpose, identifies the target audiences of the manual, introduces the safety and maintenance standards that will be covered in more detail in the manual, and explains how the manual is organized.

1.02 References

Additional information may be found in the following resources.

Resource	Location/Link
U.S. Coast Guard Logistics Handbook, COMDTINST M4000.2 (series)	CG Central
Major Systems Acquisition Manual, COMDTINST M4150.2 (series)	CG Central
Supply Policy and Procedures Manual (SPPM), COMDTINST M4400.19 (series)	CG Central
Financial Resource Management Manual (FRMM), COMDTINST M7100.3 (series)	CG Central

1.03 Contents

This part covers the following subjects.

1.1 Electronics Program Mission and Purpose

Introduction

This topic provides the mission of the Electronics Program in the United States Coast Guard (USCG), including the key success factors and the purpose of the Electronics Manual.

1.1.1 Electronics Program Mission

The United States Coast Guard (USCG) electronics community is a key element of the USCG's operational capability. Its purpose is to maintain electronic systems and the support infrastructure in an optimum readiness status, meeting today's mission needs while planning for tomorrow.

1.1.2 Electronics Program Key Success Factors

To achieve mission readiness, USCG unit personnel should focus their efforts on the key success factors listed in the table below to achieve the desired performance outcomes.

Success Factor	Explanation/Definition
1. System Readiness	We must work to maintain the highest level of electronics equipment readiness to support operational missions.
2. Open Communication and Collaborative Effort	We must promote open communications and teamwork between support and operating units to ensure success.
3. Seek Performance Feedback	We must continuously seek feedback throughout the organization and from customers, supervisors, and peers to improve the organization and ourselves.
4. Measures to Improve Results	We need to identify the right items to measure and then perform the measurements. The feedback we receive from measurements must be used to improve our • products • processes, and • services.

Continued on next page

1.1 Electronics Program Mission and Purpose, Continued

1.1.2 Key Success Factors (continued)

Success Factor	Explanation/Definition
5. Ensure Training and Opportunities	We must ensure that • training is available to personnel to fulfill the mission of the unit, and • all personnel are provided the opportunity to achieve their full potential.
6. Create and Maintain a Professional Work Environment	We need to foster a culture that is open, honest, and treats all personnel with respect so that • units can complete the mission effectively and efficiently, and • personnel are able to maximize their potential.
7. Ability to Manage Beneficial Change	We need to recognize when change is appropriate and effectively manage change implementation to minimize risks as new technology is deployed and processes are improved.
8. Expertise in Core Competencies	We must maintain core competencies in the following skill areas: • creating and maintaining a safe working environment • promoting open communication with all personnel to share our skills and knowledge with each other, and • maintaining proficiency in USCG electronics systems in – operations – maintenance – repair – management, and – support.

Continued on next page

1.1 Electronics Program Mission and Purpose, Continued

1.1.3 Purpose of This Manual

The purpose of this manual is to provide guidelines and governance to members of the Coast Guard electronics community for conducting internal functions and interacting with other communities.

Note: This manual is not intended to replace technical manuals for performing equipment-specific functions.

1.2 Target Audiences

Introduction

This topic identifies the primary, secondary, and tertiary audiences of this manual and provides guidance as to how the information in this manual should be used.

1.2.1 Primary Audience

The primary audience for the Electronics Manual is the Electronics Technician (ET).

The following additional groups are also primary audiences of the Electronics Manual:

- Electronics Technicians (ETs), including tactical groups
- Electronics Support Detachments (ESDs)
- Electronics Material Officers (EMOs), and
- Long Range Aid to Navigation (Loran) Supervisors.

Manual Use:
Each technician should be thoroughly familiar with this manual and is responsible for following all safety precautions for the equipment they operate or service. Other members of the primary audience should use the manual as a reference tool.

1.2.2 Secondary Audience

The secondary audience for the Electronics Manual includes the following groups:

- Maintenance Facilities Supervisors and Equipment Managers
- Operation Specialists (OSs)
- Aviation Technicians (AVTs)
- Information Systems Technicians (ITs)
- Gunner's Mates (GMs)
- Electrician's Mates (EMs), and
- Centers of Excellence (COEs).

Manual Use:
The secondary audience should use the manual as a reference tool.

Continued on next page

1.2 Target Audiences, Continued

1.2.3 Tertiary Audience

The tertiary audience for the Electronics Manual includes the following groups:

- Headquarters (HQ) Projects
- Commanding Officers (COs) and Officers in Charge (OinCs)
- Maintenance and Logistics Commands (MLCs)
- Area and District Commands, and
- Research and Development (R&D) Center.

Manual Use:
The tertiary audience should use the manual as a reference tool.

1.3 Safety and Maintenance Standards

Introduction

This topic introduces the safety and maintenance standards that will be covered in more detail in this manual.

1.3.1 Safety Standards

Your safety is core to the United States Coast Guard (USCG) mission. Safety precautions must be followed at all times.

See 4.0 Safety Practices for safety policies, procedures, and guidelines.

1.3.2 Scope of Equipment Management

There are over 9,000 different types of electronic equipment with a total population of 120,000 items *excluding* aircraft, fire control systems, and ship engineering control systems. Additionally, the population of electronics components and systems used within the USCG has steadily increased as a result of the incorporation of sophisticated electronics circuits and advanced control systems in many systems that were previously mechanical.

See 7.0 Equipment Maintenance for maintenance policies, procedures, and guidelines.

1.3.3 Supported Electronic Equipment

Supported electronic equipment is any equipment that has centralized logistics support, which means it meets one or more of the following criteria:

- a Systems Management and Engineering Facility (SMEF) Supervisor or Equipment Manager (EM) is identified by Commandant, Office of Command, Control (C2), and Navigation Systems (CG-64)
- an Equipment/System Integrated Logistics Support Plan (EILSP) is developed or under development
- an Allowance Parts List (APL) is developed or under development, and/or
- the equipment satisfies a Navy requirement as Navy-Type/Navy-Owned (NT/NO).

Continued on next page

1.3 Safety and Maintenance Standards, Continued

Logistics is a generic term that encompasses all the support activities associated with the development, acquisition, testing, and sustaining of mission effectiveness of an electronics system throughout its service life.

The overall objective is to provide the right personnel, equipment, spares, and information at the right time and place and at a reasonable cost.

1.3.4 Non-Supported Electronic Equipment

Non-supported electronic equipment is equipment that has not been authorized by Commandant (CG-64). This electronic equipment is usually purchased with unit or district funds to meet local requirements. Non-supported electronic equipment is reported as General Purpose Property, recorded in the Oracle Inventory Fixed Asset Management (IFAM) system, and is not supported by Commandant (CG-64).

Examples of non-supported equipment include

- telephones
- additional hand held radios and pagers
- Personal Emergency Position Indicating Radio Beacon (PEPIRB)
- unique equipment on non-standard boats
- security cameras (afloat/ashore), and
- morale televisions and satellite TV receivers.

1.3.5 Unit Configuration File

Each unit has a specific configuration file that lists its systems and equipment. This listing is limited to Commandant (CG-64) supported equipment and is known as the Unit Configuration File. It is the basis for the Management Information for Configuration and Allowances (MICA). Units will only receive support for equipment that is listed in their configuration file. Equipment that is not centrally supported is the sole responsibility of the unit and shall be recorded as General Purpose Property in the Oracle IFAM system.

Continued on next page

1.3 Safety and Maintenance Standards, Continued

1.3.6 Electronic Nomenclature Requirements

All installed electronic equipment and related test equipment shall have a nomenclature assigned by the Engineering Logistics Center (ELC). Electronic general-purpose property being tracked in IFAM is required to have an assigned nomenclature.

See 5.5.1 Management Information for Configuration and Allowances (MICA) for more detail.

1.4 How the Manual is Organized

Introduction

This topic describes how the Electronics Manual is organized in order to help you find the information you need in the shortest amount of time.

1.4.1 Hierarchical Structure and Numbering Conventions

The Electronics Manual is organized hierarchically and uses a sequential numbering convention.

The highest hierarchical level is the Part. Depending on the scope of the content covered, a Part may also contain Chapters, and occasionally Chapters contain Sections.

A Topic contains information about a specific subject. Within each Topic are discrete units of information known as Blocks.

The table below contains examples of the various hierarchical structures found throughout this manual.

Hierarchical Structure	Example
Part Topic Block	1.0 About This Manual 1.3 Safety and Maintenance Standards 1.3.4 Non-Supported Electronic Equipment
Part Chapter Topic Block	3.0 Coast Guard Electronic Systems 3.3 Navigation Sensors and Systems 3.3.1 Command and Control System (CCS) 3.3.1.2 CCS Maintenance Philosophy
Part Chapter Section Topic Block	7.0 Equipment Maintenance 7.3 Maintenance Activities 7.3.2 Routine Maintenance Activities 7.3.2.1 Cleaning Electronic Equipment 7.3.2.1.1 Cleaning Materials

Continued on next page

1.4 How the Manual is Organized, Continued

1.4.2 Paper-Based Navigation

Groupings of Chapters, Sections, and Topics organize the paper-based navigation.

Example: The title of this Part is "About This Manual." A Topic in this Part is "Target Audiences." A Block in this Topic is "Primary Audience."

At the beginning of each Part, Chapter, and Section is an Overview Topic which

- describes the content within that Part, Chapter, or Section, and
- includes a Reference Table that provides resources relevant to the Topics within (a brief description and link to each resource may be included).

Note: Throughout the manual, references to outside sources may be included within specific Topics.

2.0 Organization Roles and Responsibilities

Table of Contents

2.0 Organization Roles and Responsibilities

Overview

2.01 Scope

This part describes the organization roles and responsibilities of the

- Coast Guard offices within the Command, Control, Communications, Computers, and Information Technology (C4IT) Directorate (CG-6)
- Centers of Excellence (COEs), and
- Maintenance and Logistics Commands (MLCs) and districts in the Atlantic and Pacific areas and their subordinate units.

2.02 References

Additional information related to the organization roles and responsibilities may be found in the following resources.

Resource	Description	Location/Link
Coast Guard Organization Manual, COMDTINST M5400.7 (series)	• Information on the organization of Headquarters (HQ), Areas, Districts, MLCs, and individual units, and • policies and procedures governing the organization.	CG Central

2.03 Contents

This part covers the following subjects.

2.1 Command, Control, Communications, Computers, and Information Technology (C4IT) Directorate (CG-6)

Overview

2.1.01 Scope

This chapter contains

- an overview of the role and responsibilities of the Assistant C4IT Directorate (CG-6), and
- specific roles and responsibilities of the offices within the C4IT Directorate (CG-6).

2.1.02 Contents

This chapter covers the following subjects.

2.1.1 C4IT Directorate (CG-6) Organizational Overview

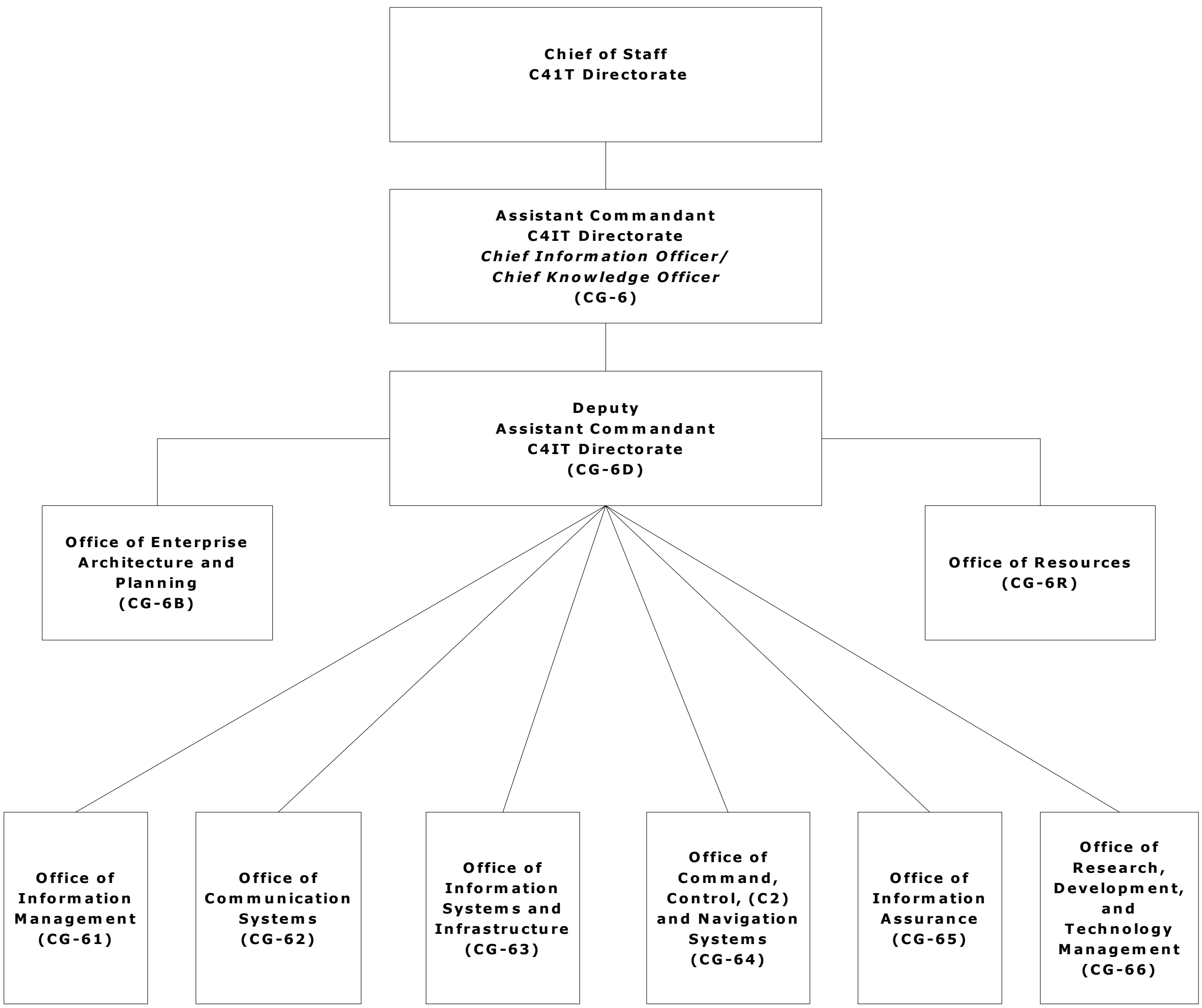
Introduction

This topic contains an overview of the C4IT Directorate (CG-6), including

- an organization chart, and
- the roles and responsibilities of the Assistant Commandant (CG-6).

2.1.1.1 Organization Chart of C4IT Directorate (CG-6)

An organization chart of the C4IT Directorate (CG-6) is shown below.



Continued on next page

2.1.1 C4IT Directorate (CG-6) Organizational Overview, Continued

2.1.1.2 Role of Assistant Commandant (CG-6)

The role of the Assistant Commandant (CG-6) is to

- serve as the
  - Chief Information Officer (CIO), and
  - Chief Knowledge Officer (CKO), and
- leverage the value of information technology (IT) for performing Coast Guard missions by developing and aligning enterprise strategies, policies, and resource decisions with CG strategic goals, mandates, and customer requirements.

The table below identifies where to find more detail on the responsibilities associated with Assistant Commandant (CG-6).

For detail on the responsibilities …	See …
for leveraging the value of IT for performing CG missions	2.1.1.3
for planning, providing, and sustaining C4IT capabilities based on business and mission requirements	2.1.1.4
for resource management	2.1.1.5
for developing and implementing performance measures to support CG missions and goals	2.1.1.6
of each office within Assistant Commandant (CG-6)	2.1.1.7

Continued on next page

2.1.1 C4IT Directorate (CG-6) Organizational Overview,
Continued

2.1.1.3 Assistant Commandant (CG-6) Responsibilities for Leveraging the Value of IT

The responsibilities of the Assistant Commandant (CG-6) for leveraging the value of IT for performing CG missions are described in the table below.

Assistant Commandant (CG-6) Responsibility	Description
Lead or support the CG vision for knowledge sharing through new technology and information systems	• Plans integration of new technology that supports all current organizational and program requirements, and • ensures that near-term initiatives move the CG toward its organizational, business, and IT goals.
Recommend application of new science and technology to executive management	• Recommends the application of new technology to executive management for conducting organizational missions more efficiently, and • advises the Commandant and executive management of new science and technology with the potential for closing performance gaps. See 2.1.9 Office of Research, Development, and Technology Management (CG-66) for detail on oversight of new technology discovery and integration.
Support development of CG-wide executive management information systems	Provides analysis, knowledge, and information for decision making to support the development of CG-wide executive management information systems.
Act as co-lead for CG innovation initiatives	Partners with the Office of Quality and Management Effectiveness (G-CQM) on innovation initiatives.

Continued on next page

2.1.1 C4IT Directorate (CG-6) Organizational Overview, Continued

2.1.1.4 Assistant Commandant (CG-6) Responsibilities for Planning, Providing, and Sustaining C4IT Capabilities

The responsibilities of the Assistant Commandant (CG-6) for planning, providing, and sustaining C4IT capabilities based on business and mission requirements are described in the table below.

Assistant Commandant (CG-6) Responsibility	Description
Establish policies based on business and mission requirements	Establishes policies based on business and mission requirements, such as • enterprise architecture • information security • intranet/internet usage, and • bandwidth management.
Implement technology and information systems for major and non-major acquisition projects	Consults with the Acquisition Directorate (G-A) and Integrated Deepwater Systems Directorate (G-D) to implement effective and supportable technology and information systems for all facets of major and non-major acquisition projects, such as the • Integrated Deepwater System (IDS) • Rescue 21 Program • Marine Information Safety and Law Enforcement System, and • Ports and Waterways Safety System.

Continued on next page

2.1.1 C4IT Directorate (CG-6) Organizational Overview, Continued

2.1.1.5 Assistant Commandant (CG-6) Responsibilities for Resource Management

The responsibilities of the Assistant Commandant (CG-6) for resource management are described in the table below.

Assistant Commandant (CG-6) Responsibility	Description
Determine, allocate, and prioritize IT resources	• Determines IT and knowledge management priorities • allocates IT resources among competing projects, and • prioritizes IT resources and processes that can be developed cross-functionally and cross-organizationally.
Oversee IT expenditures	• Oversees, and fully accounts for, IT expenditures, and • chairs the IT Management Board.
Oversee the Research, Development, Test, and Evaluation (RDT&E) appropriation	• Oversees management of the RDT&E appropriation for CG long-range objectives, and • chairs the Research & Development (R&D) Investment Board.
Implement IT management support for all facets of the Integrated Deepwater System (IDS)	Partners with the program executive officer, sponsor, support directorates, Chief Counsel organization, and IDS systems integrator to implement IT management support for all facets of IDS, including • ships and aircraft • Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR), and • logistics systems.

Continued on next page

2.1.1 C4IT Directorate (CG-6) Organizational Overview, Continued

2.1.1.6 Assistant Commandant (CG-6) Responsibilities for Developing and Implementing Performance Measures

The responsibilities of the Assistant Commandant (CG-6) for developing and implementing performance measures to support CG missions and goals are described in the table below.

Assistant Commandant (CG-6) Responsibility	Description
Incorporate performance measures into the resource decision process	Incorporates performance measures into the resource decision process to improve CG-wide IT utilization.
Assess technical competencies within the CG and recommend acquisition of skills	• Assesses the technical competencies required for new technologies, and • recommends the acquisition of advanced technical skills to meet requirements to the Human Resources Directorate (CG-1) and Engineering & Logistics Directorate (CG-4).
Improve IT and research and development (R&D) capabilities	Based on industry and government benchmarks, improves IT and R&D capabilities within the CG.
Advise the Commandant on performance of Maintenance and Logistics Commands (MLCs)	Periodically advises the Commandant on performance of MLCs for C4IT responsibilities.

Continued on next page

2.1.1 C4IT Directorate (CG-6) Organizational Overview, Continued

2.1.1.7 Offices within Assistant Commandant (CG-6)

The table below

- identifies the offices within Assistant Commandant (CG-6)
- summarizes the responsibilities of each office, and
- identifies where in this chapter to find more detail on each office.

Office	Summary of Responsibilities	Where to Find More Detail
Office of Enterprise Architecture and Planning (CG-6B)	• Ensures that IT is acquired and resources managed in compliance with the Paperwork Reduction Act of 1995, and • Develops, maintains, and facilitates implementation of integrated IT architecture for the executive agency.	2.1.2
Office of Resources (CG-6R)	Advises the Assistant Commandant on all matters related to • resource management • strategic planning, and • organizational performance measurement activities and processes of the C4IT Directorate.	2.1.3
Office of Information Management (CG-61)	• Develops and administers policy for – management of CG records, forms, correspondence, and mail – the Freedom of Information Act (FOIA) Program – Privacy Act Program, and – Directive Management Program, and • Prepares resolutions of FOIA appeals for signature by CG-6.	2.1.4

Continued on next page

2.1.1 C4IT Directorate (CG-6) Organizational Overview, Continued

2.1.1.7 Offices within Assistant Commandant (CG-6) (continued)

Office	Summary of Responsibilities	Where to Find More Detail
Office of Communication Systems (CG-62)	Exercises technical control over the • Telecommunication and Information Systems Center (TISCOM) • Command and Control Center (C2CEN) • Loran Support Unit (LSU) • Operations Systems Center (OSC), and • Research and Development Center.	2.1.5
Office of Information Systems and Infrastructure (CG-63)	• Develops and administers policies for the – Information Systems Security Program, and – Critical Infrastructure Protection Program • provides policy oversight for the Automated Information Systems Security Program, and • analyzes the management approaches, procedures, techniques, hardware, and software required for compliance with CG security programs.	2.1.6
Office of Command, Control (C2), and Navigation Systems (CG-64)	Oversees the system development life cycle (SDLC) of Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) combat and radio navigation systems.	2.1.7

Continued on next page

2.1.1 C4IT Directorate (CG-6) Organizational Overview, Continued

2.1.1.7 Offices within Assistant Commandant (CG-6) (continued)

Office	Summary of Responsibilities	Where to Find More Detail
Office of Information Assurance (CG-65)	• Develops and aligns enterprise strategies, policies, and resource decisions with current information security policies, standards, and capabilities, and • develops, maintains, and facilitates implementation of an Information Assurance Program for the executive agency.	2.1.8
Office of Research, Development, and Technology Management (CG-66)	• Anticipates future technological challenges • implements best practice solutions within the Coast Guard, and • coordinates science and technology efforts with the Department of Homeland Security (DHS) Office of Science and Technology.	2.1.9

2.1.2 Office of Enterprise Architecture and Planning (CG-6B)

Introduction

This topic contains information on the

- mission of the Office of Enterprise Architecture and Planning (CG-6B)
- assets assigned to CG-6B, and
- role and responsibilities of the Chief (CG-6B).

2.1.2.1 Mission of CG-6B

The mission of the Office of Enterprise Architecture and Planning (CG-6B) is to

- ensure that Information Technology (IT) is acquired and resources are managed in compliance with the policies and procedures in Chapter 35, Title 44, United States Code (Paperwork Reduction Act), and
- develop, maintain, and facilitate implementation of integrated IT architecture for the executive agency.

Note: The Chief, Office of Enterprise Architecture and Planning (CG-6B) operates under the general direction and supervision of the Deputy, Assistant Commandant for Command, Control, Communications, Computers, and Information Technology (C4IT) Directorate (CG-6D).

See 2.1.1 C4IT Directorate (CG-6) Organizational Overview for an organization chart of the C4IT Directorate.

2.1.2.2 Assets Assigned to CG-6B

The assets assigned to CG-6B include the

- current (“as is”) and future (“to be”) objective Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) and IT architectures
- Technical Reference Model (TRM)
- Enterprise Standards Profile, and
- associated enterprise architecture standards and policies.

Continued on next page

2.1.2 Office of Enterprise Architecture and Planning (CG-6B), Continued

2.1.2.3 Role of Chief (CG-6B)

The role of the Chief (CG-6B) is asset manager, which includes

- planning, programming, and budgeting resources to sustain and facilitate the life cycle of assigned IT architecture assets (see 2.1.2.2 for detail on the assets assigned to CG-6B)
- overseeing the system development life cycle (SDLC)
- overseeing and managing the assets assigned to CG-6B, and
- liaising with industry and other government agencies (OGAs) regarding assigned enterprise architecture assets.

The table below identifies where in this topic to find detail on the responsibilities of the Chief (CG-6B).

For detail on responsibilities for …	See …
resource planning, programming, and budgeting	2.1.2.4
SDLC oversight	2.1.2.5
asset oversight and management	2.1.2.6
liaisons with industry and OGAs	2.1.2.7

Continued on next page

2.1.2 Office of Enterprise Architecture and Planning (CG-6B), Continued

2.1.2.4 Chief (CG-6B) Responsibilities for Resource Planning, Programming, and Budgeting

The responsibilities of the Chief (CG-6B) for planning, programming, and budgeting resources to sustain and facilitate the life cycle of all assigned assets are described in the table below.

See 2.1.2.2 for detail on the assets assigned to CG-6B.

Note: These responsibilities are performed in collaboration with resource managers and program offices.

Chief (CG-6B) Responsibility	Description
Create and maintain the Enterprise Architecture Program	Creates and maintains the Enterprise Architecture Program to • maximize the use of IT resources • promote interoperability • reduce redundancy • support capital planning activities, and • ensure compliance with federal requirements.
Ensure interoperability among all assigned assets	• Plans, coordinates, and facilitates activities needed to ensure interoperability among all assigned assets (internal and external) where required to support mission, business, and organization performance objectives, and • applies policies and standards to enable interoperability where needed or mandated.

Continued on next page

2.1.2 Office of Enterprise Architecture and Planning (CG-6B), Continued

2.1.2.5 Chief (CG-6B) Responsibilities for SDLC Oversight

The responsibilities of the Chief (CG-6B) for oversight of the system development life cycle (SDLC) are described in the table below.

Note: These responsibilities involve oversight, coordination, and facilitation of all activities, standards, policies, milestones, and deliverables of the SDLC as performed by the system development agent (SDA).

Chief (CG-6B) Responsibility	Description
Develop the Coast Guard (CG) IT capital planning, investment, and control (CPIC) policy and process	Develops, promulgates, and maintains the IT CPIC policy, guidance, and process.
Participate in the Chief Information Officer (CIO) CPIC process	• Participates in each phase (select, control, and evaluate) of the CIO CPIC process, and • ensures that – each product specified in the SDLC is submitted during the appropriate phase of the process, and – all investments comply with architectural standards and support the Enterprise Transition Plan. **Note**: Each phase of the CPIC process is supported by enterprise architecture to assess project alignment with the target architecture, Technical Reference Model, Standards Profiles, and the Enterprise Transition Plan.
Provide training on enterprise architecture	Periodically provides training on the application of enterprise architecture doctrine to all • Command, Control, Communications, Computers, and Information Technology (C4IT) Directorate asset managers • SDAs, and • constituent sponsor program offices.

Continued on next page

2.1.2 Office of Enterprise Architecture and Planning (CG-6B), Continued

2.1.2.5
Chief (CG-6B) Responsibilities for SDLC Oversight (continued)

Chief (CG-6B) Responsibility	Description
Ensure compliance with enterprise architecture standards	Assists with early evaluation of new projects and resource proposals to ensure compliance with enterprise architecture principles and standards.
Review and endorse project plans	Reviews and endorses project plans submitted by program sponsors, project managers, or other stakeholders.
Enforce (and recommend modifications to) enterprise architecture standards and policies	See 2.1.2.5.1 for detail on the responsibilities for enterprise architecture standards and policies.
Enforce or translate legislative mandates	Ensures compliance with the requirements of the Federal Information Security Management Act (FISMA) of 2002.
Approve or endorse major milestones	• Approves or endorse major milestones, or • recommends approval to a higher authority (that is, the designated approving authority or CIO) when appropriate.
Oversee performance and disposition of records	• Reviews performance metrics, and • verifies disposition of records.

Continued on next page

2.1.2 Office of Enterprise Architecture and Planning (CG-6B), Continued

2.1.2.5.1 Chief (CG-6B) Responsibilities for Enterprise Architecture Standards and Policies

The responsibilities of the Chief (CG-6B) for enterprise architecture standards and policies are described in the table below.

Chief (CG-6B) Responsibility	Description
Create and update "as is" or baseline architecture	Creates and updates "as is" or baseline architecture to describe the • current state of the architecture • mission activities • systems • information flows, and • technical infrastructure.
Create and update "to be" architecture	• Creates and updates "to be" architecture to describe the Coast Guard's vision of the future state, and • integrates plans for deployment of new capabilities from major programs (such as the Integrated Deepwater System and Rescue 21 programs).
Create and maintain the • Technical Reference Model, and • Enterprise Standards Profile	Creates and maintains the Technical Reference Model and Enterprise Standards Profile to establish standards for system developers to use for building future systems.
Create, maintain, and update the Enterprise Architecture Repository	Creates, maintains, and updates the Enterprise Architecture Repository to provide a single source of all enterprise architecture resources.
Support enterprise architecture training	Supports portfolio and program managers with training on the enterprise architecture process.

Continued on next page

2.1.2 Office of Enterprise Architecture and Planning (CG-6B), Continued

2.1.2.6 Chief (CG-6B) Responsibilities for Asset Oversight and Management

The responsibilities of the Chief (CG-6B) for oversight and management of assigned assets are described in the table below.

See 2.1.2.2 for detail on the assets assigned to CG-6B.

Chief (CG-6B) Responsibility	Description
Enable appropriate or required IA integration across systems or assets	Plans, coordinates, and facilitates enterprise architecture activities, policies, or standards to enable appropriate or required integration across systems.
Plan, coordinate, and facilitate configuration management requirements, activities, processes, and policies for all assigned enterprise architecture assets	• Ensures that sound configuration management doctrine is executed and sustained for assigned enterprise architecture assets, and • participates as a voting member on assigned configuration control boards (CCBs).
Monitor, coordinate, and facilitate Integrated Deepwater System (IDS) Program activities	• Monitors, coordinates, and facilitates Integrated Deepwater System (IDS) Program planning, design, and implementation activities to ensure compliance with C4IT standards, and • coordinates the appropriate responses/interactions from C4IT (CG-6) components to ensure that the IDS Program is delivered in compliance with enterprise architecture, integrated logistics support, and SDLC standards and requirements.

2.1.2.7 Chief (CG-6B) Responsibilities for Liaisons with Industry and OGAs

The Chief (CG-6B) is responsible for partnering and liaising with industry and OGAs as needed or beneficial to

- enhance the worth of assigned enterprise architecture assets
- improve the performance of assigned enterprise architecture assets
- reduce the total ownership costs of assigned enterprise architecture assets, and
- enhance mission or business capabilities for assigned enterprise architecture assets.

2.1.3 Office of Resources (CG-6R)

Introduction

This topic contains information on the role and responsibilities of the Chief, Office of Resources (CG-6R).

2.1.3.1 Role of Chief (CG-6R)

The role of the Chief, Office of Resources (CG-6R) is to advise the Assistant Commandant of Command, Control, Communications, Computers, and Information Technology (C4IT) Directorate (CG-6) on all matters related to

- resource management
- strategic planning, and
- organizational performance measurement activities and processes of the C4IT Directorate.

Note: The Chief, Office of Resources (CG-6R) operates under the general direction and supervision of the Deputy, Assistant Commandant for C4IT Directorate (CG-6D).

See 2.1.1 C4IT Directorate (CG-6) Organizational Overview for an organization chart of the C4IT Directorate.

The table below identifies where in this topic to find detail on the responsibilities of the Chief (CG-6R).

For detail on responsibilities for …	See …
resource management	2.1.3.2
strategic planning	2.1.3.3
organizational performance measurement	2.1.3.4

Continued on next page

2.1.3 Office of Resources (CG-6R), Continued

2.1.3.2 Chief (CG-6R) Responsibilities for Resource Management

The responsibilities of the Chief (CG-6R) for resource management are described in the table below.

Chief (CG-6R) Responsibility	Description
Serve as the focal point for all resource issues in support of the C4IT Directorate and its constituents	Facilitates • development of the C4IT budget, and • preparation, submission, defense, and adjudication of resource proposals.
Manage the budget process	See 2.1.3.2.1 for detail on the responsibilities for management of the budget process.
Provide analytical assistance with allocation of resources for implementation of long-range plans	• Provides analytical assistance to C4IT offices and staff in determining efficient allocation of resources for implementation of long-range plans, and • provides economic input to headquarter directorates for C4IT related issues.
Coordinate development of required legislative documentation	Coordinates the development of legislative documentation required for resource management processes.
Coordinate C4IT resource issues with headquarter directorates	Closely coordinates planning, programming, and budgeting C4IT enterprise resources with headquarter directorates.
Serve as the C4IT Directorate's voting member	Serves as the C4IT Directorate's voting member on the • Coast Guard Resource Group, and • Resource Working Group.
Oversee IT funds as directed by the Chief Information Officer (CIO)	• Develops and maintains C4IT prioritization processes and structures • evaluates system and support service requests, and • allocates C4IT resources among competing projects as determined by the – appropriate budget boards, and – prioritization processes and governance.

Continued on next page

2.1.3 Office of Resources (CG-6R), Continued

2.1.3.2.1 Chief (CG-6R) Responsibilities for Management of the Budget Process

The responsibilities of the Chief (CG-6R) for management of the budget process are described in the table below.

Chief (CG-6R) Responsibility	Description
Administer financial planning and execution of allotment fund control (AFC) accounts	Administers resource management activities and processes involving the financial planning and execution of • AFC-30, AFC-42, and AFC-77 accounts, and • acquisition, construction, and improvement (AC&I) accounts.
Facilitate budget boards and prepare budget estimates	• Manages, maintains, and facilitates the budget board process for all C4IT (CG-6) elements, and • facilitates CG-6 involvement in the budget build and operating stage financial plan (OPSTAGE) processes.
Monitor funds	• Monitors, and accounts for, the execution of approved and allocated funding, and • prepares and executes authorized fund transfers and reprogramming as needed.
Administer funds allocated to C4IT offices	Administers funds allocated to C4IT offices, including OPSTAGE, supplemental, backlog, and fallout funding.
Measure and track the C4IT Directorate financial system	Measures and tracks planned versus actual budgets and performance of the overall financial system of the C4IT Directorate.

Continued on next page

2.1.3 Office of Resources (CG-6R), Continued

2.1.3.3 Chief (CG-6R) Responsibilities for Strategic Planning

The responsibilities of the Chief (CG-6R) for strategic planning are described in the table below.

Chief (CG-6R) Responsibility	Description
Administer planning processes	Administers planning processes for preparation of • the C4IT business plan • Government Performance and Results Act (GPRA) plans and reports • the President's Management Agenda, and • other required planning documents.
Ensure integration of strategic and business planning	Ensures integration of strategic and business planning among • C4IT offices and staff, and • resource elements of other headquarter directorates.

2.1.3.4 Chief (CG-6R) Responsibilities for Organizational Performance Measurement

The responsibilities of the Chief (CG-6R) for organizational performance measurement are described in the table below.

Chief (CG-6R) Responsibility	Description
Administer organizational performance measurement activities and processes	• Facilitates the development of C4IT performance measures, and • oversees the C4IT Directorate evaluation process.
Conduct technical, personnel, and management studies	Conducts (or assists with conducting) technical, personnel, and management studies to support C4IT programs.
Coordinate evaluation and review of C4IT Directorate full-time employees (FTEs)	• Maintains the master C4IT Directorate Personnel Allowance List (PAL) • facilitates or implements PAL transactions, and • advises the Assistant Commandant of C4IT (CG-6) of workforce management issues as appropriate.

2.1.4 Office of Information Management (CG-61)

Introduction

This topic contains

- an organization chart of the Office of Information Management (CG-61), and
- information on the
  - mission of CG-61
  - assets assigned to CG-61, and
  - role and responsibilities of the Chief (CG-61).

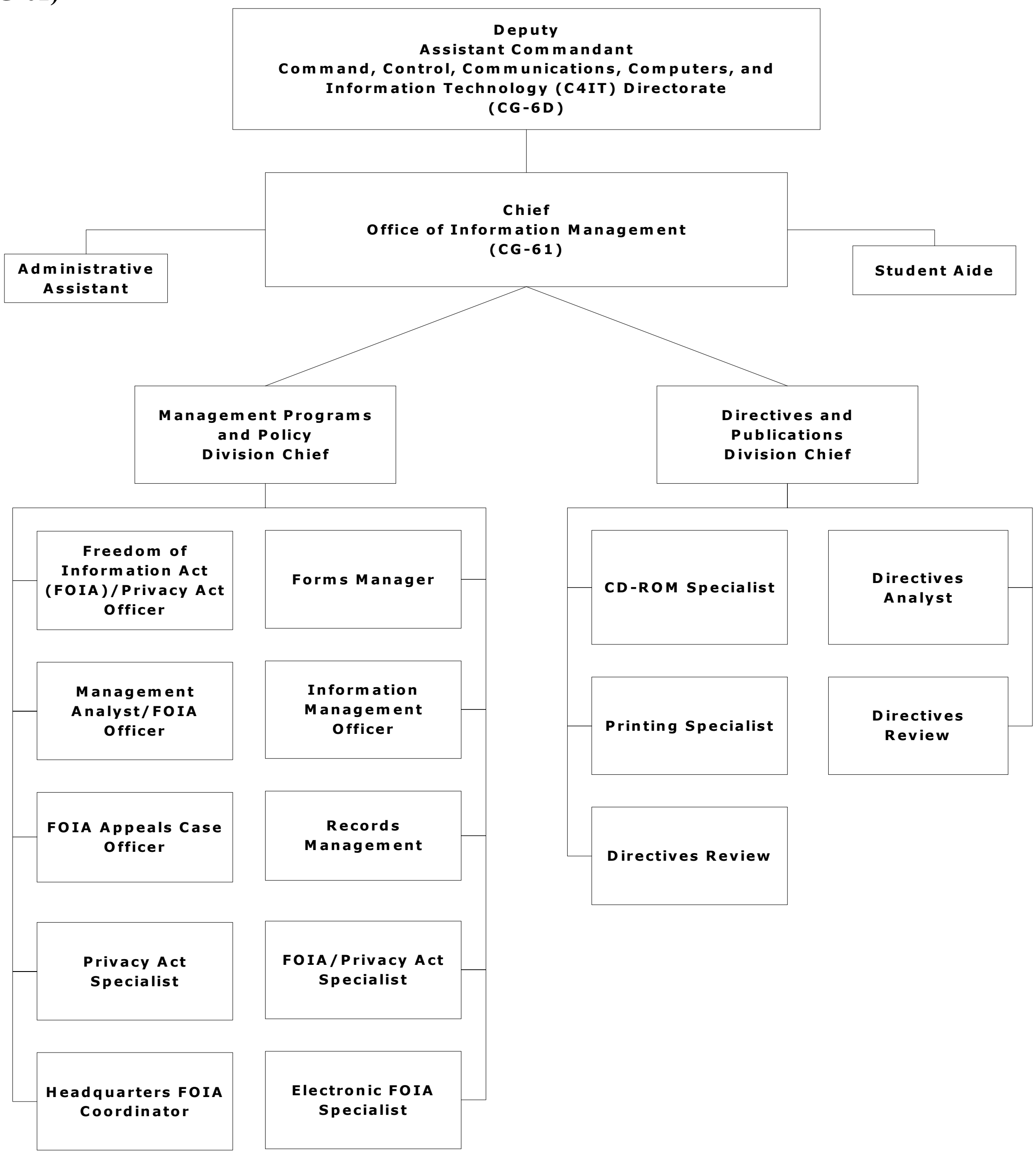
Continued on next page

2.1.4 Office of Information Management (CG-61), Continued

2.1.4.1 Organization Chart of Office of Information Management (CG-61)

An organization chart of the Office of Information Management (CG-61) is shown below.

See 2.1.1 C4IT Directorate (CG-6) Organizational Overview for an organization chart of the C4IT Directorate.



Continued on next page

2.1.4 Office of Information Management (CG-61), Continued

2.1.4.2 Mission of CG-61

The mission of the Office of Information Management (CG-61) is to

- provide policies and services for the management of information, and
- support Coast Guard goals for continuing improvement, innovation, and technological growth through the use of knowledge management principles.

2.1.4.3 Assets Assigned to CG-61

The assets assigned to CG-61 include the

- policies and services governing the production, management, and maintenance of CG publications and directives, official correspondence, mail, forms, and records, and
- associated information technology (IT) capabilities.

2.1.4.4 Role of Chief (CG-61)

The role of the Chief (CG-61) is portfolio manager, which includes

- planning, programming, and budgeting resources to sustain and facilitate the life cycle of assigned assets (see 2.1.4.3 for detail on the assets assigned to CG-61)
- overseeing the system (or asset) development life cycle (SDLC)
- overseeing and managing the assets assigned to CG-61, and
- liaising with departments and other government agencies (OGAs) regarding information management requirements.

The table below identifies where in this topic to find detail on the responsibilities of the Chief (CG-61).

For detail on responsibilities for …	See …
resource planning, programming, and budgeting	2.1.4.5
SDLC oversight	2.1.4.6
asset oversight and management	2.1.4.7
liaisons with departments and OGAs	2.1.4.8

Continued on next page

2.1.4 Office of Information Management (CG-61), Continued

2.1.4.5 Chief (CG-61) Responsibilities for Resource Planning, Programming, and Budgeting

The responsibilities of the Chief (CG-61) for planning, programming, and budgeting resources to sustain and facilitate the life cycle of assigned assets are described in the table below.

See 2.1.4.3 for detail on the assets assigned to CG-61.

Note: These responsibilities are performed in collaboration with resource managers and program offices.

Chief (CG-61) Responsibility	Description
Develop standards for the Correspondence Management Program	Develops and establishes standards for the Correspondence Management Program, including procedures and techniques for improvement.
Manage the postal budget and develop policy and procedures for CG mail and postal matters	• Manages the CG-wide postal budget • develops policies and procedures for CG mail and postal matters, and • prescribes procedures for establishment and operation of Air/Army Post Office (APO) and Fleet Post Office (FPO) addresses.
Manage Headquarters graphics and printing services and associated fund	• Manages Headquarters graphics and printing services • enforces graphics standards • serves as a liaison with the Department of Transportation (DOT) in all CG graphics and printing matters, and • manages the associated working capital fund.

Continued on next page

2.1.4 Office of Information Management (CG-61), Continued

2.1.4.6 Chief (CG-61) Responsibilities for SDLC Oversight

The responsibilities of the Chief (CG-61) for oversight of the system (or asset) development life cycle (SDLC) are described in the table below.

See 2.1.4.3 for detail on the assets assigned to CG-61.

Note: These responsibilities involve oversight, coordination, and facilitation of the activities, standards, policies, milestones, and deliverables of the SDLC as performed by the system development agent (SDA).

Chief (CG-61) Responsibility	Description
Participate in the Chief Information Officer (CIO) capital planning, investment, and control (CPIC) process	• Participates in each phase (select, control, and evaluate) of the CIO's CPIC process, and • ensures that each product specified in the SDLC is submitted during the appropriate phase of the process.
Review and endorse project plans submitted by program sponsors, project managers, or other stakeholders	• Analyzes management approaches, procedures, techniques, and hardware/software for potential application in the CG Information Management Program, and • provides guidance on all information management issues to – information systems program personnel, and – project management personnel.
Manage changes to enterprise architecture standards and policies	See 2.1.4.6.1 for detail on the responsibilities for enterprise architecture standards and policies.
Develop policies and services that comply with legislative mandates	See 2.1.4.6.2 for detail on the responsibilities for policies and services that comply with legislative mandates.
Approve or endorse major milestones	• Approves or endorses major milestones, and • recommends approval of a higher authority (that is, the designated approving authority or CIO) when appropriate.
Monitor progress of Command, Control, Communications, Computers, and Information Technology (C4IT) assets	Monitors progress of C4IT (CG-6) asset acquisition, development, deployment, and implementation, including operation and management.

Continued on next page

2.1.4 Office of Information Management (CG-61), Continued

2.1.4.6
Chief (CG-61) Responsibilities for SDLC Oversight (continued)

Chief (CG-61) Responsibility	Description
• Manage organizational acceptance of new systems or assets, and • promote information management and IT training	• Manages or directs organizational acceptance of new (or major changes to) systems or assets, and • promotes training and consulting services for a broad range of information management and IT policies, standards, and system design.
Oversee performance and disposition of records	• Review performance metrics, and • verify disposition of records.

2.1.4.6.1 Chief (CG-61) Responsibilities for Enterprise Architecture Standards and Policies

The responsibilities of the Chief (CG-61) for managing changes to enterprise architecture standards and policies are described in the table below.

Chief (CG-61) Responsibility	Description
Develop information management life cycle policies and services	• Develops service-wide information management life cycle policies and procedures, and • manages the standard subject identification code (SSIC) system for official correspondence.
Manage the CG directives system and Web site	• Develops and maintains the CG directives system, and • monitors and maintains the CG directives Web site.
Manage information disseminated to the public	Implements guidelines and administers policy to ensure that information disseminated to the public is at the highest level of quality, objectivity, utility, and integrity.

Continued on next page

2.1.4 Office of Information Management (CG-61), Continued

2.1.4.6.2 Chief (CG-61) Responsibilities for Policies and Services that Comply with Legislative Mandates

The responsibilities of the Chief (CG-61) for developing policies and services that comply with legislative mandates are described in the table below.

Chief (CG-61) Responsibility	Description
Develop policy for CG forms	Develops and administers policy and procedures for CG forms, including implementation of Government Paperwork Elimination Act requirements for • electronic forms, and • interactive use by the public.
Develop policy to meet the requirements of the • Freedom of Information Act (FOIA) of 1966 and 1996	Liaises with CG and other government agency (OGA) legal staffs to develop and administer policy and procedures that ensures public access to information as mandated by the FOIA.

Continued on next page

2.1.4 Office of Information Management (CG-61), Continued

2.1.4.6.2
Chief (CG-61) Responsibilities for Policies and Services that Comply with Legislative Mandates (continued)

Chief (CG-61) Responsibility	Description
Develop policy to meet the requirements of the Privacy Act of 1974	• Develops and administers policy and procedures to ensure that system notices are published and current as mandated by the Privacy Act • manages the computer matching program, and • provides guidance on the development of computer matching agreements and Privacy Act statements.
Develop policy to ensure that all areas of public use reporting requirements comply with legislative mandates	• Develops policy and procedures to ensure that all areas of public use reporting requirements are in compliance with the – Paperwork Reduction Act – Office of Management and Budget (OMB) Circular A-130 regulations, and – OGA guidelines • develops procedures for implementing OMB Circular A-130 and Management of Federal Information Resources, and • makes recommendations for commonality and legal compliance of information and data.

Continued on next page

2.1.4 Office of Information Management (CG-61), Continued

2.1.4.6.2
Chief (CG-61) Responsibilities for Policies and Services that Comply with Legislative Mandates (continued)

Chief (CG-61) Responsibility	Description
Develop policy and administer control over the service-wide printing and duplicating program	• Develops policy and administers legal and budgetary controls over the service-wide printing and duplicating program, including development of alternative printing operations (such as CD-ROMs) • oversees legal parameters established by the OMB, Government Printing Office (GPO), Department of Homeland Security (DHS), and Joint Committee on Printing (JCP), and • develops policy and administers procedures for printing and distribution matters within CG Headquarters.

Continued on next page

2.1.4 Office of Information Management (CG-61), Continued

2.1.4.7 Chief (CG-61) Responsibilities for Asset Oversight and Management

The responsibilities of the Chief (CG-61) for oversight and management of assigned assets are described in the table below.

See 2.1.4.3 for detail on the assets assigned to CG-61.

Chief (CG-61) Responsibility	Description
Plan and coordinate implementation of assets throughout the life cycle	See 2.1.4.7.1 for detail on the responsibilities for asset implementation.
Ensure interoperability among all assigned assets	• Plans, coordinates, and facilitates activities needed to ensure interoperability among all assigned assets (internal and external) where required to support mission, business, and organization performance objectives, and • applies policies and standards to enable interoperability where needed or mandated.
Plan, coordinate, and facilitate configuration management requirements, activities, processes, and policies for all assigned assets	• Ensures that sound configuration management doctrine is executed and sustained for assigned assets, and • participates as a voting member on assigned configuration control boards (CCBs).
Plan and coordinate disposition of assets	• Maintains asset inventory data and total asset visibility for all assigned assets, and • plans and coordinates (or supports planning and coordination of) disposition of assets at or near the end of the life cycle.

Continued on next page

2.1.4 Office of Information Management (CG-61), Continued

2.1.4.7.1 Chief (CG-61) Responsibilities for Asset Implementation

The responsibilities of the Chief (CG-61) for planning and coordinating (or support planning and coordination of) implementation of assets throughout the life cycle are described in the table below.

Chief (CG-61) Responsibility	Description
Administer policy for the CG Information and Records Management Program	• Develops and administers policy and procedures for the CG Information and Records Management Program, and • establishes systems and standards for service-wide control over the creation, use, maintenance, and disposal of records.
Develop standards for electronic records	• Develops standards and criteria for managing electronic records, and • serves as the senior technical advisor on e-government initiatives and information management matters.
Develop online directives and publications accessible via the CG Web site and internet	Develops, monitors, and maintains the following information on Web sites accessible via the CG Web site and internet: • automated directives and publications • Directives, Publications, Reports Index, and • Standard Distribution List.
Develop policy on the release of FOIA/PA information via the intranet/internet and privacy implications in information systems.	Develops and promulgates CG Information Management policy regarding release of information, and develops policies and procedures for conducting privacy threshold analysis and privacy impact assessments to evaluate privacy risks in information systems.

Continued on next page

2.1.4 Office of Information Management (CG-61), Continued

2.1.4.8 Chief (CG-61) Responsibilities for Liaisons with Departments and OGAs

The Chief (CG-61) serves as the CG representative regarding information management requirements before working groups and committees of

- the Department of Homeland Security (DHS)
- the Department of Defense (DOD), and
- other government agencies (OGAs).

2.1.5 Office of Communication Systems (CG-62)

Introduction

This topic contains

- an organization chart of the Office of Communication Systems (CG-62), and
- information on the
  - mission of CG-62
  - assets assigned to CG-62, and
  - role and responsibilities of the Chief (CG-62).

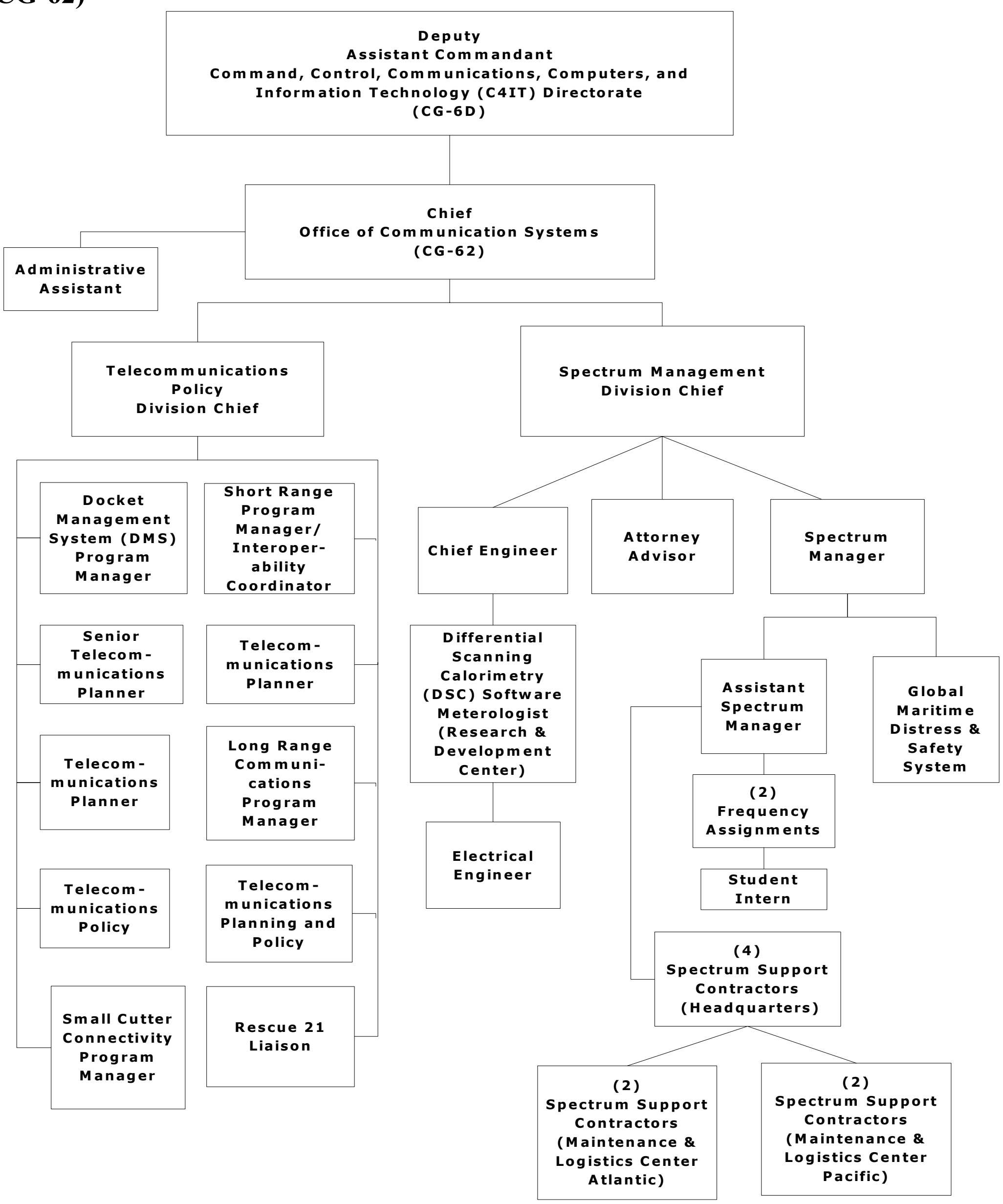
Continued on next page

2.1.5 Office of Communication Systems (CG-62), Continued

2.1.5.1 Organization Chart of Office of Communication Systems (CG-62)

An organization chart of the Office of Communication Systems (CG-62) is shown below.

See 2.1.1 C4IT Directorate (CG-6) Organizational Overview for an organization chart of the C4IT Directorate.



Continued on next page

2.1.5 Office of Communication Systems (CG-62), Continued

2.1.5.2 Mission of CG-62

The mission of the Office of Communication Systems (CG-62) is to

- manage the Coast Guard (CG) telecommunications operating program and systems, and
- establish requirements for all classified and unclassified CG national telecommunication systems.

2.1.5.3 Assets Assigned to CG-62

The assets assigned to CG-62 include the CG

- communications system and infrastructure
- integrated communication systems
- communications security (COMSEC)
- data network, and
- radio frequency spectrum.

2.1.5.4 Role of Chief (CG-62)

The role of the Chief (CG-62) is portfolio manager, which includes

- planning, programming, and budgeting resources to sustain and facilitate the life cycle of assigned assets (see 2.1.5.3 for detail on the assets assigned to CG-62)
- overseeing the system (or asset) development life cycle (SDLC)
- overseeing and managing the assets assigned to CG-62, and
- liaising with industry and other government agencies (OGAs) regarding maritime safety and communication system requirements.

The table below identifies where in this topic to find detail on the responsibilities of the Chief (CG-62).

For detail on responsibilities for …	See …
resource planning, programming, and budgeting	2.1.5.5
SDLC oversight	2.1.5.6
asset oversight and management	2.1.5.7
liaisons with industry and OGAs	2.1.5.8

Continued on next page

2.1.5 Office of Communication Systems (CG-62), Continued

2.1.5.5 Chief (CG-62) Responsibilities for Resource Planning, Programming, and Budgeting

The responsibilities of the Chief (CG-62) for planning, programming, and budgeting resources to sustain and facilitate the life cycle of assigned assets are described in the table below.

See 2.1.5.3 for detail on the assets assigned to CG-62.

Note: These responsibilities are performed in collaboration with resource managers and program offices.

Chief (CG-62) Responsibility	Description
Establish requirements, policy, and procedures for telecommunication systems	• Establishes requirements for all CG classified and unclassified national telecommunication systems, including – voice, message, data, and image transport services to CG units, and – connections to external agencies and the civil maritime community, and • establishes policy and promulgates procedures for the operation of all classified and unclassified national telecommunication systems.
Develop and maintain the telecommunications portion of the Command, Control, Communications, Computers, and Information Technology (C4IT) business plan	• Develops the telecommunication portion of the C4IT (CG-6) business plan • maintains the telecommunications plan, and • prioritizes all decisions related to the budget, research and development projects, and capital investments.
Oversee development of secure communication plans and policy	• Administers the – CG communication security (COMSEC) system – COMSEC material system (CMS) – communication tactical (COMTAC) system, and – North Atlantic Treaty Organization (NATO) communication system, and • provides policy, guidance, support, and availability of COMSEC equipment and keying material.

Continued on next page

2.1.5 Office of Communication Systems (CG-62), Continued

2.1.5.6 Chief (CG-62) Responsibilities for SDLC Oversight

The responsibilities of the Chief (CG-62) for oversight of the system (or asset) development life cycle (SDLC) are described in the table below.

Note: These responsibilities involve oversight, coordination, and facilitation of activities, standards, policies, milestones, and deliverables of the SDLC as performed by the system development agent (SDA).

Chief (CG-62) Responsibility	Description
Participate in the Chief Information Officer (CIO) capital planning, investment, and control (CPIC) process	Participates in each phase (select, control, and evaluate) of the CIO's CPIC process.
Review and endorse project plans	Reviews and endorses project plans submitted by program sponsors, project managers, or other stakeholders.
Enforce enterprise architecture standards and legislative mandates	• Enforces (or recommends changes to) architecture standards and policies, and • enforces or translates legislative and departmental mandates.
Approve or endorse major milestones	• Approves or endorses major milestones, and • recommends approval of the CIO when appropriate.
Oversee SDLC as voting member and chair of configuration control boards (CCBs) and the senior leadership team	Serves as • a voting member of the Overarching Configuration Control Board (OCCB) • chair of the Secret Internet Protocol Router Network (SIPRNET) Configuration Control Board, and • chair of the Communication Systems Senior Leadership Team (CSSLT).
Serve as approving authority for the CG Data Network Plus (CGDN+)	• Serves as designated approving authority (DAA) for the CGDN+, and • oversees the CGDN+ certifying authority of the Telecommunication and Information Systems Command (TISCOM).
Monitor progress of C4IT assets	Monitors progress of C4IT asset acquisition, development, deployment, and implementation, including operations and maintenance.

Continued on next page

2.1.5 Office of Communication Systems (CG-62), Continued

2.1.5.6
Chief (CG-62) Responsibilities for SDLC Oversight (continued)

Chief (CG-62) Responsibility	Description
Manage organizational acceptance of systems or assets	Manages or directs organizational acceptance of new (or major changes to) systems or assets.
Oversee deployments, performance, security, and disposition of records	• Deconflicts system or asset deployments as necessary • reviews performance metrics, and • verifies – compliance with security requirements, and – disposition of records.
Resolve issues and resource deficiencies that may encumber the SDLC or SDA	Collaborates with the sponsoring program manager, resource managers, other portfolio managers, and the SDA's project manager to resolve issues and resource deficiencies that may encumber the SDLC or SDA.

2.1.5.7 Chief (CG-62) Responsibilities for Asset Oversight and Management

The responsibilities of the Chief (CG-62) for oversight and management of assigned assets are described in the table below.

See 2.1.5.3 for detail on the assets assigned to CG-62.

Chief (CG-62) Responsibility	Description
Manage the CG radio spectrum assets	• Manages the Radio Frequency Plan • obtains spectrum availability authorization from the Office of Management and Budget (OMB)-A11 for CG radio systems, and • coordinates with the Department of Homeland Security (DHS) on spectrum matters when necessary.
Plan and coordinate implementation of assigned assets	Plans and coordinates (or supports planning and coordination of) implementation of assigned assets throughout the life cycle.

Continued on next page

2.1.5 Office of Communication Systems (CG-62), Continued

2.1.5.7
Chief (CG-62) Responsibilities for Asset Oversight and Management (continued)

Chief (CG-62) Responsibility	Description
Ensure interoperability among all assigned assets	• Plans, coordinates, and facilitates activities, policies, and standards to ensure interoperability among assigned assets (internally or externally) where needed or mandated to support mission, business, and organization performance objectives, and • applies policies and standards that enable interoperability where needed or mandated.
Plan and coordinate integration across systems or assets	Plans, coordinates, and facilitates activities, policies, or standards to enable appropriate or required integration across systems or assets.
Plan and coordinate integrated logistics support (ILS) of assigned assets	Plans and coordinates (or supports planning and coordination of) ILS of assigned assets which includes, where appropriate • supply and support chain management, and • alignment of field and tri-level support elements among – Maintenance and Logistics Commands (MLCs) – Coast Guard Yard – Engineering Logistics Center (ELC) – support contractors – Integrated Coast Guard Systems (ICGS) – system development agents (SDAs), and – Centers of Excellence (COEs).
Plan and coordinate configuration management requirements, activities, policies, and processes of assigned assets	• Ensures that sound configuration management of assigned assets is executed and sustained, and • participates as a voting member on assigned configuration control boards (CCBs).

Continued on next page

2.1.5 Office of Communication Systems (CG-62), Continued

2.1.5.7
Chief (CG-62) Responsibilities for Asset Oversight and Management (continued)

Chief (CG-62) Responsibility	Description
Oversee, support, and coordinate activities, policies, and guidance (as necessary) to ensure or facilitate the effectiveness, efficiency, and responsiveness of assigned COEs	• Serves as the technical control office and Headquarters Program Coordinator (HQPC) for TISCOM, and • serves as the HQPC for communication area master stations and communication stations.
Coordinate C4IT professional development with human resource managers and specialists	Coordinates professional development with human resource managers and specialists to support assigned assets by • developing and training civilian and military C4IT professionals (engineers, managers, and technicians), and • providing support and expertise for the development, specification, and maintenance of C4IT civilian and military professional grades and ratings.

2.1.5.8 Chief (CG-62) Responsibilities for Liaisons with Industry and OGAs

The responsibilities of the Chief (CG-62) for liaisons with industry and OGAs regarding maritime safety and communication system requirements are described in the table below.

Chief (CG-62) Responsibility	Description
Partner and liaise with industry and OGAs regarding assigned assets (see 2.1.5.3 for detail on the assets assigned to CG-62)	Partners and liaises with industry and OGAs as needed or beneficial to • enhance worth of assigned assets • improve performance of assigned assets • reduce total ownership costs of assigned assets, and • enhance mission or business capabilities.

Continued on next page

2.1.5 Office of Communication Systems (CG-62), Continued

2.1.5.8
Chief (CG-62) Responsibilities for Liaisons with Industry and OGAs (continued)

Chief (CG-62) Responsibility	Description
Represent the Coast Guard and civil maritime community before organizations developing radio regulatory standards and policies	Serves as subject matter expert for the civil maritime community to ensure implementation of • communication and navigation standards, and • international, national, statutory, and treaty regulations.
Represent the Coast Guard and U.S. maritime safety interests nationally and internationally	• Represents the Coast Guard and U.S. maritime safety interests before the International Telecommunications Union to oversee implementation of – national and international maritime distress services, and – radio communication safety services, and • heads the U.S. delegation to the International Maritime Organization (IMO) Radio Communications and Search and Rescue Subcommittee.
Develop and refine international, national, and federal policies and standards	Develops and refines international, national, and federal telecommunication policies and standards through • Coast Guard initiatives, and • participation on international, national, and federal committees.
Serve as representative for CG telecommunications military capabilities, interoperability, and planning	Serves as representative for CG telecommunications military capabilities, interoperability, and planning before the • Department of Navy (N6) • Joint Staff (J6) • Defense Information Systems Agency (DISA), and • Military Communications Electronics Board (MCEB).

2.1.6 Office of Information Systems and Infrastructure (CG-63)

Introduction

This topic contains

- an organization chart of the Office of Information Systems and Infrastructure (CG-63), and
- information on the
  - mission of CG-63
  - assets assigned to CG-63, and
  - role and responsibilities of the Chief (CG-63).

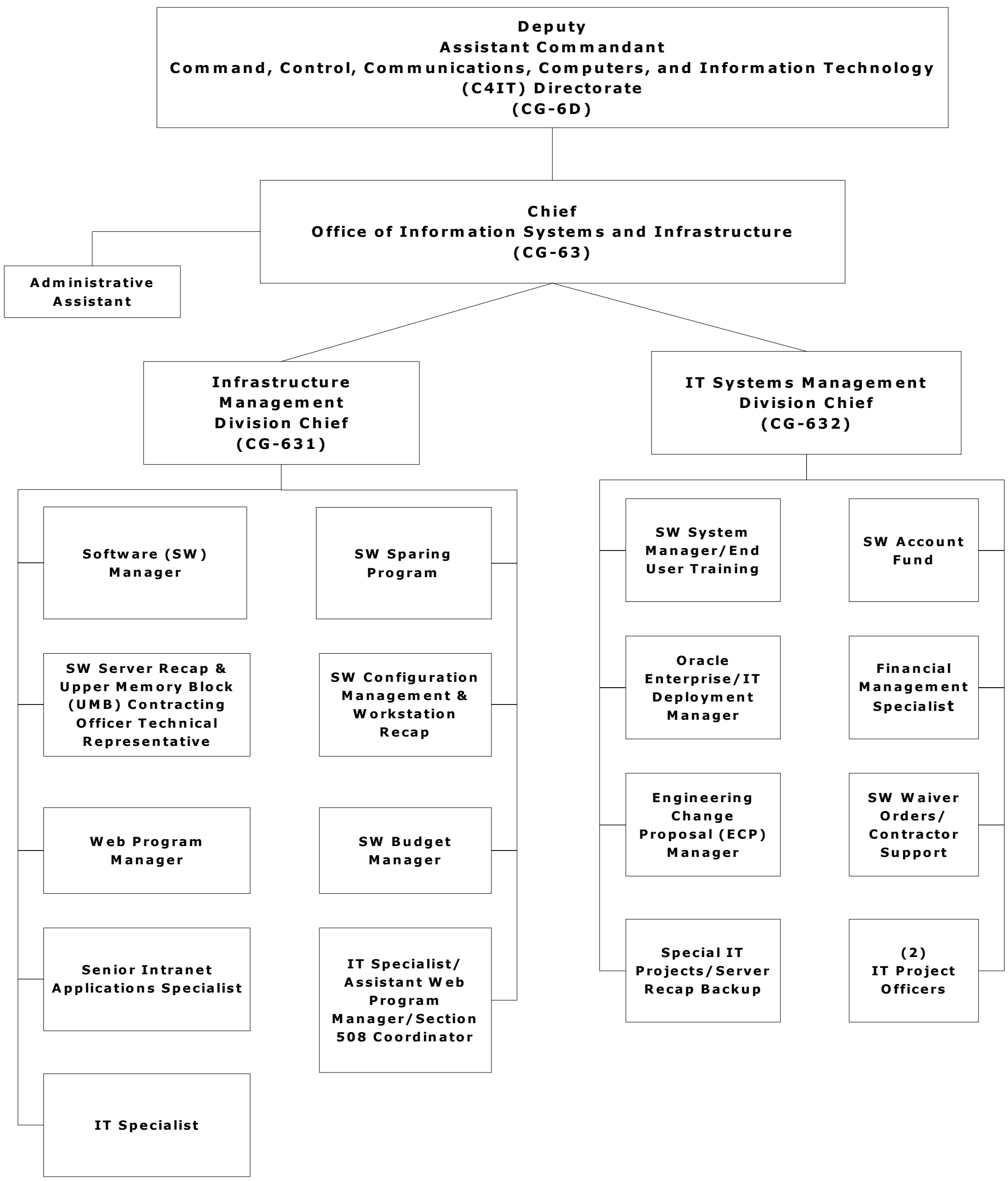
Continued on next page

2.1.6 Office of Information Systems and Infrastructure (CG-63), Continued

2.1.6.1 Organization Chart of Office of Information Systems and Infrastructure (CG-63)

An organization chart of the Office of Information Systems and Infrastructure (CG-63) is shown below.

See 2.1.1 C4IT Directorate (CG-6) Organizational Overview for an organization chart of the C4IT Directorate.



Continued on next page

2.1.6 Office of Information Systems and Infrastructure (CG-63), Continued

2.1.6.2 Mission of CG-63

The mission of the Office of Information Systems and Infrastructure (CG-63) is to

- support and manage the Coast Guard (CG) standard workstation infrastructure
- plan and implement CG business needs through information systems on the infrastructure
- advocate for information technology (IT) resources within Command, Control, Communications, Computers, and Information Technology (C4IT), and
- oversee the system development life cycle (SDLC) of information systems that enhance mission performance.

2.1.6.3 Assets Assigned to CG-63

The assets assigned to CG-63 include the

- standard workstation infrastructure, which includes the core hardware, software, and network devices that provide the platform for
  - e-mail and internet connectivity, and
  - enterprise applications to support missions
- central information technology (IT) fund, and
- IT system policies and directives.

Continued on next page

2.1.6 Office of Information Systems and Infrastructure (CG-63), Continued

2.1.6.4 Role of Chief (CG-63)

The role of the Chief (CG-63) is asset manager, which includes

- planning, programming, and budgeting resources to sustain and facilitate the life cycle of assigned assets (see 2.1.6.3 for detail on the assets assigned to CG-63)
- overseeing the system development life cycle (SDLC)
- overseeing and managing the assets assigned to CG-63, and
- liaising with industry and other government agencies (OGAs) regarding assigned assets.

The table below identifies where in this topic to find detail on the responsibilities of the Chief (CG-63).

For detail on responsibilities for …	See …
resource planning, programming, and budgeting	2.1.6.5
SDLC oversight	2.1.6.6
asset oversight and management	2.1.6.7
liaisons with industry and OGAs	2.1.6.8

Continued on next page

2.1.6 Office of Information Systems and Infrastructure (CG-63), Continued

2.1.6.5 Chief (CG-63) Responsibilities for Resource Planning, Programming, and Budgeting

The responsibilities of the Chief (CG-63) for planning, programming, and budgeting resources to sustain and facilitate the life cycle of assigned assets are described in the table below.

See 2.1.6.3 for detail on the assets assigned to CG-63.

Note: These responsibilities are performed in collaboration with resource managers, program offices, and Activities (see 2.3 Maintenance and Logistics Commands (MLCs), Districts, and Subordinate Units for detail on Activities).

Chief (CG-63) Responsibility	Description
Serve as program manager for the standard workstation infrastructure	Develops planning documents—including resource proposals, acquisition support plans (ASPs), and relevant acquisition development plans (ADPs)—for modernization and support of the standard workstation infrastructure.
Plan and budget resources for the CG-wide networked microcomputer infrastructure	• Supports the CG-wide networked microcomputer infrastructure by – developing acquisition strategies, and – planning and/or managing funding and the project life cycle • establishes policy for the microcomputer infrastructure, and • manages and provides technical oversight for IT support contracts to operate and maintain the microcomputer infrastructure.
Develop policy to define the scope and use of the central IT fund	Develops and manages the central IT fund to acquire, support, and implement the microcomputer infrastructure.
Develop policy and/or manage the microcomputer personnel support program	• Develops policy and/or centrally manages (or coordinates) the microcomputer personnel support program, and • coordinates with human resource managers and specialists to provide training and support requirements for development and maintenance of IT professional ratings.

Continued on next page

2.1.6 Office of Information Systems and Infrastructure (CG-63), Continued

2.1.6.6 Chief (CG-63) Responsibilities for SDLC Oversight

The responsibilities of the Chief (CG-63) for oversight of the system development life cycle (SDLC) are described in the table below.

Note: These responsibilities involve oversight, coordination, and facilitation of the activities, standards, policies, milestones, and deliverables of the SDLC as performed by the SDA.

Chief (CG-63) Responsibility	Description
Participate in the Chief Information Officer (CIO) capital planning, investment, and control (CPIC) process	• Participates in each phase (select, control, and evaluate) of the CIO's CPIC process, and • ensures that each product specified in the SDLC is submitted during the appropriate phase of the process.
Approve project plans	Approves project plans submitted by program sponsors, project managers, or other stakeholders.
Enforce (and recommend changes to) enterprise architecture standards and policies	See 2.1.6.6.1 for detail on the responsibilities for enterprise architecture standards and policies.
Manage the life cycle of CG-wide standard computer system platforms	Manages the life cycle of CG-wide standard computer system platforms, including the planning, budgeting, acquisition, implementation, support, and replacement of • standard hardware, and • core software.
Approve or endorse major milestones	• Approves or endorses major milestones, and • recommends approval of a higher authority (that is, the designated approving authority or CIO) when appropriate.

Continued on next page

2.1.6 Office of Information Systems and Infrastructure (CG-63), Continued

2.1.6.6
Chief (CG-63) Responsibilities for SDLC Oversight (continued)

Chief (CG-63) Responsibility	Description
Oversee the SDLC as voting member on configuration control board (CCB)	Serves as a voting member on the Overarching Configuration Control Board (OCCB).
Monitor progress of C4IT (CG-6) assets	Actively participates in • major IT acquisitions of CG-wide systems and services for the networked microcomputer infrastructure, including – standard information systems – microcomputer hardware systems – core software, and – operating and maintenance services, and • oversight of the entire life cycle of the systems and services, including acquisition, integration, conversion, and implementation.
Manage organizational acceptance of new systems or assets	Manages or directs organizational acceptance of new (or major changes to) systems or assets.
Oversee deployments and performance	• Deconflicts system or asset deployment as necessary, and • reviews performance metrics.
Resolve issue and resource deficiencies that may encumber the SDLC or SDA	Collaborates with the sponsoring program manager, resource manager, other asset managers, and the SDA's project manager to resolve issue and resource deficiencies that may encumber the SDLC or SDA.

Continued on next page

2.1.6 Office of Information Systems and Infrastructure (CG-63), Continued

2.1.6.6.1 Chief (CG-63) Responsibilities for Enterprise Standards and Policies

The responsibilities of the Chief (CG-63) for enforcing (and recommending changes to) enterprise architecture standards and policies are described in the table below.

CG-63 Responsibility	Description
Develop CG IT architecture	Provides technical assistance and coordinates with the enterprise architect (CG-6B) and Chief (CG-62) to develop IT architecture, including • microcomputer platforms • local area networks, and • data communication requirements.
Ensure that business information systems comply with C4IT standards and IT architecture	• Collaborates with program managers to ensure that business information systems comply with – C4IT standards, and – established IT architecture, and • assists program managers with the preparation of integrated and prioritized C4IT requirements for CIO development, deployment, and operation.
Manage enterprise-wide licensing agreements for standard microcomputer software	Manages enterprise-wide licensing agreements for standard microcomputer software, such as • server and workstation operating system software • e-mail • anti-virus software, and • electronic forms, graphics, and other office productivity tools.

Continued on next page

2.1.6 Office of Information Systems and Infrastructure (CG-63), Continued

2.1.6.7 Chief (CG-63) Responsibilities for Asset Oversight and Management

The responsibilities of the Chief (CG-63) for oversight and management of assigned assets are described in the table below.

See 2.1.6.3 for detail on the assets assigned to CG-63.

Chief (CG-63) Responsibility	Description
Plan and coordinate implementation of business systems	Plans and coordinates (or supports planning and coordination of) business systems throughout the life cycle.
Ensure interoperability among all assigned assets	• Plans, coordinates, and facilitates activities needed to ensure interoperability among all assigned assets (internal and external) where required to support mission, business, and organization performance objectives, and • applies policies and standards to enable interoperability where needed or mandated.
Enable integration across systems or assets	• Plans, coordinates, and facilitates activities, policies, or standards to enable appropriate or required integration across systems or assets, and • coordinates with the Telecommunications Systems Command (TISCOM) and Operations Systems Center (OSC) to integrate the implementation and support of computer platforms into a synergistic infrastructure that ensures interoperability between diverse Coast Guard, other government agencies (OGAs), and public sector IT systems.

Continued on next page

2.1.6 Office of Information Systems and Infrastructure (CG-63), Continued

2.1.6.7
Chief (CG-63) Responsibilities for Asset Oversight and Management (continued)

Chief (CG-63) Responsibility	Description
Facilitate, coordinate, and plan configuration management activities, requirements, processes, and policies for all assigned assets	• Provides guidance and assistance to program sponsors for system development activities to ensure that sound configuration management doctrine is executed and sustained for assigned assets • collaborates with TISCOM to provide configuration management of the standard workstation infrastructure • participates as a voting member on assigned CCBs, and • serves as chair of the Software CCB to maintain an integrated and responsive CCB process (in collaboration with other resource and portfolio managers).
Oversee and support assigned Centers of Excellence (COEs), and the OSC	• Oversees, supports, and coordinates activities, policies, or guidance as necessary to ensure (or facilitate) the effectiveness, efficiency, and responsiveness of assigned COEs, and • serves as the technical control office and Headquarters Program Coordinator (HQPC) for the OSC.
Maintain asset inventory	Maintains asset inventory data and total asset visibility for all assigned assets.
Coordinate C4IT professional development with human resource managers and specialists	Coordinates professional development with human resource managers and specialists to support assigned assets by • developing and training civilian and military C4IT professionals (engineers, managers, and technicians), and • providing support and expertise for the development, specification, and maintenance of C4IT civilian and military professional grades and ratings.

Continued on next page

2.1.6 Office of Information Systems and Infrastructure (CG-63), Continued

2.1.6.8 Chief (CG-63) Responsibilities for Liaisons with Industry and OGAs

The Chief (CG-63) is responsible for partnering and liaising with industry and OGAs as needed or beneficial to

- enhance worth of assigned assets
- improve performance of assigned assets
- reduce total ownership costs of assigned assets, and
- enhance mission or business capabilities.

2.1.7 Office of Command, Control (C2), and Navigation Systems (CG-64)

Introduction

This topic contains

- an organization chart of the Office of Command, Control (C2), and Navigation Systems (CG-64), and
- information on the
  - mission of CG-64
  - assets assigned to CG-64, and
  - role and responsibilities of the Chief (CG-64).

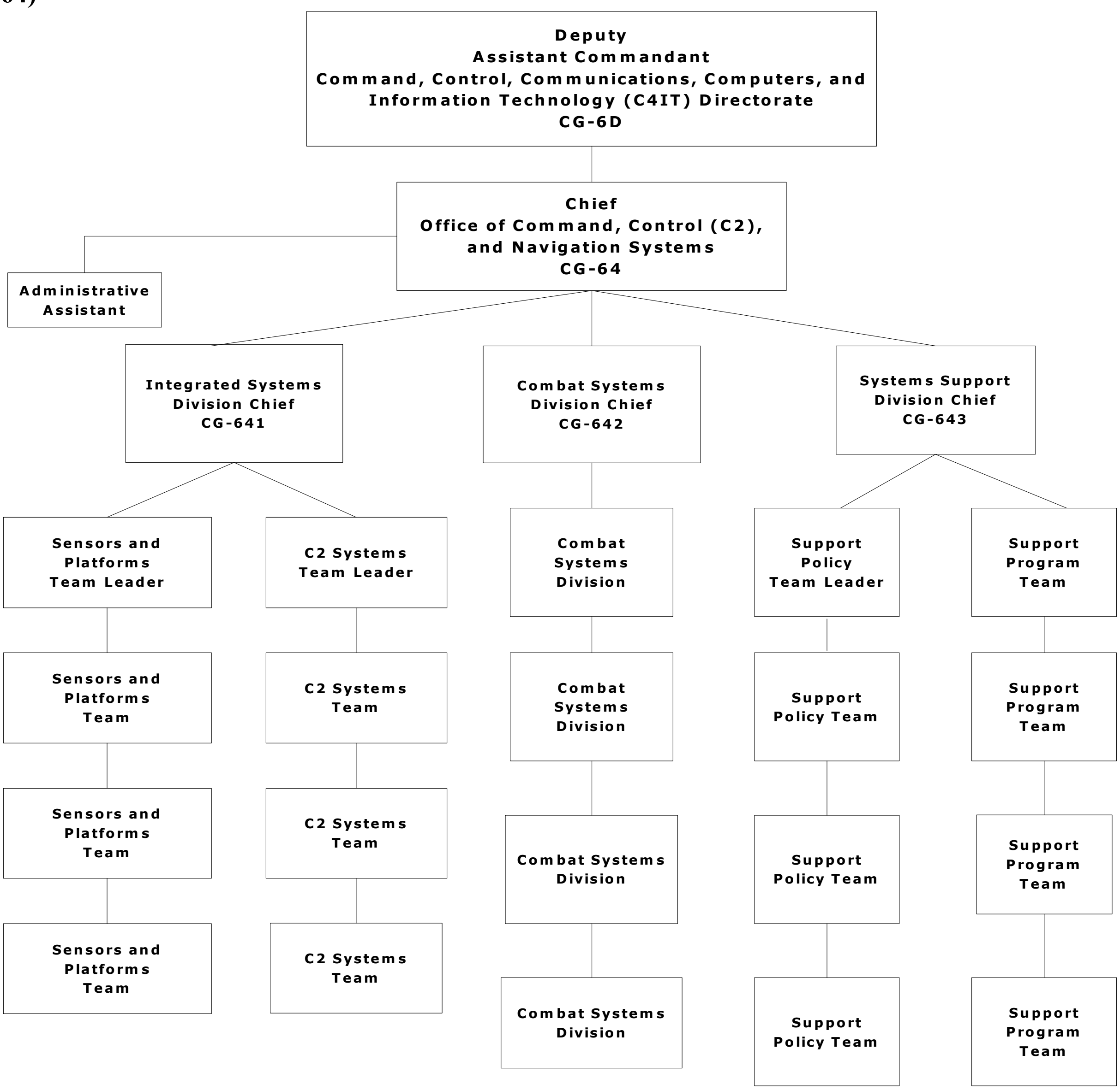
Continued on next page

2.1.7 Office of Command, Control (C2), and Navigation Systems (CG-64), Continued

2.1.7.1 Organization Chart of Office of Command, Control (C2), and Navigation Systems (CG-64)

An organization chart of the Office of Command, Control (C2), and Navigation Systems (CG-64) is shown below.

See 2.1.1 C4IT Directorate (CG-6) Organizational Overview for an organization chart of the C4IT Directorate.



Continued on next page

2.1.7 Office of Command, Control (C2), and Navigation Systems (CG-64), Continued

2.1.7.2 Mission of CG-64

The mission of the Office of C2 and Navigation Systems (CG-64) is to support the life cycle of Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR), combat, and national radio navigation systems that preserve and enable Coast Guard missions.

2.1.7.3 Assets Assigned to CG-64

The assets assigned to CG-64 include

- integrated electronics systems
- integrated C2 and Navigation systems
- Navy-type/Navy-owned (NT/NO) combat systems, and
- mission operational information systems.

2.1.7.4 Role of Chief (CG-64)

The role of the Chief (CG-64) is portfolio management, which includes

- planning, programming, and budgeting resources to sustain and facilitate the life cycle of assigned assets (see 2.1.7.3 for detail on the assets assigned to CG-64)
- overseeing the system development life cycle (SDLC) for the initiation, design, and implementation of cross-functional and cross-programmatic electronics-based systems and operational mission applications
- overseeing and managing the assets assigned to CG-64, and
- liaising with industry, the U.S. Navy, and other government agencies (OGAs) regarding assigned assets.

The table below identifies where in this topic to find detail on the responsibilities of the Chief (CG-64).

For detail on responsibilities for …	See …
resource planning, programming, and budgeting	2.1.7.5
SDLC oversight	2.1.7.6
asset oversight and management	2.1.7.7
liaisons with industry, U.S. Navy, and OGAs	2.1.7.8

Continued on next page

2.1.7 Office of Command, Control (C2), and Navigation Systems (CG-64), Continued

2.1.7.5 Chief (CG-64) Responsibilities for Resource Planning, Programming, and Budgeting

The responsibilities of the Chief (CG-64) for planning, programming, and budgeting resources to sustain and facilitate the life cycle of assigned assets are described in the table below.

See 2.1.7.3 for detail on the assets assigned to CG-64.

Note: These responsibilities are performed in collaboration with resource managers and program offices.

Chief (CG-64) Responsibility	Description
Provide policy and input for allocation and oversight of assigned allotments	Provides policy and input for the allocation and oversight of • Allotment Fund Control (AFC)-30 and AFC-42 funds • U.S. Navy support fund (AFC-77), and • acquisition, construction, and improvement (AC&I) resources involving electronics and portfolio management of mission systems.
Support defined C4IT and knowledge management priorities	• Supports C4IT (CG-6) and knowledge management priorities • evaluates system and support service requests • supports the allocation of CG-6 resources among competing projects • monitors the execution of CG-6 spending plans for headquarters and headquarter units, and • identifies and initiates measures to maximize efficient use of funds to pursue CG goals and objectives.
Serve as the principal advisor to C4IT (CG-6) on all matters and questions relating to electronics systems	Reviews requirements for, provides policy guidance to, and serves as the support manager for CG electronics systems and assigned assets.

Continued on next page

2.1.7 Office of Command, Control (C2), and Navigation Systems (CG-64), Continued

2.1.7.5
Chief (CG-64) Responsibilities for Resource Planning, Programming, and Budgeting (continued)

Chief (CG-64) Responsibility	Description
Assist (or provide input to) program managers with the preparation and annual revision of the Chief Information Officer's (CIO's) strategic vision and five-year information resource management (IRM) program business or strategic plans	• Identifies information needs, business requirements, goals, objectives, success factors, measures of effectiveness, and monitoring procedures to assist (or provide input to) program managers in the preparation of the – CIO's strategic vision, and – five-year IRM program business or strategic plans, and • supports program managers in – the development of, and representations in, their IRM plans and CG-6 resource proposal prioritizations, and – their peer review efforts (if requested).

2.1.7.6 Chief (CG-64) Responsibilities for SDLC Oversight

The responsibilities of the Chief (CG-64) for oversight of the system development life cycle (SDLC) for the initiation, design, and implementation of cross-functional and cross-programmatic electronics-based systems and operational mission applications are described in the table below.

Note: These responsibilities involve oversight, coordination, and facilitation of the activities, standards, policies, milestones, and deliverables of the SDLC as performed by the system development agent (SDA).

Chief (CG-64) Responsibility	Description
Participate in the CIO capital planning, investment, and control (CPIC) process	• Participates in the CIO CPIC process in each phase (select, control, and evaluate), and • ensures that each product identified in the SDLC is submitted during the appropriate phase of the process.

Continued on next page

2.1.7 Office of Command, Control (C2), and Navigation Systems (CG-64), Continued

2.1.7.6
Chief (CG-64) Responsibilities for SDLC Oversight (continued)

Chief (CG-64) Responsibility	Description
Review and endorse project plans submitted by program sponsors, project managers, or other stakeholders	• Performs periodic reviews and analyses of the functionality of existing mission systems (including sensors, combat, navigation, and tactical communication assets) • validates program functional requirements to – ensure efficient use of current technology – identify opportunities to eliminate redundant applications, and – optimize the use of common C4IT (CG-6) tools, and • ensures that the sponsoring program documents its functional and project requirements.
Review project deliverables to ensure that all life cycle requirements are properly addressed	• Assists project managers with projects for acquisition of unique CG electronic systems, including – command, control, navigation, combat, and sensor systems (with the exception of communications, ordnance, computers, avionics, and engine room electronics systems), and – mission applications • provides pre-acquisition reviews of the system design • investigates and recommends alternatives that capitalize on the latest technology to satisfy prioritized information requirements, and • assists with acquisition of the appropriate procurement authority (as needed).
Enforce (and recommend modifications to) enterprise standards and policies	• Collaborates with program managers to ensure that C4IT (CG-6) standards are applied to mission systems for facilitation of system knowledge and information sharing • collaborates with mission system program managers to ensure that initiatives are compliant with established objective IT architectures, and • assists program managers with the preparation and presentation of integrated and prioritized C4IT system architecture requirements for CIO development, deployment, and operation.

Continued on next page

2.1.7 Office of Command, Control (C2), and Navigation Systems (CG-64), Continued

2.1.7.6
Chief (CG-64) Responsibilities for SDLC Oversight (continued)

Chief (CG-64) Responsibility	Description
Enforce or translate legislative mandates	Ensures compliance with appropriate federal government IT policies, standards, and regulations.
Approve or endorse major milestones or recommend approval to a higher authority when appropriate	See 2.1.7.6.1 for detail on the responsibilities for approving or endorsing major milestones.
Monitor progress in C4IT asset acquisition, development, deployment, and implementation (including operation and management)	• Performs all functions of system management engineering for all supported electronics equipment, and • provides policy and direct oversight for electronics and mission application projects.
Deconflict system or asset deployments as necessary	• Oversees and assists with the management (or coordination of) electronics, integrated systems, and mission application deployments, and • assists the program sponsor and SDA with – planning system or application deployments, and – resolving issues or obstacles.
Resolve issues and resource deficiencies that may encumber the SDLC or SDA	Collaborates with the sponsoring program manager, resource managers, other portfolio managers, and the SDA's project manager (as appropriate) to resolve issues and resource deficiencies that may encumber the SDLC or SDA.

Continued on next page

2.1.7 Office of Command, Control (C2), and Navigation Systems (CG-64), Continued

2.1.7.6.1 Chief (CG-64) Responsibilities for Approving or Endorsing Major Milestones

The responsibilities of the Chief (CG-64) for approving or endorsing major milestones are described in the table below.

Chief (CG-64) Responsibility	Description
Provide direction throughout the project life cycle to the • Loran Support Center (LSU) • Command and Control Engineering Center (C2CEN) • Operations Systems Center (OSC), and • Maintenance and Logistics Commands (MLCs)	Provides direction to the LSU, C2CEN, OSC, and MLCs throughout the complete project life cycle to ensure that prior to the start of the project • a formal requirements validation is conducted, and • an integrated logistics support plan (ILSP) is developed. **Exception**: These requirements do not apply to acquisition projects that are Level IV or below (such as AC&I and operating expense projects).
Ensure that approved mission system project plans include adequate life cycle support resources	Ensures that development, deployment, operation, and maintenance of approved mission system projects include adequate life cycle support resources.
Review acquisition and development initiatives	Reviews acquisition and development initiatives to ensure the • success of critical milestones, and • efficient use of current technology.

Continued on next page

2.1.7 Office of Command, Control (C2), and Navigation Systems (CG-64), Continued

2.1.7.7 Chief (CG-64) Responsibilities for Asset Oversight and Management

The responsibilities of the Chief (CG-64) for oversight and management of assigned assets are described in the table below.

See 2.1.7.3 for detail on the assets assigned to CG-64.

Chief (CG-64) Responsibility	Description
Plan and coordinate implementation of assets	• Plans and coordinates (or supports planning and coordination of) implementation of assets throughout the life cycle, and • ensures appropriate management of project activities throughout all project phases by advising and coordinating with the – Loran Support Unit (LSU) – Command and Control Engineering Center (C2CEN) – Operations Systems Center (OSC), and – Maintenance and Logistics Commands (MLCs).
Ensure interoperability among assigned assets	• Plans, coordinates, and facilitates activities needed to ensure interoperability among all assigned assets (internal and external) where required to support mission, business, and organization performance objectives, and • applies policies and standards to enable interoperability where needed or mandated.
Plan and coordinate integration to enable appropriate or required integration across systems or assets	• Plans, coordinates, and facilitates activities, policies, or standards to enable appropriate or required integration across systems or assets, and • assigns subject matter experts to integrated product teams.

Continued on next page

2.1.7 Office of Command, Control (C2), and Navigation Systems (CG-64), Continued

2.1.7.7
Chief (CG-64) Responsibilities for Asset Oversight and Management (continued)

Chief (CG-64) Responsibility	Description
Plan and coordinate sustainment and integrated logistics support (ILS) of assigned assets	See 2.1.7.7.1 for detail on responsibilities for ILS of assigned assets.
Plan, coordinate, and facilitate configuration management requirements, activities, processes, and policies for all assigned assets	• Ensures that sound configuration management doctrine is executed and sustained for assigned assets • participates as a voting member on assigned configuration control boards (CCBs) • initiates actions for improvements in reliability or maintainability of equipment, and • establishes and maintains policy, and coordinates activities with, the ELC and CG logistics policy authorities involving formalized configuration management of equipment, systems, ship platforms, and shore facilities in areas where equipment is installed.
Oversee, support, and coordinate activities, policies, or guidance (as needed) to ensure and facilitate the effectiveness, efficiency, and responsiveness of assigned COEs	• Serves as the technical control office and Headquarters Program Coordinator (HQPC) for the C2CEN and LSU • designates, oversees, and provides policy for Systems Management and Engineering Facilities (SMEFs) and depot level repair service facilities for electronics equipment • assists (when necessary) the ELC with establishing all service-wide maintenance contracts for electronics equipment, and • monitors CG research and development activities involving mission systems and electronics.

Continued on next page

2.1.7 Office of Command, Control (C2), and Navigation Systems (CG-64), Continued

2.1.7.7
Chief (CG-64) Responsibilities for Asset Oversight and Management (continued)

Chief (CG-64) Responsibility	Description
Maintain asset inventory and plan and coordinate asset disposition.	• Maintains asset inventory data and total asset visibility for assigned assets, and • plans and coordinates (or supports planning and coordination of) disposition of assets at or near the end of the life cycle.
Coordinate C4IT professional development with human resource managers and specialists	Coordinates professional development with human resource managers and specialists to support assigned assets by • developing and training civilian and military C4IT professionals (engineers, managers, and technicians) • providing support and expertise for the development, specification, and maintenance of C4IT civilian and military professional grades and ratings, and • providing input for training programs for electronics and assigned assets.

Continued on next page

2.1.7 Office of Command, Control (C2), and Navigation Systems (CG-64), Continued

2.1.7.7.1 Chief (CG-64) Responsibilities for Integrated Logistics Support of Assigned Assets

The responsibilities of the Chief (CG-64) for planning and coordinating sustainment and integrated logistics support (ILS) of assigned assets are described in the table below.

See 2.1.7.3 for detail on the assets assigned to CG-64.

Chief (CG-64) Responsibility	Description
Plan and coordinate sustainment and ILS of assigned assets, including (where appropriate) • supply and support chain management, and • alignment of field and tri-level support	Plans and coordinates (or supports planning and coordination of) sustainment and ILS of assigned assets, including (where appropriate) supply and support chain management and alignment of field and tri-level support among the • MLCs • Coast Guard Yard • Engineering Logistics Center (ELC) • Integrated Coast Guard Systems (ICGS) • support contractors • SDAs, and • Centers of Excellence (COEs).
Provide policy direction for sustainment and ILS of assigned assets	• Establishes and manages policy for identifying and maintaining electronics equipment installed on CG ships or shore units, and • provides policy direction (as needed) to area, district, and MLC commanders for the operation, administration, and inspection of selected CG ship and shore unit electronic systems.

Continued on next page

2.1.7 Office of Command, Control (C2), and Navigation Systems (CG-64), Continued

2.1.7.8 Chief (CG-64) Responsibilities for Liaisons with Industry, U.S. Navy, and OGAs

The responsibilities of the Chief (CG-64) for liaising with industry, the U.S. Navy, and OGAs regarding assigned assets are described in the table below.

See 2.1.7.3 for details on the assets assigned to CG-64.

Chief (CG-64) Responsibility	Description
Partner and liaise with industry and (OGAs)	Partners and liaises with industry and OGAs as needed or beneficial to • enhance the worth of assigned assets • improve performance of assigned assets • reduce total ownership costs of assigned assets, and • enhance mission or business capabilities.
Execute memoranda of understanding with constituent headquarter and OGAs	Prepares, maintains, and executes memoranda of understanding (as required) with • constituent headquarter directorates and units, and • OGAs.
Maintain liaison with the U.S. Navy	Maintains liaison with the U.S. Navy to obtain Navy electronics equipment, spare parts, and maintenance funds for Navy owned equipment on CG vessels.
Liaise with • professional organizations, and • foreign and domestic government and civilian agencies	Represents the Coast Guard and maintains liaisons with professional organizations and foreign and domestic government and civilian agencies to promote inter-agency consistency and efficiency in the development of • electronics systems • integrated systems, and • mission applications.

Continued on next page

2.1.7 Office of Command, Control (C2), and Navigation Systems (CG-64), Continued

2.1.7.8
Chief (CG-64) Responsibilities for Liaisons with Industry, U.S. Navy, and OGAs (continued)

Chief (CG-64) Responsibility	Description
Represent the Coast Guard on interagency committees and working groups regarding • electronics systems • integrated tactical systems, and • civil navigation systems	Serves as the Coast Guard representative regarding electronics, integrated tactical, and civil navigation systems • on working groups and committees (as directed by the Assistant Commandant of C4IT) in the – Department of Homeland Security (DHS) – Department of Defense (DOD) – Department of Transportation (DOT) – National Institute of Science and Technology – General Services Administration (GSA), and – Office of Management and Budget (OMB), and • before Congressional staff and OGAs as required.

2.1.8 Office of Information Assurance (CG-65)

Introduction

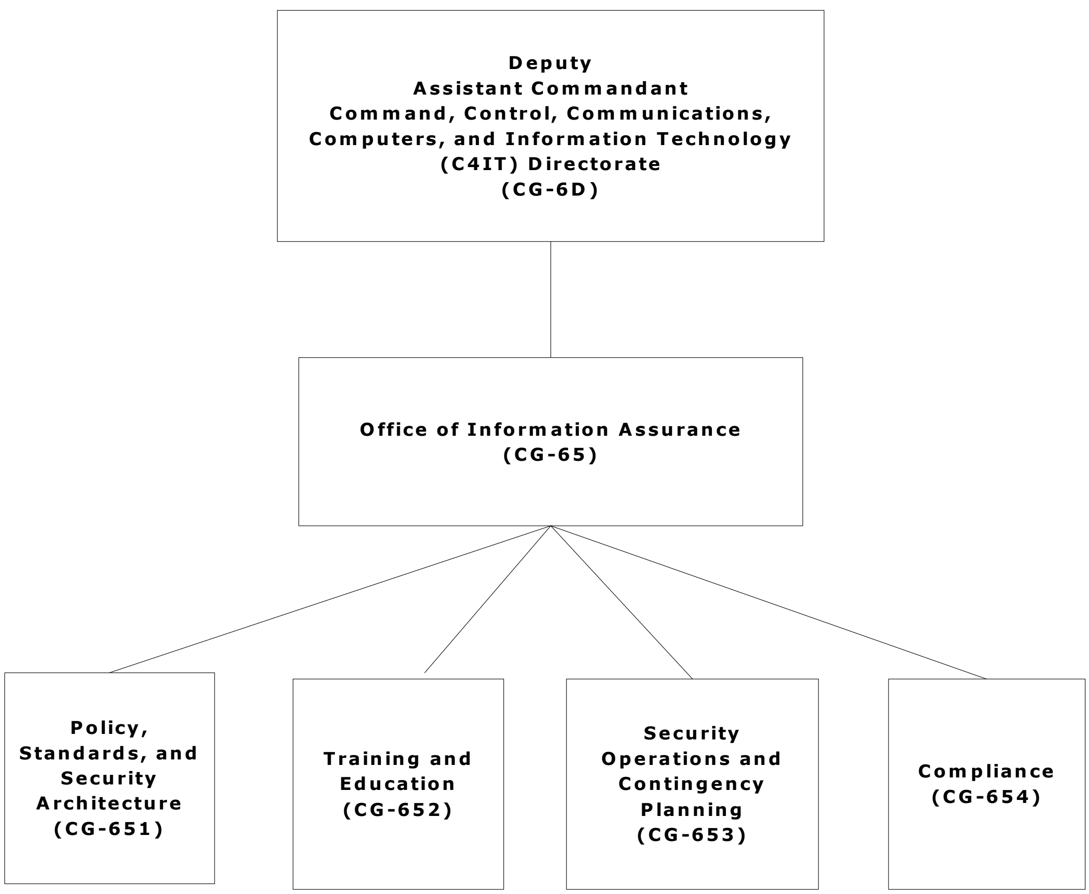
This topic contains

- an organization chart of the Office of Information Assurance (CG-65), and
- information on the
  - mission of CG-65
  - assets assigned to CG-65, and
  - role and responsibilities of the Chief (CG-65).

2.1.8.1 Organization Chart of Office of Information Assurance (CG-65)

An organization chart of the Office of Information Assurance (CG-65) is shown below.

See 2.1.1 C4IT Directorate (CG-6) Organizational Overview for an organization chart of the C4IT Directorate.



Continued on next page

2.1.8 Office of Information Assurance (CG-65), Continued

2.1.8.2 Mission of CG-65

The mission of the Office of Information Assurance (CG-65) is to

- leverage the value of information and technology for performing CG missions by developing and aligning enterprise strategies, policies, and resource decisions with current information security policies, standards, and capabilities, and
- develop, maintain, and facilitate implementation of an Information Assurance Program for the executive agency.

2.1.8.3 Assets Assigned to CG-65

The assets assigned to CG-65 include

- certification and accreditation standards, policies, and practices
- information assurance (IA) technology, and
- information about IA technology.

2.1.8.4 Role of Chief (CG-65)

The role of the Chief (CG-65) is asset management, which includes

- planning, programming, and budgeting resources to sustain and facilitate the life cycle of all assigned assets (see 2.1.8.3 for detail on the assets assigned to CG-65)
- overseeing the system development life cycle (SDLC)
- overseeing and managing the assets assigned to CG-65, and
- liaising with industry and other government agencies (OGAs) regarding assigned assets.

The table below identifies where in this topic to find detail on the responsibilities of the Chief (CG-65).

For detail on responsibilities for …	See …
resource planning, programming, and budgeting	2.1.8.5
SDLC oversight	2.1.8.6
asset oversight and management	2.1.8.7
liaisons with industry and OGAs	2.1.8.8

Continued on next page

2.1.8 Office of Information Assurance (CG-65), Continued

2.1.8.5 Chief (CG-65) Responsibilities for Resource Planning, Programming, and Budgeting

The responsibilities of the Chief (CG-65) for planning, programming, and budgeting resources to sustain and facilitate the life cycle of all assigned assets are described in the table below.

See 2.1.8.3 for detail on the assets assigned to CG-65.

Note: These responsibilities are performed in collaboration with resource managers and program offices.

Chief (CG-65) Responsibility	Description
Ensure that information assurance (IA) standards and policies are implemented and enabled	• Plans, coordinates, and facilitates activities to ensure that IA standards and policies are implemented where required to support mission, business, and organization performance objectives, and • applies policies and standards to enable IA where needed or mandated.
Serve as the program manager for the CG Computer Incident Response Team (CIRT)	Develops and manages the field Information Systems Security Officer (ISSO) Program.

Continued on next page

2.1.8 Office of Information Assurance (CG-65), Continued

2.1.8.6 Chief (CG-65) Responsibilities for SDLC Oversight

The responsibilities of the Chief (CG-65) for oversight of the system development life cycle (SDLC) are described in the table below.

Note: These responsibilities involve oversight, coordination, and facilitation of all activities, standards, policies, milestones, and deliverables of the SDLC as performed by the system development agent (SDA).

Chief (CG-65) Responsibility	Description
Participate in the Chief Information Officer (CIO) capital planning, investment, and control (CPIC) process	• Participates in each phase (select, control, and evaluate) of the CIO CPIC process • ensures that each product specified in the SDLC is submitted during the correct phase • ensures that all investments comply with IA standards and support the – Enterprise Transition Plan – Technical Reference Model, and – Enterprise Standards Profile, and • assesses implementation of IA requirements in project applications during each phase of the process.
Review and endorse project plans	Reviews and endorses project plans submitted by program sponsors, project managers, or other stakeholders.
Enforce (and recommend modifications to) IA standards and policies	See 2.1.8.6.1 for detail on the responsibilities for enforcing IA standards and policies.
Enforce or translate legislative or OGA mandates involving IA	Ensures compliance with the requirements of the Federal Information Security Management Act (FISMA) of 2002.
Approve or endorse major milestones	• Approves or endorse major milestones, or • recommends approval to a higher authority (that is, the designated approving authority or CIO) when appropriate.
Verify IA compliance	• Develops, manages, administers, and provides training for the Information Assurance Program • integrates IA policy requirements into the Enterprise Architecture Standards Profile • ensures that contingency and disaster recovery plans related to telecommunications and computer operations are developed, implemented, and maintained, and • verifies disposition of records.

Continued on next page

2.1.8 Office of Information Assurance (CG-65), Continued

2.1.8.6.1 Chief (CG-65) Responsibilities for Enforcing IA Standards and Policies

The responsibilities of the Chief (CG-65) for enforcing IA standards and policies are described in the table below.

Chief (CG-65) Responsibility	Description
Recommend changes to IA standards and policies	Updates the • "as is" or baseline architecture to portray the current state of IA • Enterprise Transition Plan (ETP) to achieve the target architecture (that is, coordination across mission areas and major programs) by implementing new IA capabilities, and • Technical Reference Model and Enterprise Standards Profile to establish IA standards for system developer use when building future systems.
Support IA training	Supports asset managers and program managers with training on IA principles and standards.
Ensure IA compliance	Assists with early evaluation of new projects to ensure compliance with IA principles and standards.

Continued on next page

2.1.8 Office of Information Assurance (CG-65), Continued

2.1.8.7 Chief (CG-65) Responsibilities for Asset Oversight and Management

The responsibilities of the Chief (CG-65) for oversight and management of assigned assets are described in the table below.

See 2.1.8.3 for detail on the assets assigned to CG-65.

Chief (CG-65) Responsibility	Description
Plan and coordinate appropriate or required IA integration across systems	Plans, coordinates, and facilitates activities, policies, or standards to enable appropriate or required IA integration across systems.
Plan, coordinate, and facilitate IA configuration management requirements, activities, processes, and policies for all assigned assets	• Ensures that sound configuration management doctrine is executed and sustained for assigned assets, and • participates as a voting member on assigned configuration control boards (CCBs).
Coordinate C4IT professional development with human resources and specialists	Coordinates professional development with human resource managers and specialists to support IA assets by • developing and training civilian and military C4IT professionals (engineers, managers, and technicians), and • providing support and expertise for the development, specification, and maintenance of C4IT civilian and military professional grades and ratings.

2.1.8.8 Chief (CG-65) Responsibilities for Liaisons with Industry and OGAs

The Chief (CG-65) is responsible for partnering and liaising with industry and OGAs as needed or beneficial to

- enhance the worth of assigned assets
- improve the performance of assigned assets
- reduce the total ownership costs of assigned assets, and
- enhance mission or business capabilities for assigned assets.

2.1.9 Office of Research, Development, and Technology Management (CG-66)

Introduction

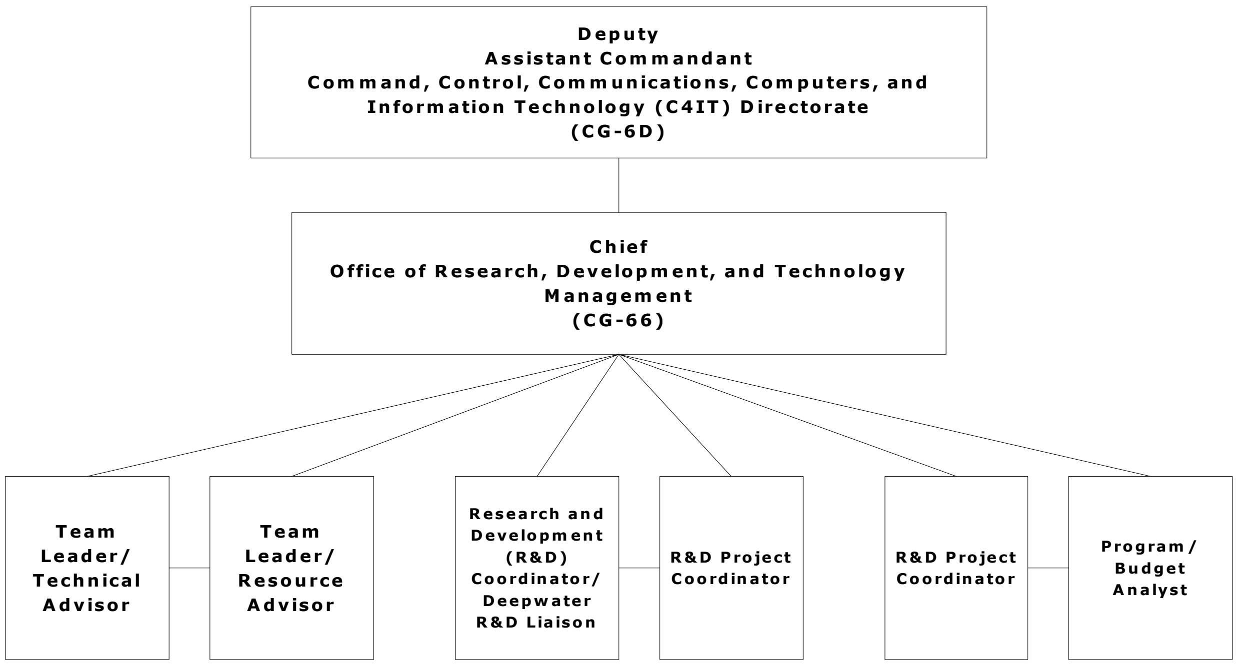
This topic contains

- an organization chart of the Office of Research, Development, and Technology Management (CG-66), and
- information on the
  - – mission of CG-66
  - – assets assigned to CG-66, and
  - – role and responsibilities of the Chief (CG-66).

2.1.9.1 Organization Chart of Office of Research, Development, and Technology Management (CG-66)

An organization chart of the Office of Research, Development, and Technology Management (CG-66) is shown below.

See 2.1.1 C4IT Directorate (CG-6) Organizational Overview for an organization chart of the C4IT Directorate.



Continued on next page

2.1.9 Office of Research, Development, and Technology Management (CG-66), Continued

2.1.9.2 Mission of CG-66

The mission of CG-66 is to

- anticipate future technological challenges
- implement best practice solutions within the Coast Guard, and
- coordinate Coast Guard science and technology efforts with the Department of Homeland Security (DHS) Office of Science and Technology.

2.1.9.3 Assets Assigned to CG-66

The assets assigned to CG-66 include the

- research and development (R&D) appropriation, and
- intellectual capital encompassing all CG
  - missions
  - academic and research partners, and
  - research products ranging from proof-of-concept, prototypes, and applied technology and concepts.

Continued on next page

2.1.9 Office of Research, Development, and Technology Management (CG-66), Continued

2.1.9.4 Role of Chief (CG-66)

The role of the Chief (CG-66) is portfolio management, which includes

- planning, programming, and budgeting resources for the Research, Development, and Technology Management Program
- overseeing new technology discovery and integration
- overseeing and managing the assets assigned to CG-66 (see 2.1.9.3 for detail on the assets assigned to CG-66), and
- partnering and coordinating with foreign and domestic government and private agencies on R&D matters.

The table below identifies where in this topic to find detail on the responsibilities of the Chief (CG-66).

For detail on responsibilities for …	See …
planning, programming, and budgeting resources for the Research, Development, and Technology Management Program	2.1.9.5
oversight of new technology discovery and integration	2.1.9.6
asset oversight and management	2.1.9.7
partnering and coordinating with government and private agencies on R&D matters	2.1.9.8

Continued on next page

2.1.9 Office of Research, Development, and Technology Management (CG-66), Continued

2.1.9.5 Chief (CG-66) Responsibilities for Planning, Programming, and Budgeting Resources

The responsibilities of the Chief (CG-66) for planning, programming, and budgeting resources for the Research, Development, and Technology Management Program are described in the table below.

Chief (CG-66) Responsibility	Description
Serve as program manager for the Research, Development, and Technology Management Program	Manages and coordinates the Research, Development, and Technology Management Program to ensure that is responsive to • CG long-range objectives • requirements of operation and support programs, and • technological opportunities for new or improved systems, equipment, methods, and procedures.
Manage funds, resources, and support for the Research, Development, and Technology Management Program	• Manages the execution of funds within the Research, Development, and Test and Evaluation appropriation, and • obtains and defends resources and support for the Research, Development, and Technology Management Program.

Continued on next page

2.1.9 Office of Research, Development, and Technology Management (CG-66), Continued

2.1.9.6 Chief (CG-66) Responsibilities for Oversight of New Technology Discovery and Integration

The responsibilities of the Chief (CG-66) for oversight of new technology discovery and integration are described in the table below.

Chief (CG-66) Responsibility	Description
Oversee and manage R&D investments to capitalize on emerging technologies	Oversees and manages a portfolio of R&D investments designed to capitalize on emerging technologies with the potential to close performance gaps in CG operations and missions.
Participate in the Chief Information Officer (CIO) capital planning, investment, and control (CPIC) process	• Participates in each phase (select, control, and evaluate) of the CIO CPIC process, and • ensures that each product is submitted during the appropriate phase of the process.
Review and endorse project plans submitted by program sponsors, project managers, or other stakeholders	See 2.1.9.6.1 for detail on responsibilities for reviewing and endorsing project plans.
Oversee use of the new product gating process for new products that emerge from R&D investments	Oversees, coordinates, and facilities use of the new product gating process to manage the investigation, development, testing, evaluation, and implementation of new products that emerge from the R&D investments.
Oversee enterprise standards and policies and legislative mandates	• Maintains awareness of current enterprise standards and policies • recommends modifications to enterprise standards and policies, and • enforces or translates legislative mandates.
Approve or endorse major milestones	• Approves or endorses major milestones, and • recommends approval to a higher authority (that is, the designated approving authority or CIO) when appropriate.

Continued on next page

2.1.9 Office of Research, Development, and Technology Management (CG-66), Continued

2.1.9.6
Chief (CG-66) Responsibilities for Oversight of New Technology Discovery and Integration (continued)

Chief (CG-66) Responsibility	Description
Monitor progress of assets	Monitors progress in asset acquisition, development, deployment, and implementation (including operation and maintenance).
Manage organizational acceptance of new systems or assets	Manages or directs organizational acceptance of new (or major changes to) systems or assets.
Review performance	Reviews performance metrics.

2.1.9.6.1 Chief (CG-66) Responsibilities for Reviewing and Endorsing Project Plans

The responsibilities of the Chief (CG-66) for reviewing and endorsing project plans are described in the table below.

Chief (CG-66) Responsibility	Description
Identify innovative science and technology applications and developments that may • support mission areas, or • close performance gaps	• Consults with all headquarter directorates and Centers of Excellence (COEs) regarding new innovative science and technology applications that may support mission areas, and • advises the Chief Knowledge Officer and executive management of new science and technology developments that may close performance gaps.
Identify existing or potential performance gaps that may be closed through R&D efforts and products	Maintains close liaisons with district commanders and headquarter program offices to identify existing or potential performance gaps that may be closed through R&D efforts and products.

Continued on next page

2.1.9 Office of Research, Development, and Technology Management (CG-66), Continued

2.1.9.6.1
Chief (CG-66) Responsibilities for Reviewing and Endorsing Project Plans (continued)

Chief (CG-66) Responsibility	Description
Assist with implementation of new R&D products	Assists with • building a business case for new R&D products, and • preparing resource proposals for the funding and support staff needed for successful implementation of new R&D products.
Export R&D products to multiple mission areas	• Determines the cross-programmatic applicability of R&D products, and • collaborates with program offices and area and district staffs to export R&D products to as many mission areas as possible.

2.1.9.7
Chief (CG-66) Responsibilities for Asset Oversight and Management

The responsibilities of the Chief (CG-66) for oversight and management of assigned assets are described in the table below.

See 2.1.9.3 for detail on the assets assigned to CG-66.

Chief (CG-66) Responsibility	Description
Enable interoperability of assigned assets	Applies policies and standards to enable interoperability of assigned assets where needed or mandated.
Oversee and coordinate the effectiveness, efficiency, and responsiveness of assigned Centers of Excellence (COEs)	• Oversees, supports, and coordinates activities, policies, or guidance as necessary to ensure (or facilitate) the effectiveness, efficiency, and responsiveness of assigned COEs, and • serves as the technical control office and Headquarters Program Coordinator (HQPC) for the Research and Development Center.

Continued on next page

2.1.9 Office of Research, Development, and Technology Management (CG-66), Continued

2.1.9.7
Chief (CG-66) Responsibilities for Asset Oversight and Management (continued)

Chief (CG-66) Responsibility	Description
Support the planning and coordination of asset disposition	Supports the planning and coordination of asset disposition at or near the end of the life cycle.
Coordinate R&D professional development with human resource managers and specialists	• Coordinates development and training of R&D civilian and military professionals (engineers, analysts, managers, and technicians) with human resource managers and specialists to maintain the knowledge, skills, and abilities needed for R&D programs, and • provides support and expertise for development, specification, and maintenance of R&D civilian and military professional grades and ratings.

2.1.9.8 Chief (CG-66) Responsibilities for Partnering with Government and Private Agencies on R&D Matters

The responsibilities of the Chief (CG-66) for partnering and coordinating with foreign and domestic government and private agencies on R&D matters are described in the table below.

Chief (CG-66) Responsibility	Description
Represent the Coast Guard on R&D matters in partnerships and liaisons with domestic and foreign government and private agencies	Represents the Coast Guard (or DHS as directed) in partnerships and liaisons with domestic and foreign government and private agencies on R&D matters.

Continued on next page

2.1.9 Office of Research, Development, and Technology Management (CG-66), Continued

2.1.9.8
Chief (CG-66) Responsibilities for Partnering with Government and Private Agencies on R&D Matters (continued)

Chief (CG-66) Responsibility	Description
Identify opportunities for joint R&D efforts through coordination with government, public, and private agencies	Identifies beneficial opportunities for joint R&D efforts through coordination with the • Department of Homeland Security (DHS) • Department of Defense (DOD) • Department of Transportation (DOT), and • other public and private agencies.
Coordinate with the DHS Office of Science and Technology Directorate to manage funds dedicated to CG missions and national and federal laboratories	As the lead interface, coordinates with the DHS Office of Science and Technology Directorate to manage the portion of funds in the DHS Office of Science and Technology appropriation dedicated to CG missions and national and federal laboratories.

2.2 Centers of Excellence

Overview

2.2.01 Scope

This chapter describes the organization, roles, and responsibilities of the Centers of Excellence (COEs), which include the

- Coast Guard Yard
- Aircraft Repair and Supply Center (ARSC)
- Command and Control Engineering Center (C2CEN)
- Engineering and Logistics Center (ELC)
- Loran Support Unit (LSU)
- Navigation Center (NAVCEN)
- Operations Systems Center (OSC)
- Telecommunication and Information Systems Command (TISCOM), and
- Research and Development (R&D) Center.

2.2.02 Relationship Between COEs and Systems Directorate (CG-4)

The Centers of Excellence (COEs) operate under the direction of the Systems Directorate.

The Systems Directorate

- ensures the operational availability of the various facilities, platforms, and systems within the Coast Guard (CG), and
- develops, deploys, and maintains resources to meet operational requirements and meet CG strategic goals for
  - maritime safety, mobility, and security
  - protection of natural resources, and
  - national defense.

Continued on next page

Overview, Continued

2.2.03 Contents

This chapter covers the following subjects.

2.2.1 Coast Guard Yard

Introduction

This topic contains information on the

- role of the Coast Guard Yard
- organization of the Coast Guard Yard, and
- management and divisional responsibilities of the Coast Guard Yard.

2.2.1.1 Role of the Coast Guard Yard

The role of the Coast Guard Yard is to

- build, repair, and renovate vessels and navigation aids
- manufacture miscellaneous Coast Guard equipment
- serve as the host facility for the
  - – Engineering Logistics Center (ELC)
  - – Legacy Sustainment Support Unit, and
  - – Sector Baltimore, and
  - – Station Curtis Bay, and
- serve as the homeport for the cutters “CGC Sledge” and “CGC James Rankin.”

2.2.1.2 Organization of the Coast Guard Yard

The Coast Guard Yard organization consists of the

- Industrial Manager
- Production Manager
- Planning and Marketing Division
- Engineering Design Division, and
- Support Manager.

The table below identifies where in this topic to find detail on the management and divisional responsibilities of the Coast Guard Yard.

For detail on the responsibilities of the …	See …
Industrial Manager	2.2.1.3
Production Manager	2.2.1.4
Planning and Marketing Division	2.2.1.5
Engineering Design Division	2.2.1.6

Continued on next page

2.2.1 Coast Guard Yard, Continued

2.2.1.3 Coast Guard Yard Industrial Manager Responsibilities

The responsibilities of the Coast Guard Yard Industrial Manager are to

- manage and coordinate all industrial work
- use assigned resources to plan and execute industrial work, and
- prioritize workload, budget, and schedule constraints.

2.2.1.4 Coast Guard Yard Production Manager Responsibilities

The responsibilities of the Coast Guard Yard Production Manager are described in the table below.

Responsibility	Description
Supervise and manage production work	• Supervises project management staffs and shop supervisors • coordinates production work • monitors progress of construction, repair, and renovation projects, and • reviews, authorizes, and releases work orders to production shops.
Correct or prevent production problems	Directs corrective or preventive actions related to cost, workforce, progress, or material requirement problems.
Determine resource requirements and work priorities	• Determines resource requirements for assigned workloads • coordinates cross-functional trades and crafts, and • determines work priorities to meet production schedules.

Continued on next page

2.2.1 Coast Guard Yard, Continued

2.2.1.5 Coast Guard Yard Planning and Marketing Division Responsibilities

The responsibilities of the Coast Guard Yard Planning and Marketing Division are described in the table below.

Responsibility	Description
Supervise Division staffs	Supervises the • Electronics/Ordnance Project Management staff • Industrial Engineering staff, and • Management Analyst staff.
Review incoming projects	• Reviews detailed plans/specifications for incoming projects, and • prepares estimates and job orders for incoming projects.
Recommend efficient workforce levels	• Prepares and releases work orders to project staffs, and • plans and markets efficient employment of full-time equivalent (FTE) resources for long-range workload planning.
Market and support production	• Conducts marketing field visits, and • provides Contracting Officer Technical Representative (COTR) services to support production.

2.2.1.6 Coast Guard Yard Engineering Design Division Responsibilities

The responsibilities of the Coast Guard Yard Engineering Design Division are to provide engineering services for construction, modernization, overhaul, maintenance, and repair of ships and small boats in the fields of

- naval architecture
- marine engineering, and
- electrical and electronic engineering.

2.2.2 Aircraft Repair and Supply Center (ARSC)

Introduction

This topic contains information on the

- role of the Aircraft Repair and Supply Center (ARSC)
- organization of the ARSC, and
- divisional responsibilities of the ARSC.

2.2.2.1 Role of the Aircraft Repair and Supply Center (ARSC)

The role of the ARSC is to provide complete logistics support to the entire CG aviation fleet, which includes

- policy guidance
- depot maintenance services
- technical services
- inventory management services for aircraft product lines
- contracting support, and
- on-site field training and assistance (24 hours a day, 7 days a week) for over 200 Coast Guard aircraft at 25 air stations throughout the United States and Puerto Rico.

Note: The aircraft product lines include

- HH-60 (Jay Hawk)
- HH-65 (Dolphin)
- HH-130 (Hercules), and
- HU-25 (Falcon Jet).

Continued on next page

2.2.1 Coast Guard Yard, Continued

2.2.2.2 Organization of the ARSC

The ARSC organization consists of the following four support divisions:

- Engineering and Industrial Support
- Information Systems
- Aviation Logistics Support, and
- Personnel Support.

The table below identifies where in this topic to find detail on the ARSC support division responsibilities.

For detail on the responsibilities of the …	See …
Engineering and Industrial Support Division	2.2.2.3
Information Systems Division	2.2.2.4
Aviation Logistics Division	2.2.2.5
Personnel Resource Division	2.2.2.6

2.2.2.3 ARSC Engineering and Industrial Support Division Responsibilities

The responsibilities of the ARSC Engineering and Industrial Support Division are to

- provide aviation engineering support to all product lines and air stations
- manage reliability centered maintenance (RCM), corrosion, and avionics configuration programs
- oversee repair and overhaul of aircraft components
- maintain aviation technical publications, and
- manage contract field teams performing aircraft modifications.

2.2.2.4 ARSC Information Systems Division Responsibilities

The responsibilities of the ARSC Information Systems Division are to maintain the Aircraft Maintenance Management Information System (AMMIS), and Aircraft Computerized Maintenance System (ACMS).

The AMMIS and ACMS are used to

- support procurement, inventory management, fiscal accounting, and flight operations and qualifications
- track and schedule aircraft maintenance, aircraft configuration, and avionics components, and
- provide technical publication tracking and ordering.

Continued on next page

2.2.1 Coast Guard Yard, Continued

2.2.2.5 ARSC Aviation Logistics Division Responsibilities

The responsibilities of the ARSC Aviation Logistics Division are to manage

- CG-wide aviation inventory valued at $750 million
- the Allotment Fund Control (AFC)-41 budget of $200 million
- acquisition, construction, and improvement (AC&I) funds of approximately $90 million per year, and
- 180 contracts valued at $5 million.

2.2.2.6 ARSC Personnel Resource Division Responsibilities

The responsibilities of the ARSC Personnel Resource Division are to manage all personnel actions for over 650 military and civilian employees throughout the ARSC.

2.2.3 Command and Control Engineering Center (C2CEN)

Introduction

This topic contains information on the

- role of the Command and Control Engineering Center (C2CEN)
- organization of the C2CEN, and
- responsibilities of the C2CEN.

2.2.3.1 Role of the Command and Control Engineering Center (C2CEN)

The role of C2CEN is to

- function as the System Management and Engineering Facility (SMEF) to support new and existing command, control, and navigation systems on all Coast Guard (CG) ships and shore units, and
- develop, integrate, support, and provide training for future command, control, and navigation systems to perform CG missions.

See
- 2.2.3.3 for detail on C2CEN responsibilities
- 2.2.3.4 for a list of the C2CEN SMEF-supported systems, and
- Appendix 10-C Training for detail on C2CEN training responsibilities.

2.2.3.2 Organization of C2CEN

The C2CEN organization consists of

- the Command Support, Engineering, and Systems divisions, and
- over 130 military and civilian members, supplemented by onsite contractors.

2.2.3.3 C2CEN Responsibilities

The C2CEN is the single point of contact responsible for

- providing troubleshooting and maintenance assistance for the supported systems
- acting as technical liaison and providing immediate information via the SMEF Help Desk, and
- disseminating SMEF advisories and other pertinent system and equipment information via the C2CEN intranet site at CG Central.

Continued on next page

2.2.3 Command and Control Engineering Center (C2CEN), Continued

2.2.3.4 C2CEN SMEF-Supported Systems

The C2CEN acts as SMEF for the following systems:

- Command and Control Personal Computer (C2PC)
- Computerized American Practical Navigator (CAPN)
- Closed Circuit Television (CCTV)
- Flight Deck Video Systems (FDVS)
- Marine Forward Looking Infrared (MARFLIR)
- Navigation Sensors, including
  - Smallboat Integrated Navigation System (SINS)
  - differential global positioning system (DGPS) receivers
  - direction finders
  - fathometers, and
  - AN/SPS-73(V) surface search radar (SSR)
- DGPS, including
  - maritime and national broadcast sites, and
  - the nationwide control station
- Optical Surveillance System (OSS)
- Shipboard Command and Control System (SCCS) for 378, 270, and 21 foot high and medium endurance cutters
- Short Range Aids to Navigation (SRAN)
- Vessel Management System (VMS)
- Vessel Traffic Service System (VTS), and
- Integrated Shipboard Control System (ISCS) for the
  - 175 foot juniper class coastal buoy tenders (WLMs), and
  - 225 foot seagoing buoy tenders (WLBs).

2.2.4 Engineering Logistics Center (ELC)

Introduction

This topic contains information on the

- role of the Engineering Logistics Center (ELC)
- organization of the ELC, and
- divisional responsibilities of the ELC.

2.2.4.1 Role of the ELC

The role of the ELC is to

- manage engineering and logistics support, including technical and logistical information system support
- manage vessel platforms, including cross platform configuration for electronic and ordnance systems
- manage equipment configurations, which includes
  – communications
  – navigation
  – auxiliary
  – propulsion, and
  – electrical systems that provide design and engineering support
- direct depot repairs
- manage and distribute material, and
- provide critical equipment and support services to specified regional customers.

Note: The ELC is responsible for over 40 external products including parts, information, and services.

Continued on next page

2.2.4 Engineering Logistics Center (ELC), Continued

2.2.4.2 Organization of the ELC

The ELC organization consists of the following divisions:

- Platform Management
- Equipment Support, and
- Material.

The table below identifies where in this topic to find the divisional responsibilities of the ELC.

For detail on the responsibilities of the …	See …
Platform Management Division	2.2.4.3
Equipment Support Division	2.2.4.4
Material Division	2.2.4.5

Continued on next page

2.2.4 Engineering Logistics Center (ELC), Continued

2.2.4.3 ELC Platform Management Division Responsibilities

The ELC Platform Management Division is the primary/initial point of customer entry to the ELC.

The responsibilities of the ELC Platform Management Division are described in the table below.

Responsibility	Description
Implement platform support philosophies and logistics requirements	Implements • platform support philosophies established by Headquarters, and • logistics requirements in accordance with the Equipment/System Integrated Logistics Support Plan (EILSP).
Develop policy and guidance to Headquarters	Develops and recommends policy and environmental guidance to Headquarters.
Manage platform engineering logistics programs, funds, and related information	• Prepares, manages, and evaluates individual platform engineering logistics programs • manages funds and project information, and • manages and promulgates configuration and allowance information, including – item visibility for designated inventory on all platforms, and – redistribution to meet operational needs.
Maintain the ELC's life cycle for platforms	Maintains the ELC's life cycle costing methodology/equations for specific platforms.
Manage technical information	Maintains technical information, including ownership of all platform-related hull, mechanical, ordnance, and electrical and electronic technical information not associated with specific equipment or systems.

Continued on next page

2.2.4 Engineering Logistics Center (ELC), Continued

2.2.4.4 ELC Equipment Support Division Responsibilities

The responsibilities of the ELC Equipment Support Division are described in the table below.

Responsibility	Description
Implement the logistics support philosophy for equipment and systems	• Prepares, manages, and evaluates equipment engineering logistics programs • obtains the resources necessary to implement support plans • develops and recommends policy to Headquarters • manages requisitions, and • provides ship and system design engineering support as directed and resourced, including maintaining life cycle costing for systems and equipment.
Serve as owner of technical information	Serves as the owner of all equipment and systems-related hull, mechanical, and electrical and electronic technical information.

2.2.4.5 ELC Material Division Responsibilities

The responsibilities of the ELC Material Division are described in the table below.

Responsibility	Description
Provide warehousing and physical distribution support	Provides warehousing and physical distribution support for a variety of material items essential to CG operational and administrative needs. Support includes • receiving material items onsite, and • inspecting, packaging, and shipping material items.
Manage a retail inventory	Manages a retail inventory of parts for resale in support of the Coast Guard Yard and other local commands.
Manage temporary storage, transportation, and mail service	• Manages items in temporary storage or for staging projects • coordinates local transportation services, and • provides mail service for the ELC and Coast Guard Yard.

2.2.5 Loran Support Unit (LSU)

Introduction

This topic contains information on the

- role of the Loran Support Unit (LSU)
- organization of the LSU, and
- responsibilities of the LSU.

2.2.5.1 Role of the Loran Support Unit (LSU)

The role of the LSU is to function as the System Management and Engineering Facility (SMEF) for the Long Range Navigation (Loran) system.

Note: The Loran system in North America includes 29 transmitting stations, 29 monitoring stations, and three control stations.

See 2.2.5.3 for detail on the responsibilities of the LSU as SMEF.

2.2.5.2 Organization of the LSU

The LSU organization consists of

- the Support, Engineering, and Administration divisions, and
- an approximately 60 member staff composed primarily of
  - Coast Guard (CG) officer engineers
  - enlisted electronics technicians, and
  - civilian electronic engineers and technicians.

2.2.5.3 LSU SMEF Responsibilities

The responsibilities of the LSU as SMEF are to

- provide technical support and maintenance for the Loran system, which is currently used for land, air, and maritime operations throughout North America
- conduct a variety of Coast Guard and Federal Aviation Administration projects to improve existing systems
- provide technical support to Canada and Russia through international agreements for radio navigation, and
- interface operationally and technically with LSU and communication engineers and specialists in Norway, Iceland, the Netherlands, Germany, Italy, Saudi Arabia, and Japan.

2.2.6 Navigation Center (NAVCEN)

Introduction

This topic contains information on the

- role of the Navigation Center (NAVCEN)
- technical support provided to the NAVCEN, and
- responsibilities of the NAVCEN and the Navigation Information System.

2.2.6.1 Role of the Navigation Center (NAVCEN)

Under the control and direction of the Chief, Office of Aids to Navigation (G-OPN), the Navigation Center (NAVCEN)

- functions as a tenant command of the Telecommunication and Information Systems Command (TISCOM), and
- provides operational control and guidance to the Long Range Navigation (Loran)-C system and Differential Global Positioning System (DGPS).

See 2.2.8 Telecommunication and Information Systems Command (TISCOM) for detail on the responsibilities of the TISCOM.

2.2.6.2 Technical Support Provided to NAVCEN

The NAVCEN receives technical guidance and support from the

- Commandant of Command, Control, Communications, Computers, and Information Technology (C4IT) Directorate (CG-6)
- Command, Control (C2), and Navigation Center (C2CEN), and
- Loran Support Unit (LSU).

See
- 2.2.3 Command and Control Engineering Center (C2CEN) for detail on the responsibilities of the C2CEN, and
- 2.2.5 Loran Support Unit (LSU) for detail on the responsibilities of the LSU.

Continued on next page

2.2.6 Navigation Center (NAVCEN), Continued

2.2.6.3 NAVCEN Responsibilities

The NAVCEN is responsible for

- ensuring that accurate navigation information is provided to commercial and military users by the DGPS and Loran-C system, and
- operating the Navigation Information System (NIS), which is the primary Coast Guard liaison with the maritime community.

See 2.2.6.4 for detail on the responsibilities of NIS.

2.2.6.4 Navigation Information System (NIS) Responsibilities

The Navigation Information System (NIS), which is staffed 24 hours a day, is responsible for providing timely operational status advisories (such as the Local Notice to Mariners) and other marine information via a variety of media (mailings, telephone, e-mail, fax on demand, electronic bulletin board, and the internet).

Note: The boating safety 1-800 information service is co-located with the NIS.

2.2.7 Operations Systems Center (OSC)

Introduction

This topic contains information on the role and responsibilities of the Operations Systems Center (OSC).

2.2.7.1 Role of the Operations Systems Center (OSC)

Under the control and direction of the Commandant of Command, Control, Communications, Computers, and Information Technology (C4IT) Directorate (CG-6), the Operations Systems Center (OSC) develops, fields, maintains, and provides user support for the major information systems and databases that are accessible to the Coast Guard at all times throughout the world.

See 2.2.7.3 for detail on the information systems supported by the OSC.

2.2.7.2 OSC Responsibilities

The responsibilities of the OSC are to

- provide technical support and services for CG developed software
- provide specific wide-area network operations support
- administer the Automated Information System risk management program for other data centers and major mission-critical software development projects, and
- provide information system disaster recovery planning.

Continued on next page

2.2.7 Operations Systems Center (OSC), Continued

2.2.7.3 Information Systems Supported by the OSC

The information systems supported by the OSC

- provide the information core of the following Coast Guard functions:
  – search and rescue
  – marine safety
  – logistics
  – national security
  – law enforcement, and
  – personnel support functions, and
- include the
  – Computer Aided Search Planning (CASP) system
  – Automated Merchant Vessel Reporting (AMVER) system
  – Ship Arrival Notification System (SANS)
  – Marine Information for Safety and Law Enforcement (MISLE) system, and
  – Law Enforcement Information System (LEIS).

2.2.8 Telecommunication and Information Systems Command (TISCOM)

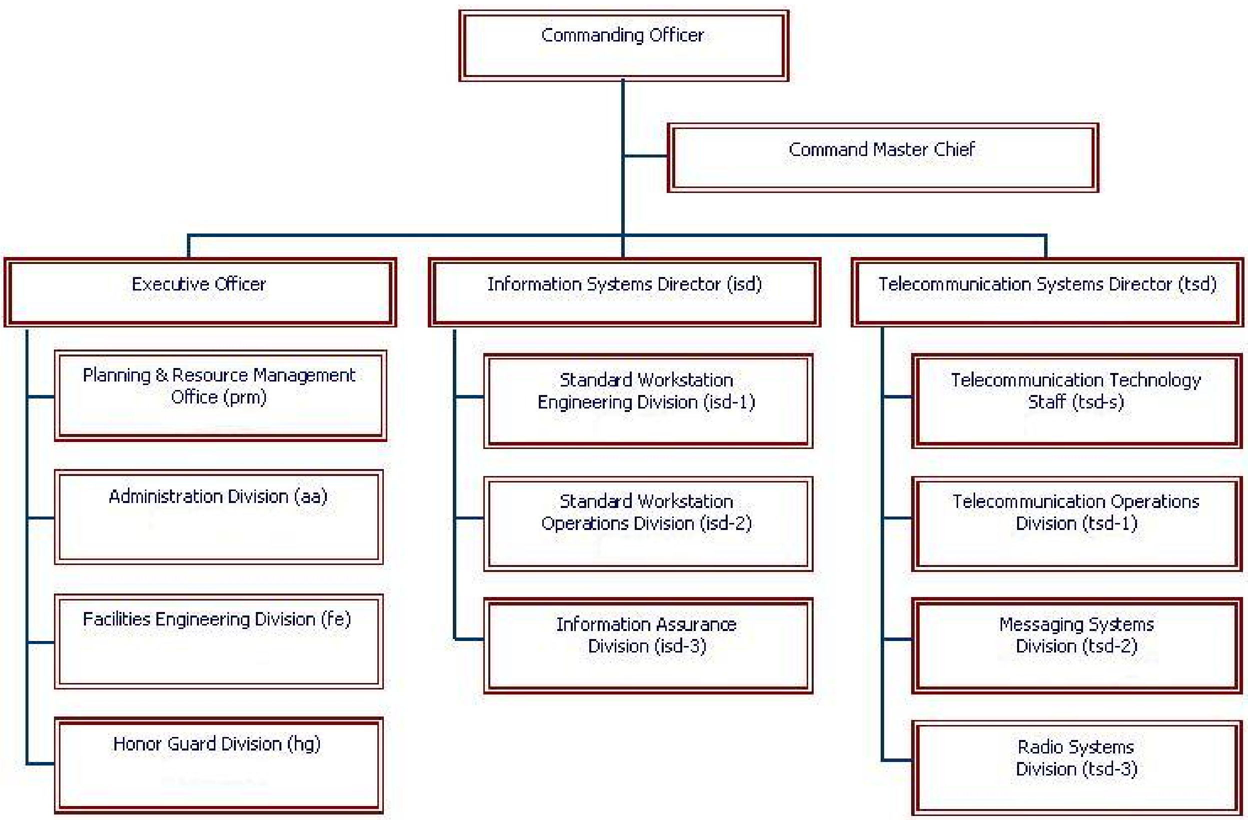
Introduction

This topic contains

- an organization chart of the Telecommunication and Information Systems Command (TISCOM), and
- information on the responsibilities of TISCOM.

2.2.8.1 Organization Chart of TISCOM

An organization chart of the Telecommunication and Information Systems Command (TISCOM) is shown below.



Continued on next page

2.2.8 Telecommunication and Information Systems Command (TISCOM), Continued

2.2.8.2 TISCOM Responsibilities

The responsibilities of TISCOM are to

- develop, implement, and support cost-effective telecommunication, electronic, and information systems to meet the current needs of the Coast Guard, and
- provide highly skilled military units to represent the Coast Guard at federal or national ceremonial functions.

Note: The tenant organizations located on the TISCOM site include the Coast Guard Navigation Center (NAVCEN) and a field office of the Investigative Service. See 2.2.6 Navigation Center (NAVCEN) for detail on the responsibilities of NAVCEN.

2.2.9 Research and Development (R&D) Center

Introduction

This topic contains information on the role and responsibilities of the Research and Development (R&D) Center.

2.2.9.1 Role and Responsibilities of the Research and Development Center

The role of the Research and Development (R&D) Center is to conduct research, development, tests, and evaluations in support of the Coast Guard strategic goals.

The R&D Center is responsible for

- conducting research and development requested by operation and program managers
- bringing the most recent advances in science and technology to the attention of potential R&D customers, and
- operating the Fire and Safety Test Detachment in Mobile, AL.

Note: The R&D Center consists of approximately 120 civilian and military personnel.

2.3 Maintenance and Logistics Commands (MLCs), Districts, and Subordinate Units

Overview

2.3.01 Scope

This chapter describes the

- organization of Maintenance and Logistics Commands (MLCs) in the Atlantic and Pacific areas
- roles and responsibilities of
  – Electronic Systems Support Units and Detachments (ESUs/ESDs)
  – Integrated Support Commands (ISCs) and detachments, and
  – districts and subordinate units, and
- responsibilities of personnel within a unit's Electronic Systems Division.

2.3.02 References

Additional information related to organization roles and responsibilities of MLCs and districts may be found in the following resources.

Resource	Description	Location/Link
Coast Guard Regulations, COMDTINST M5000.3 (series), 1992	Geographical organization of districts.	CG Central
Coast Guard Organization, COMDTINST M5400.7 (series), 1994	Organization Manual	CG Central

2.3.03 Contents

This chapter covers the following subjects.

2.3.1 MLC Organizational Overview

Introduction

This topic

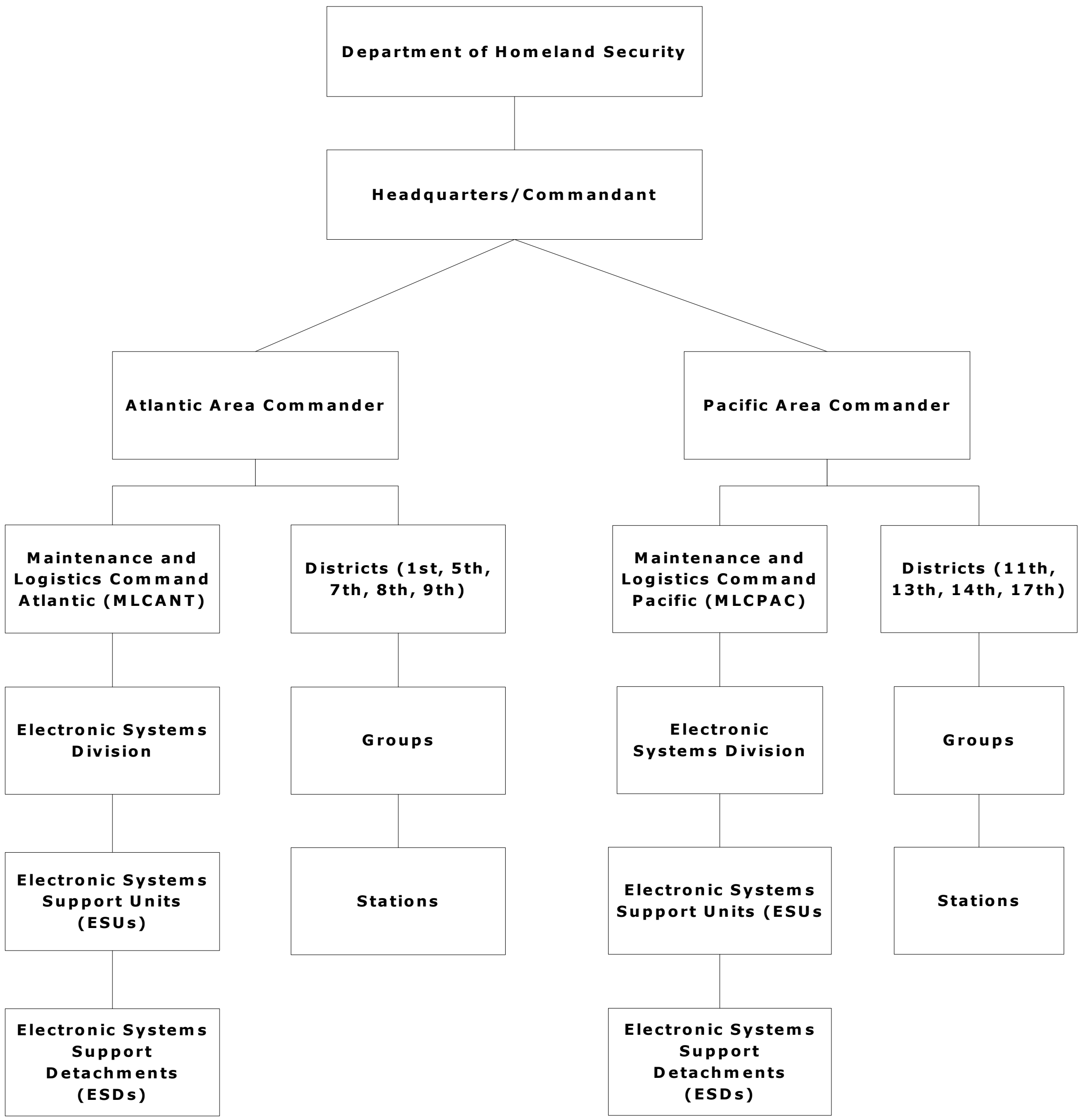
- contains an organization chart of the Maintenance and Logistics Commands (MLCs) and districts in the Atlantic and Pacific areas, and
- describes the responsibilities of MLCs for providing maintenance and logistics support.

Continued on next page

2.3.1 MLC Organizational Overview, Continued

2.3.1.1 Organization Chart of Maintenance and Logistics Commands (MLCs) and Districts

An organization chart of the Maintenance and Logistics Commands (MLCs) and districts in the Atlantic and Pacific areas is shown below.



Continued on next page

2.3.1 MLC Organizational Overview, Continued

2.3.1.2 Role of MLC Atlantic and MLC Pacific

The role of MLC Atlantic (MLCANT) and MLC Pacific (MLCPAC), under the direction of the Area Commander, is to provide maintenance and logistics support to the districts within their area.

The Electronic Systems Division within MLCANT and MLCPAC

- consists of Electronic Systems Support Units (ESUs) and Electronic Systems Support Detachments (ESDs), and
- manages projects and contracts for the operation, installation, maintenance, and repair of electronic, telecommunication, and computer equipment and systems for the floating and shore units in their area.

See 2.3.2 Electronic Systems Support Units and Detachments (ESUs/ESDs) for detail on the responsibilities of ESUs and ESDs.

2.3.1.3 Districts in the Atlantic and Pacific Areas

The Atlantic and Pacific areas are divided into districts—each district is responsible for an area of the U.S. coastline.

See 2.3.4 Districts and Subordinate Units for a listing of all districts in the Atlantic and Pacific areas.

2.3.1.4 Maintenance and Logistics Command (MLC) Responsibilities

Maintenance and Logistics Commands Atlantic (MLCANT) and Pacific (MLCPAC) are responsible for

- planning, budgeting, and managing funds
- developing and preparing annual budget submissions to Headquarters in accordance with current directives
- ensuring the proper operation, installation, maintenance, and modification of
  - supported electronic equipment and systems (see 2.3.1.5 for more detail)
  - telecommunication systems (see 2.3.1.6 for more detail), and
  - automatic data processing (ADP) systems (see 2.3.1.7 for more detail), and
- assisting area and district units with technical expertise and installation, maintenance, and modification services beyond the scope of the district unit capabilities (see 2.3.1.8 for detail on requesting assistance).

Continued on next page

2.3.1 MLC Organizational Overview, Continued

2.3.1.5 MLC Responsibilities for Supported Electronic Equipment and Systems

The MLCs are responsible for all supported electronic equipment and systems on shore and floating units and at non-staffed sites, which includes equipment and systems for

- communications
- command and control
- radar and positioning
- monitor and control, and
- navigation.

The MLC responsibilities for supported equipment and systems are described in the table below.

Responsibility	Description
Support and manage all electronic shops	Supports and manages all electronic shops under A-76 commercial contract support—that is, Class A-D Electronic Systems Support Detachments (ESDs). See 2.3.2 Electronic Systems Support Units and Detachments (ESUs/ESDs) for detail on Class A-D ESDs.
Manage accountability, reporting, and calibration for supported electronic equipment	• Supports and manages electronic equipment accountability and reporting functions, and • acquires, manages, and provides calibration support for all area and district – general purpose electronic test equipment (GPETE), and – MLC-designated special purpose electronic test equipment (SPETE). See 9.0 Test Equipment Life Cycle Management for detail on test equipment requirements.

2.3.1.6 MLC Responsibilities for Telecommunication Systems

The MLCs are responsible for managing and supporting all telecommunication systems, including but not limited to

- area networks, landlines, and secure communication and telephone systems at all shore facilities, and
- cryptographic and telephone systems on all vessels.

Continued on next page

2.3.1 MLC Organizational Overview, Continued

2.3.1.7 MLC Responsibilities for ADP Systems

The MLCs are responsible for supporting all activities within their area related to ADP systems, including

- training and operations
- configuration control, and
- information resource management (IRM).

2.3.1.8 Requests for MLC Assistance

Requests from district and Headquarter units for MLC assistance should be made via the chain of command.

MLCs may also request assistance from Headquarter units via the chain of command.

Reference: For detail on complete organizational, functional, and administrative procedures for requesting assistance, refer to the applicable MLC directive and instructions.

2.3.2 Electronic Systems Support Units and Detachments (ESUs/ESDs)

Introduction

This topic contains information on

- Electronic Systems Support Units (ESUs), which are under the management of Maintenance and Logistics Commands (MLCs), and
- Electronic Systems Support Detachments (ESDs), which are under the management of ESUs.

2.3.2.1 Electronic Systems Support Unit (ESU) Responsibilities

Electronic Systems Support Units (ESUs), under the management of the Maintenance and Logistics Command (MLC) Electronic Systems Division, are responsible for overseeing the Electronic Systems Support Detachments (ESDs) within their area of responsibility.

Note: ESDs are located strategically to provide rapid response to technical problems or requests for assistance.

See 2.3.2.2 for detail on the responsibilities of ESDs.

Continued on next page

2.3.2 Electronic Systems Support Units and Detachments (ESUs/ESDs), Continued

2.3.2.2 Electronic Systems Support Detachment (ESD) Responsibilities

Electronic Systems Support Detachments (ESDs), under the management of the ESU, are responsible for providing support services for the operation, installation, maintenance, overhaul, and modification of most electronic, telecommunication, and computer equipment and related software.

ESD capabilities vary depending on the classification of the facility, as described in the table below.

Location	Capabilities	Services Provided
	Class A ESD Facilities	
Usually co-located with an Integrated Support Command (ISC) See 2.3.3 Integrated Support Commands (ISCs) and Detachments for detail on ISCs.	Major overhauls, refurbishing, and retrofitting	• Equipped to install, overhaul, repair, and modify – most electronic equipment – certain electronic modules, and – telephone, teletype, public address, and intercom systems • maintains a stock of electronic replacement equipment and parts for emergency use and routine repairs • may provide minor test equipment calibration and repair services • maintains liaisons with local power and telephone companies, and • may be equipped to repair power, telephone, and submarine cables.
	Class B ESD Facilities	
Usually located with an ISC	Major overhauls, refurbishing, and retrofitting	• Equipped to install, overhaul, repair, and modify – most electronic equipment and systems, and – certain electronic modules • maintains a stock of electronic replacement equipment and parts for emergency use and routine repairs, and • may provide minor test equipment calibration and repair services.

Continued on next page

2.3.2 Electronic Systems Support Units and Detachments (ESUs/ESDs), Continued

2.3.2.2
Electronic Systems Support Detachment (ESD) Responsibilities (continued)

Location	Capabilities	Services Provided
Class C ESD Facilities		
Located with a sector, communication station, or other unit See 2.3.4 Districts and Subordinate Units for detail on sectors and stations.	Install, overhaul, repair, and modify equipment and systems that do not require an industrial facility	• Equipped to install, overhaul, repair, and modify – electronic equipment – telephone, teletype, public address, and intercom systems, and – electronic modules not requiring industrial facilities • maintains a limited stock of electronic replacement parts for emergency use and routine repairs, and • may be equipped to repair power, telephone, and submarine cables.
Class D ESD Facilities		
Located with a sector, communication station, or other unit	Install, overhaul, repair, and modify equipment and systems that do not require an industrial facility	• Equipped to install, overhaul, repair, and modify – electronic equipment, and – modules not requiring industrial facilities, and • maintains a limited stock of electronic replacement parts for emergency use and routine repairs.

2.3.3 Integrated Support Commands (ISCs) and Detachments

Introduction

This topic contains information on the role of

- Integrated Support Commands (ISCs), and
- Industrial Support Detachments (ISDs).

2.3.3.1 Role of Integrated Support Commands (ISCs)

The role of Integrated Support Commands (ISCs) is to provide a combination of personnel, morale, healthcare, transportation, storage, facility maintenance, motor vehicle, and industrial support services to units in a specific geographic area.

The three types of ISCs, based on the level of support services provided, include

- industrial
- partial industrial, and
- non-industrial.

2.3.3.2 Industrial Support Detachments (ISDs)

Industrial Support Detachments (ISDs) are facilities under the management of ISCs with industrial capabilities, which include fabrication, overhaul, coating application, and other industrial type activities.

ISDs are usually located where they can provide industrial support to units in a specific geographic area.

See 2.3.2 Electronic Systems Support Units and Detachments (ESUs/ESDs) for detail on ESD facilities that are co-located with ISCs.

2.3.4 Districts and Subordinate Units

Introduction

This topic contains information on the

- districts in the Atlantic and Pacific areas
- subordinate units within a district, which include
  - activities
  - sections, and
  - sectors and stations, and
- role and responsibilities of District Commanders and Unit Technicians.

2.3.4.1 Districts in the Atlantic and Pacific Areas

The Atlantic and Pacific areas are divided into districts—each district is responsible for an area of the U.S. coastline.

The districts in each area, the location of their headquarters, and their areas of responsibility are listed in the table below.

District	Headquarters	Areas of Responsibility
	Atlantic Area	
First District	Boston, MA	• New England states • New York, and • northern New Jersey
Fifth District	Portsmouth, VA	• Pennsylvania, Delaware, Maryland, Virginia, North Carolina, and • southern New Jersey
Seventh District	Miami, FL	• South Carolina, Georgia, and • eastern Florida
Eighth District	New Orleans, LA	Inland waters of the U.S. and Gulf of Mexico
Ninth District	Cleveland, OH	Great Lakes
	Pacific Area	
Eleventh District	Alameda, CA	California, Arizona, Nevada, and Utah
Thirteenth District	Seattle, WA	Oregon, Washington, Idaho, and Montana
Fourteenth District	Honolulu, Hawaii	Hawaii and Pacific territories
Seventeenth District	Juneau, Alaska	Alaska

Continued on next page

2.3.4 Districts and Subordinate Units, Continued

2.3.4.2 District Activities

Activities are district commands that perform multiple missions within a geographical area, such as

- vessel traffic service
- marine safety operations
- Captain of the Port, and
- small boat operations.

The role of the Activity Commander is to provide operational and administrative control of the units within their area of responsibility.

2.3.4.3 District Sections

A section serves a designated geographic region within a district, which is under the administrative and operational control of the district.
(See 2.3.4.1 for detail on districts in the Atlantic and Pacific areas).

A regional section staff handles the operations and administration of the units within the section.

Reference: For detail on the geographic organization of sections, refer to COMDINST M5000.3 (series), 1992.

The three Coast Guard sections, and the areas and districts under which they operate, are listed in the table below.

Section	Area	District
Greater Antilles Section	Atlantic	Seventh District
Western River Operations	Atlantic	Eighth District
Marianas Section	Pacific	Fourteenth District

Continued on next page

2.3.4 Districts and Subordinate Units, Continued

2.3.4.4 District Sectors and Stations

The Sector Commander provides operational and administrative control for district units or stations assigned to a sector.

Stations, under the operational control of a sector or district, perform specific mission functions, such as

- Aid to Navigation Teams (ANTs)
- coastal patrol boats (CPBs)
- patrol boats in the Deepwater program (WPBs), and
- inland construction tenders (WLICs).

IMPORTANT: To accomplish mission functions, units and stations require the maximum operational availability of electronic equipment and systems and usually rely upon MLCs for support and maintenance.

2.3.4.5 Role and Responsibilities of District Commanders and Unit Technicians

The role of District Commanders is to

- perform Coast Guard operational mission functions, and
- provide command and program management of their district units.

The electronic technicians and information technologists assigned to district units are responsible for providing maintenance and support services for their units.

See 2.3.5 Unit's Electronics System Division for specific responsibilities of technicians.

Note: MLCs or ESUs provide technical expertise and assistance for support requirements beyond the scope of district unit technicians, including new installations, alterations to existing equipment, and maintenance
See 2.3.1 MLC Organizational Overview for detail on requests for MLC assistance.

2.3.5 Unit's Electronic Systems Division

Introduction

This topic contains information on the roles and responsibilities of the following personnel within the Electronic Systems Division of Coast Guard units that have attached organic technical support (ET/IT):

- Commanding Officer (CO) or Officer-in-Charge
- Operations Officer
- Electronics Material Officer (EMO)
- Senior Technician, and
- Operators and Technicians.

2.3.5.1 Role of Commanding Officer and Operations Officer

The role of the

- Commanding Officer (CO) or Officer-in-Charge is to provide operational support for basic Coast Guard missions, and
- Operations Officer (under the direction of the CO) is to ensure the readiness of the unit, including the general condition of electronic equipment assigned to the unit.

Continued on next page

2.3.5 Unit's Electronic Systems Division, Continued

2.3.5.2 Role and Responsibilities of Electronics Material Officer

The role of the Electronics Material Officer (EMO)—or Senior Technician when an EMO is not assigned—is to provide unit-level administration of the ESU.

See 2.3.5.3 for more detail on the role of the Senior Technician.

The responsibilities of the EMO are described in the table below.

EMO Responsibility	Description
Personnel safety	• Ensures that all operators and technicians follow prescribed safety practices for the maintenance of electronic equipment, and • Disseminates safety instructions and directives. See 4.0 Safety Practices for detailed information on safety practices.
Readiness of electronic equipment assigned to the unit	• Maintains familiarity with the Commandant, Area Commander, MLC, and district directives and procedures for managing and supporting electronic equipment • provides information on the capabilities, limitations, and reliability of electronic equipment • prepares initial work requests, reports, and information required for repair and overhaul of equipment, and • ensures that – equipment is inspected and tested frequently – the allowance of replacement spare parts as listed in the Management Information for Configuration and Allowances (MICA) is current and adequate to support unit missions, and – installations of and modifications or alterations to equipment are performed as required by authorized alterations, field changes, instructions, and improvement programs.

Continued on next page

2.3.5 Unit's Electronic Systems Division, Continued

2.3.5.2
Role and Responsibilities of Electronics Material Officer (continued)

EMO Responsibility	Description
Personnel supervision	• Supervises personnel engaged in the maintenance and repair of electronic equipment, and • schedules and assigns tasks using the Coast Guard Planned Maintenance System (see 7.2 Maintenance Programs and Systems for more detail).
Personnel training and professional development	Ensures that electronics and maintenance personnel • receive appropriate formal electronics training required for working with electronic equipment and systems, and • participate in continued professional development through – on-the-job training – unit-level training plans and outlines – correspondence courses, and – formal training, including advanced technical training.

2.3.5.3
Role of Senior Technician

The role of the Senior Technician is to

- assume the responsibilities of the EMO when one is not assigned, and
- assist the EMO, when one is assigned, by
  – supervising tasks delegated by the EMO, and
  – assuming EMO responsibilities in the EMO's absence.

See 2.3.5.2 for detail on EMO responsibilities.

Continued on next page

2.3.5 Unit's Electronic Systems Division, Continued

2.3.5.4 Responsibilities of Operators and Technicians

The responsibilities of operators and technicians are described in the table below.

Operator/Technician Responsibility	Description
Safety	Follows all safety practices when working with electronic equipment and systems. See 4.0 Safety Practices for detailed information on safety practices.
Proficiency in assigned tasks	• Achieves proficiency in assigned tasks through – on-the-job work with equipment, and – study of technical manuals and bulletins, operator manuals, and safety notices and publications • becomes familiar with duties of the immediate supervisor, and • instructs subordinates as needed.
Professional development	• Improves knowledge and abilities through – on-the-job training – correspondence courses, and – off-duty studies, and • fosters professional development of subordinates.

3.0 Coast Guard Electronic Systems

Table of Contents

3.0 Coast Guard Electronic Systems

Overview

3.01 Scope

This part contains general overviews of the various complex core systems that are used to perform Coast Guard missions, including

- descriptions of how each system works, and
- the maintenance philosophy for each system.

Note: The information in this part is not intended to replace the appropriate technical manuals. The intent is to supplement existing manuals.

3.02 References

Additional information on Coast Guard electronic systems may be found in the following resources.

Resource	Description	Location/Link
C2CEN Intranet Site	Command and Control Engineering Center	CG Central
C2CEN SMEF Desk	Support calls and general questions to the Systems Management and Engineering Facility (SMEF) Desk can be submitted via telephone	(757) 686-2156

3.03 Contents

This part covers the following subjects.

3.1 Communication Systems

Overview

3.1.01 Scope

This chapter describes the following information regarding communication systems:

- definitions and descriptions of acronyms for common communication systems or modes of communication used in the Coast Guard, and
- general information on radio frequency (RF) communication systems.

3.1.02 References

Additional information on communication systems may be found in the following resources.

Resource	Location/Link
Command and Control Engineering Center (C2CEN) Intranet	CG Central
Telecommunication and Information Systems Command (TISCOM)	CG Central

3.1.03 Contents

This chapter contains the following topics.

3.1.1 Communication Systems Terms and Definitions

Introduction

This topic contains definitions of

- common communication system terms, and
- acronyms for common communication systems or modes of communication used in the Coast Guard.

3.1.1.1 Definition: NAVTEX

Navigation Telex Radio (NAVTEX) is a navigational warning system that

- uses the internationally designated frequency of 518kHz to broadcast
  - Notice to Mariners
  - weather warning messages, and
  - other maritime information, and
- automatically generates a printout from a dedicated receiver.

3.1.1.2 Definition: TEMPEST

TEMPEST is an unclassified short name referring to investigations and studies of unintentional signals that, if intercepted and analyzed, would disclose the information transmitted, received, handled, or otherwise processed by telecommunication or automated information systems equipment.

Through a vigorous application of the TEMPEST program, the Coast Guard can protect national security information.

TEMPEST-certified equipment or systems comply with the national requirements of the National Security Telecommunications and Information Systems Security Advisory Memorandum (NSTISSAM) TEMPEST/1-92 Level I or previous editions.

Reference: For more detail on TEMPEST, refer to MIL-HDBK-232A(1), Red/Black Engineering-Installation Guidelines. (See 10-B.2.3 Military Handbooks (MIL-HDBKs) for procurement information.)

Continued on next page

3.1.1 Communication Systems Terms and Definitions, Continued

3.1.1.3 System-Related Acronyms

System-related acronyms are defined in the table below.

Acronym	Definition
GMDSS	Global Maritime Distress and Safety System
LINK-11	A Navy tactical communication system
MARS	Military Affiliated Radio System
NAVMACS	Naval Modular Automated Communication System
NDRS	National Distress and Response System
OTCIXS	Officer in Tactical Command Information Exchange System

3.1.1.4 Satellite-Related Acronyms

Satellite-related acronyms are defined in the table below.

Acronym	Definition
COMSTCOM	Commercial Satellite Communications
DAMA	Demand Assigned Multiple Access (a Navy satellite communications system)
EPSBRT	Enhanced Portable Satellite Broadcast Receive Terminal
INMARSAT	International Maritime Satellite • INMARSAT A – Voice-only analog • INMARSAT B – Digital voice and data • INMARSAT C – Digital data only, store and send • INMARSAT Mini-M – Digital voice and data
MILSATCOM	Military Satellite Communications
SATCOM	Satellite Communications

Continued on next page

3.1.1 Communication Systems Terms and Definitions,
Continued

3.1.1.5 Other Common Communication Acronyms

Other common communications acronyms are defined in the table below.

Acronym	Definition
ALE	Automatic Link Establishment
CUDIX	Common User Digital Exchange
DSC	Digital Selective Calling
HFDL	High Frequency Data Link
SITOR	Simplex Teletype Over Radio

3.1.2 Radio Frequency (RF) Communication Systems

Introduction

This topic contains information on radio frequency (RF) communication systems, including

- all means of transmitting and receiving electromagnetic (radio) waves for shipboard and shore communications
- the Coast Guard frequency band designations and the rationale for using them instead of the corresponding International Radio Advisory Committee (IRAC) classifications
- RF tolerances
- examples of different types of audio frequency (AF) communication equipment, and
- a clarification of administrative verse operational computers.

Exceptions: This topic does not include RF transmissions and receptions for other purposes such as direction finding, navigation, sounding, and so on.

3.1.2.1 RF References

The radio frequency (RF) references listed below may be used to expand the information covered in this section.

- International Radio Advisory Committee (IRAC) Table
- Telecommunications Manual, COMDTINST M2000.3 (series)
- Coast Guard Radio Frequency Plan, COMDTINST M2400.1 (series)
- Naval Warfare Publication (NWP) 10-1-10
- Navy Engineering Information Bulletins (EIBs), SO111-XX-EIB-XX (first XX is the year and last XX is the EIB number)
- Navy Electronics Installation and Maintenance Books (EIMBs), NAVSEA SE000-00-EIM-XXX series (particularly SE000-00-EIM-120 of this set)
- Telecommunication and Information Systems Command (TISCOM) Web site within CG Central.

Continued on next page

3.1.2 Radio Frequency (RF) Communication Systems,
Continued

3.1.2.2 RF Communication Scope and Classification

The IRAC groups frequencies in frequency bands. However, because of frequencies used by the Coast Guard and common terminology adopted by radio operators, the Coast Guard has modified the IRAC designations. The Coast Guard classification helps to eliminate confusion when referring to transmitters that are capable of spanning two frequency bands (for example, an AN/WSC-3 operating on 243 MHz is referred to as an UHF rather than a VHF/UHF transceiver).

The Coast Guard frequency band classifications for equipment, described in the table below, are used throughout this manual.

Frequency Band	Coast Guard Classification	Corresponding IRAC Designation
Medium Frequency (MF)	250–525 kHz	300 kHz–3.0 MHz
High Frequency (HF)	2.0–30.0 MHz	3.0–30 MHz
Very High Frequency (VHF)	118–175 MHz	30–300 MHz
Ultra High Frequency (UHF)	225–400 MHz	300–3000 MHz

3.1.2.3 RF Tolerances

Communications equipment used by Coast Guard units must conform to current specifications and tolerances as directed by the Commandant or other cognizant government agencies.

Note: The equipment covered in this topic operates over the frequency range of 250 kHz to 400 MHz. Frequency tolerance requirements vary depending on

- fixed or mobile use
- frequency, and
- type of emission.

Reference: For a general list of frequency tolerances, refer to the IRAC Tables of Frequency Tolerances.

Continued on next page

3.1.2 Radio Frequency (RF) Communication Systems,
Continued

3.1.2.4 AF Communication Equipment

Audio frequency (AF) communication equipment includes

- interior communications (IC) systems (except sound powered phones)
- public address (PA) systems
- telephone systems, and
- carrier equipment used over landlines.

References: For guidelines, procedures, and standards for maintaining and repairing AF communication equipment refer to
- original equipment manufacturer (OEM) technical manuals
- Coast Guard Equipment/System Integrated Logistics Support Plan (EILSP) documentation, and
- Coast Guard Planned Maintenance System (CGPMS) standards.

See 7.2 Maintenance Programs and Systems for more information on CGPMS.

3.1.2.5 RF Communication Equipment Maintenance Philosophy

Use the resources listed below for information on maintaining and repairing RF communication equipment.

- OEM technical manuals
- Coast Guard EILSP documentation, and
- CGPMS standards.

See 7.2 Maintenance Programs and Systems for more information on CGPMS.

3.2 Aid-to-Navigation Systems

Overview

3.2.01 Scope

This chapter describes the following general information regarding aid-to-navigation systems used on Coast Guard cutters, boats, and shore stations:

- equipment requirements
- system capabilities
- installation, and
- maintenance guidelines.

Note: The information in this part is not intended to replace the appropriate technical manuals. The intent is to supplement existing manuals.

3.2.02 References

Additional information may be found in the following resources.

Resource	Location/Link
Aids to Navigation Manual—Technical, COMDTINST M16500.3 (series)	CG Central
Federal Radio Navigation Plan	CG Central
Command and Control Engineering Center (C2CEN) Web site	CG Central
Short Range Aids-to-Navigation (SRAN) Web site	CG Central

Continued on next page

Overview, Continued

3.2.03 Contents

This chapter contains the following topics.

3.2.1 Vessel Traffic Service (VTS) System

Introduction

This topic contains information on the Vessel Traffic Service (VTS) system, including

- references to resources for more detailed information
- the purpose and process of the VTS system, and
- the system's maintenance philosophy.

3.2.1.1 VTS References

For more detailed information on using and maintaining the Vessel Traffic Service (VTS) system, refer to the Command and Control Engineering Center (C2CEN) Web site found on CG Central.

3.2.1.2 VTS System Purpose

The VTS system

- enhances the Coast Guard's (CG's) ability to monitor and provide advisories to vessels in specific ports, and
- provides the capability to document traffic incidents and conditions for later analysis.

3.2.1.3 VTS System Process

The VTS system process is described in the table below.

See 3.2.1.4 for a VTS system diagram that illustrates this process.

Stage	Description
1	Very high resolution tower-mounted antennae and dual transmitter/receivers at each remote site gather vessel traffic data using some or all of the following sensors: • Automated Identification System (AIS) information • surveillance video, and • VHF-FM voice communications to the Vessel Traffic Center (VTC).

Continued on next page

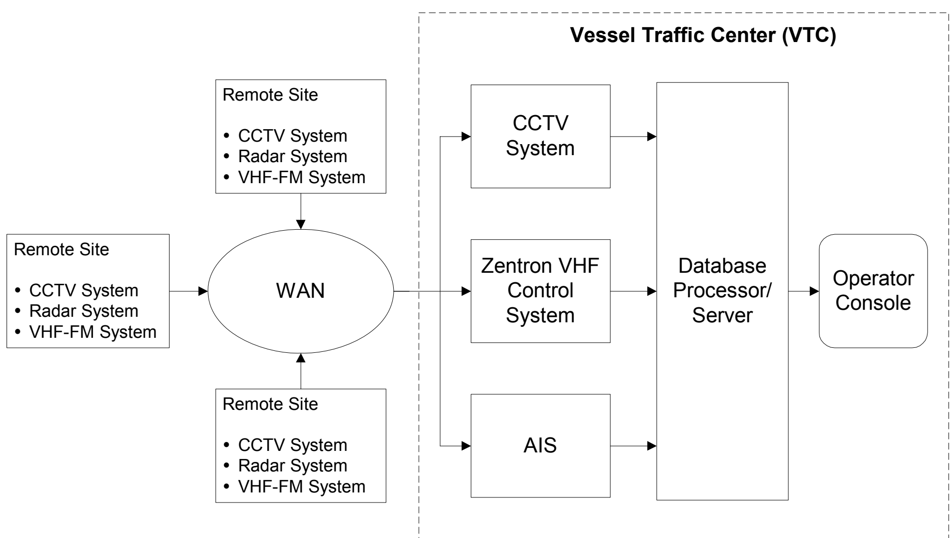
3.2.1 Vessel Traffic Service (VTS) System, Continued

3.2.1.3
VTS System Process (continued)

Stage	Description
2	All of the remote sites transmit the vessel traffic sensor data to the VTC via either commercial or CG-owned wide area network (WAN). Data transmitted includes • radar video, sync, and azimuth data that are relayed by means of a simplex wideband link, and • radar site control and status signals that are relayed via duplex voice grade link.
3	The VTC receives the sensor data and distributes it to the appropriate equipment/subsystem via a local area network (LAN).
4	A main VTC database processor/server integrates the subsystem data and sends it to the operator consoles.
5	The VTC operator monitors, identifies, and corrects potentially dangerous vessel traffic conditions.

3.2.1.4
VTS System Diagram

Each VTS system may consist of up to 24 remote sites. Each remote site is modularly configured with only the sensors deemed necessary. How the information is transmitted and used in the VTS system is shown in the diagram below.



Continued on next page

3.2.1 Vessel Traffic Service (VTS) System, Continued

3.2.1.5 VTS System Electronic Equipment Maintenance Philosophy

The maintenance philosophy for VTS electronic equipment is described in the table below.

Level	Maintenance Activities
Organizational	Assigned unit personnel and applicable Electronics Support Detachments (ESDs) or contractors perform preventive and corrective maintenance.
Intermediate	The applicable Maintenance and Logistics Command (MLC) and/or the MLC's subordinate units and contractors perform corrective maintenance beyond the capability of the assigned organizational level.
Depot	The Command and Control Engineering Center (C2CEN) repairs and stocks the following items used in the VTS system: • modules • assemblies, and • components.
Systems Management and Engineering Facility (SMEF)	The C2CEN is the SMEF and provides "last stop" technical assistance for corrective maintenance beyond the capabilities of the organizational and intermediate levels. Responsibilities include • resolving – System Trouble Reports (STRs) – System Improvement Reports (SIRs), and – Engineering Change Proposals (ECPs), and • developing – field changes, and – overall system engineering.

3.2.2 Differential Global Positioning System (DGPS)

Introduction

This topic contains information on the Coast Guard (CG) Differential Global Positioning System (DGPS), including

- references to resources for more detailed information
- a description of DGPS and how it works
- a description of the Global Positioning System (GPS), and
- maintenance philosophies for the system and its components.

3.2.2.1 DGPS References

The references listed below on the Coast Guard (CG) Differential Global Positioning System (DGPS) may be used to expand the information covered in this topic.

- Aids to Navigation Manual—Technical, COMDTINST M16500.3 (series)
- Differential Global Positioning System (DGPS) Navigation Service Concept of Operations, COMDTINST M16577.2 (series)
- Navigation Plan (current edition)
- Tower Manual, COMDTINST M11000.4 (series)
- Civil Engineering Manual, COMDTINST M11000.11 (series)
- Nationwide Differential Global Positioning System (NDGPS) Interagency Memorandum of Agreement of 23 February 1999 (includes all applicable equipment technical manuals and operations guides)
- Command and Control Engineering (C2CEN) Web sites found on CG Central.
- Navigation Center (NAVCEN) Web site found on CG Central.

Continued on next page

3.2.2 Differential Global Positioning System (DGPS), Continued

3.2.2.2
DGPS Purpose

The DGPS is a land-based system that receives and processes Global Positioning System (GPS) satellite position information. It provides mariners with reliable position accuracy of better than 10 meters (2 drms about 95 percent of the time) when navigating in harbor and harbor approach areas of the continental United States, Alaska, Hawaii, and Puerto Rico.

Secondary Uses:

- A nationwide expansion to the DGPS system is providing DGPS signal coverage to the continental U.S. to meet mission requirements of the Federal Railroad Administration, Federal Highways Administration, and other federal and state agencies in accordance with Public Law 105-66.
- The CG DGPS partners with other government agencies to improve weather forecasting, precision surveying, and geological monitoring.

3.2.2.3
DGPS Process

The DGPS process is described in the table below.

Stage	Description	See …
1	Orbiting GPS satellites send GPS satellite position information to the land-based DGPS broadcast sites. **Note**: DGPS is dependent on the overall operation of GPS, but can tolerate small-scale GPS satellite failures.	3.2.2.4 for a description of the GPS system.
2	DGPS • processes GPS satellite position information • calculates corrections from a known position, and • broadcasts these corrections via medium frequency (MF) transmitters to DGPS user receivers in the MF broadcast coverage area.	• 3.2.2.5 for a description of the GPS/DGPS receiver maintenance philosophy, and • 3.2.2.6 for a description of the DGPS broadcast sites.

Continued on next page

3.2.2 Differential Global Positioning System (DGPS), Continued

3.2.2.3
DGPS Process (continued)

Stage	Description	See …
3	DGPS user equipment automatically applies corrections to received DGPS information to improve positional accuracy.	---
4	DGPS Control Stations monitor and control broadcast sites via a commercial wide area network (WAN).	• 3.2.2.7 for the control station description and maintenance philosophy • 3.2.2.8 for the WAN description and maintenance philosophy.

3.2.2.4 GPS Description

The GPS employs approximately 26 satellites that are in very high polar orbits. This altitude ensures a very large area of visibility for each satellite and extreme physical separation. The system is designed so that six to eleven satellites are in view at any time and from any position.

The satellites use two frequencies to continually transmit data that includes information such as the satellite position and ranging information.

The table below describes how the number of satellites used to obtain a GPS fix determines the dimensions used to define a point.

When the number of satellites used to obtain a GPS fix is …	Then the intersection lines of position (LOP) define a point in …
three	• latitude, and • longitude. **Note**: A minimum of three satellites must be used to obtain a GPS fix.
four	• latitude • longitude, and • altitude. **Note**: The GPS fix is improved by using four satellites.

Continued on next page

3.2.2 Differential Global Positioning System (DGPS), Continued

3.2.2.5 GPS/DGPS Receiver Maintenance Philosophy

Maintenance of GPS and DGPS receivers is limited. The maintenance philosophy for GPS and DGPS receivers is described in the table below.

Level	Maintenance Activities
Organizational	Assigned maintenance personnel on the vessels, or Electronic Support Detachment (ESD) personnel for units without Electronics Technicians (ETs), perform organizational level preventive and corrective maintenance. Actual repairs are limited to • changing fuses • repairing external wiring, and • replacing individual equipment in the system.
Intermediate	There is no intermediate level support for GPS/DGPS receivers.
Depot	The Engineering Logistics Center (ELC) in Baltimore • provides replacement equipment listed in the ELC Support Gram • performs depot level maintenance which consists of repairing and stocking the following items used in the equipment system: – modules – assemblies, and – components.
Systems Management and Engineering Facility (SMEF)	The C2CEN is the SMEF for GPS/DGPS broadcast sites and provides “last stop” technical assistance for corrective maintenance beyond the capabilities of the organizational level. SMEF responsibilities consist of • resolution of – System Trouble Reports (STRs) – System Improvement Reports (SIRs) – Engineering Change Proposals (ECPs) • development of field changes, and • overall system engineering.

Continued on next page

3.2.2 Differential Global Positioning System (DGPS), Continued

3.2.2.6 N/DGPS Broadcast Site Locations and Maintenance Philosophy

Nationwide DGPS (N/DGPS) broadcast sites are strategically positioned to cover the continental United States, Alaska, Hawaii, and Puerto Rico.

The maintenance philosophy for N/DGPS broadcast sites is described in the table below.

Level	Maintenance Activities
Organizational	• The NAVCEN or NAVCEN Detachment are responsible for notifying the maintenance facility when a failure has occurred. • The applicable Maintenance and Logistics Command (MLC) and/or its subordinate units, Electronic Support Units (ESUs)/Electronic Support Detachments (ESDs), or contractors are responsible for organizational level support. • The applicable MLC is responsible for facilities maintenance at all N/DGPS sites. **Note**: DGPS broadcast sites are remotely located with no ETs assigned.
Intermediate	The applicable MLC and/or its subordinate units, ESUs/ESDs, or contractors perform preventive and corrective maintenance.
Depot	The ELC performs the repair and stocking of DGPS system • modules • assemblies, and • components.
SMEF	The C2CEN is the SMEF and provides “last stop” technical assistance for corrective maintenance beyond the capabilities of the organizational and intermediate levels.

Continued on next page

3.2.2 Differential Global Positioning System (DGPS), Continued

3.2.2.7 DGPS Control Station Locations and Maintenance Philosophy

DGPS is controlled from two control stations in the following locations:

- Alexandria, VA (NAVCEN), and
- Petaluma, CA (NAVCEN Detachment).

Note: A third control station is located at C2CEN. It is used primarily for support and engineering; however it can be used as a contingency.

The maintenance philosophy for DGPS control stations is described in the table below.

Level	Maintenance Activities
Organizational	Assigned personnel at NAVCEN and NAVCEN Detachment perform preventive and corrective maintenance.
Intermediate	The C2CEN performs corrective maintenance beyond the capability of the assigned organization level.
Depot	C2CEN administers a commercial contract to provide depot level maintenance which consists of repairing and stocking the following items used in the DGPS control system: • modules • assemblies, and • components.
SMEF	The C2CEN is the SMEF and provides “last stop” technical assistance for corrective maintenance beyond the capabilities of the organizational and intermediate levels.

Continued on next page

3.2.2 Differential Global Positioning System (DGPS), Continued

3.2.2.8 DGPS WAN Description and Maintenance Philosophy

A commercial wide area network (WAN) provider is used by DGPS control stations to monitor and control broadcast sites. The equipment used to support the WAN is described below.

- Each DGPS control station uses two T-1 data circuits.
- Each broadcast site has a dedicated synchronous data circuit installed which provides connections to
  - GPS receivers
  - MF transmitters, and
  - remote sensors.

The maintenance philosophy for DGPS WAN is described in the table below.

Level	Maintenance Activities
Organizational	The NAVCEN and NAVCEN Detachment notify the intermediate maintenance facility when a failure occurs.
Intermediate	The applicable MLC and/or their subordinate units or contractors perform corrective maintenance that is beyond the capability of the assigned organizational level.
Depot	The ELC performs depot level maintenance which consists of repairing and stocking the following items used in the DGPS control system: • modules • assemblies, and • components.
SMEF	The C2CEN is the SMEF for DGPS Broadcast sites and provides “last stop” technical assistance for corrective maintenance beyond the capabilities of the organizational and intermediate levels.

3.2.3 Long Range Navigation (Loran) System

Introduction

This topic contains information on the Long Range Navigation (Loran) system, including

- references to resources for more detailed information
- a description of the system and how it works
- the mission and components of the Loran-C transmitting stations, and
- the maintenance philosophy for each system component.

3.2.3.1 Loran References

The references listed below on the Long Range Navigation (Loran) system may be used to expand the information covered in this topic.

- Aids to Navigation Manual–Technical, COMDTINST M16500.3 (series)
- Specification of the Transmitted Loran-C Signal, COMDTINST M16562.4 (series)
- Loran-C Users Handbook, COMDTPUB P16562.6 (series)
- Federal Radio Navigation Plan (current edition)
- Tower Manual, COMDTINST M11000.4 (series)
- Loran-C Operations Manual, NAVCENIST M16562.1 (series), and
- All applicable equipment technical manuals and operations guides found on CG Central.

Continued on next page

3.2.3 Long Range Navigation (Loran) System, Continued

3.2.3.2 Loran System Description

Loran is a hyperbolic radio navigation aid, which operates on the principle that the difference of the time of arrival of signals from two stations, observed at a point in the coverage area, is directly proportional to the difference in the distance from the point of observation to each of the stations. The Loran system

- operates in the frequency spectrum of 90–110 kHz with a carrier frequency of 100 kHz
- has a "chain" of three or more transmitting stations, with a typical Loran-C chain consisting of a master (M) and four secondary stations (W, X, Y, and Z), and
- has stations operating either at a
  - dual-rate (functioning as two stations, each on a different rate), or
  - single-rate (functioning as a single station).

Notes:
- Chain coverage is determined by the power transmitted from each station, the distance between them, and their orientation.
- Loran-C transmissions may also be used for timing and frequency reference and communication purposes.

Reference: For specific rate information, refer to CG Central.

Continued on next page

3.2.3 Long Range Navigation (Loran) System, Continued

3.2.3.3 Loran System Process

The Loran system process is described in the table below.

Stage	Description	See …
1	A Loran-C transmitting station chain develops and transmits the Loran-C signals to the user service area in the sequence described below. • The *master* station broadcasts a series of pulse transmissions. • *Secondary station (W)* waits for a precise interval (coding delay) and then transmits a series of pulses. The pulses are then transmitted in sequence (X, Y, Z) by the other secondary stations.	• 3.2.3.4 for detail on the Loran-C transmitting stations. • 3.2.3.5 for Loran-C transmitting station maintenance philosophy.
2	Primary Control Monitor Sets (PCMS), located at a remote monitor site in a critical Loran-C user area • utilize a highly accurate linear averaging digital Loran-C monitor receiver to track multiple Loran-C chains • capture real-time Loran-C signal data transmitted from the master and secondary stations, and • relay the signal data to the new Loran-C Consolidated Control System (nLCCS) via data links. **Note**: The PCMS has equipment to provide remote communications and back-up power.	3.2.3.6 for PCMS maintenance philosophy.
3	The nLCCS, located at the Navigation Center (NAVCEN) and NAVCEN Detachment • remotely monitors Loran-C chain operations via data links by analyzing and relaying signal and control data between the transmitting stations and the PCMS sites, and • controls the parameters of the transmitted signal from the Control Station (CONSTA).	3.2.3.7 for the nLCCS maintenance philosophy.

Continued on next page

3.2.3 Long Range Navigation (Loran) System, Continued

3.2.3.4 Loran-C Transmitting Stations

The primary mission of the Loran-C transmitting stations is to develop and transmit Loran-C signals to the user service area. Transmitting stations are located in the United States and Canada.

Each transmitting station consists of three components described in the table below.

See 3.2.3.5 for Loran-C transmitting station maintenance philosophy.

Reference: For a list of Loran transmitting stations, and more detail on the components of a transmitting station, refer to the applicable equipment technical manuals and operations guides on CG Central.

Component	Description
High power transmitting equipment	Loran-C transmitting equipment consists of the three types of high-power transmitters described below. • ***Tube-type transmitters*** contain mostly discrete components and require significant onsite maintenance. Developed and installed in the 1960s. • ***Solid-state transmitters*** have a modular design and contain mostly depot-repairable circuit assemblies. Developed and installed in the 1970s–1980s. • ***New solid-state transmitters*** have been developed and installed in 2000 to the present time.

Continued on next page

3.2.3 Long Range Navigation (Loran) System, Continued

3.2.3.4
Loran-C Transmitting Stations (continued)

Component	Description
Timing and Frequency Equipment (TFE)	The TFE • develops and shapes the Loran-C pulse • provides timing and frequency stability, and • provides for remote control of the transmitted signal. **Notes**: • TFE was formerly known as timing and control equipment (TCE). • The precisely timed pulse transmissions from all stations are on a time-shared basis, using the common carrier frequency of 100 kHz. • The time elapsed between the initiating pulse from the master and the next initiating pulse from the same master is know as the group repetition interval (GRI). Each Loran-C chain is designated by a unique GRI.
Communications, Control, and Monitor (CCM) Equipment	The CCM equipment • communicates, controls, and monitors the – high power transmitting equipment, and – TFE, and • relays real-time Loran-C signal data and station alarms to the Loran-C Consolidated Control System (LCCS).

Continued on next page

3.2.3 Long Range Navigation (Loran) System, Continued

3.2.3.5 Loran-C Transmitting Station Maintenance Philosophy

The maintenance philosophy for Loran-C transmitting stations is described in the table below.

Level	Maintenance Activities
Organizational	Assigned transmitting station personnel perform preventive and corrective maintenance at the transmitting stations.
Intermediate	The Loran Support Unit (LSU) performs corrective maintenance that is beyond the capability of the assigned organizational level personnel.
Depot	The Engineering Logistics Center (ELC) performs all assigned depot level maintenance, which consists of repairing and stocking the following items used in the transmitting station: • modules • assemblies, and • components.
Systems Management and Engineering Facility (SMEF)	The LSU is the SMEF and provides "last stop" technical assistance for corrective maintenance beyond the capabilities of the organizational and intermediate levels.

Continued on next page

3.2.3 Long Range Navigation (Loran) System, Continued

3.2.3.6 PCMS Maintenance Levels

The maintenance philosophy for PCMS is described in the table below.

Reference: For more detail on PCMS equipment, refer to the Primary Chain Monitor Set Operator's Guide on CG Central.

Level	Maintenance Activities
Organizational	• The NAVCEN and NAVCEN Detachment are responsible for notifying the maintenance facility when a failure has occurred. • The applicable Maintenance and Logistics Command (MLC) and/or its subordinate units, Electronic Support Units (ESUs)/Electronic Support Detachments (ESDs), or contractors are responsible for organizational level support. **Note**: PCMS sites are remotely located with no Electronics Technicians (ETs) assigned.
Intermediate	The applicable MLC and/or its subordinate units, ESUs/ESDs, perform preventive and corrective maintenance. **Exception**: PCMS sites, located at commercial airports, are maintained by Federal Aviation Administration (FAA) technicians or their contractors.
Depot	The ELC performs all assigned depot level maintenance, which consists of repairing and stocking the following items used in the PCMS: • modules • assemblies, and • components.
SMEF	The LSU is the SMEF and provides "last stop" technical assistance for corrective maintenance beyond the capabilities of the organizational and intermediate levels.

Continued on next page

3.2.3 Long Range Navigation (Loran) System, Continued

3.2.3.7 nLCCS Maintenance Philosophy

The maintenance philosophy for nLCCS is described in the table below.

Reference: For more detail on nLCCS equipment, refer to the Loran-C Consolidated Control System Operator's Guide on CG Central.

Level	Maintenance Activities
Organizational	The NAVCEN and NAVCEN Detachment perform preventive and corrective maintenance.
Intermediate	The LSU performs the corrective maintenance that is beyond the capability of the assigned organizational level maintenance personnel.
Depot	Depot level maintenance is provided under commercial contract administered by the LSU. Depot level maintenance consists of repairing and stocking modules, assemblies, and components used in the nLCCS.
SMEF	The LSU is the SMEF and provides "last stop" technical assistance for corrective maintenance beyond the capabilities of the organizational and intermediate levels.

3.2.4 Short Range Aids-to-Navigation (SRAN)

Overview

3.2.4.01 Scope

This section describes

- the Short Range Aids-to-Navigation (SRAN) program
- how the Aid Control and Monitor System (ACMS) is utilized to monitor and control the automated aids in the SRAN program
- the typical equipment that is used, including equipment that provides and/or monitors
  - – primary, secondary, and emergency light and sound signals
  - – power systems
  - – fog, and
  - – intrusion or fire at the aid, and
- new SRAN installation planning requirements.

Note: The information in this section is not intended to replace the appropriate technical manuals. The intent is to supplement existing manuals.

3.2.4.02 References

Additional information on Short Range Aids-to-Navigation (SRAN) may be found in the following resource.

Resource	Description	Location/Link
C2CEN	Command and Control Engineering Center	CG Central

Continued on next page

Overview, Continued

3.2.4.03 Contents

This section contains the following topics.

3.2.4.1 Overview of the Short Range Aids-to-Navigation (SRAN) Program

Introduction

This topic contains an overview of the Short Range Aids-to-Navigation (SRAN) program, including

- a description of the SRAN program and where aids are typically located
- an illustration of SRAN system components
- SRAN maintenance guidelines and philosophy, and
- SRAN service contacts.

3.2.4.1.1 SRAN System Description

The Short Range Aids-to-Navigation (SRAN) program develops and deploys equipment used to navigate near the shoreline. SRAN equipment features are described in the table below.

Note: See 3.2.4.1.2 for an illustration of SRAN system components.

Feature	Description
Coverage	SRAN equipment provides navigational coverage from 1–30 miles.
System capabilities	SRAN system capabilities are used at some sites to control and monitor functions at lighthouses and ranges, such as • lights • sound signals, and • power.
Power source	SRAN equipment operates using • alternating current from generators or commercial power, or • direct current from batteries or solar panels.
Operating environment	SRAN equipment operates in environments where the temperature and humidity are unregulated.
Testing requirements	Some SRAN equipment that emits signals is subject to Military Standard testing, such as • MIL-STD-462 • MIL-STD-461, and • MIL-STD-810.
Location	• The majority of SRAN equipment is located at sites where boaters operate 24 hours a day, year round. • A few aids are located where the equipment is used seasonally.

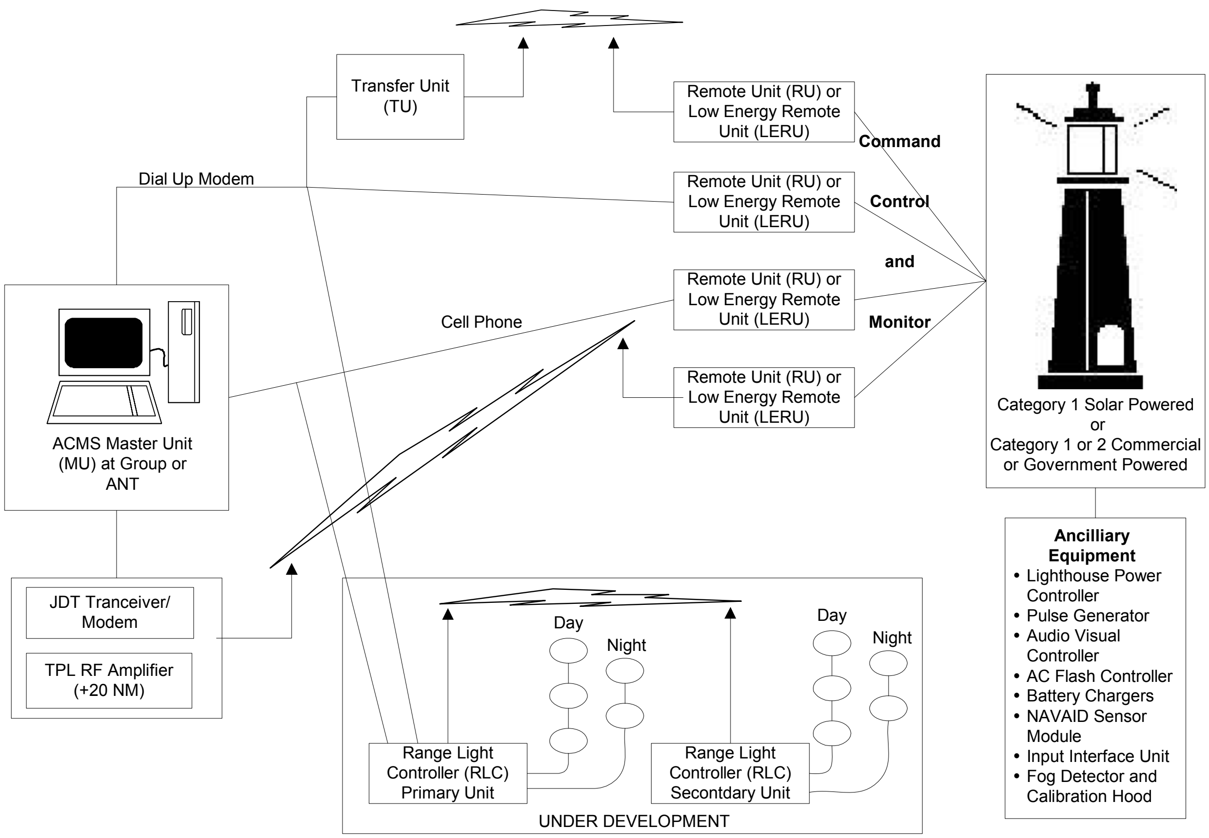
Continued on next page

3.2.4.1 Overview of the Short Range Aids-to-Navigation (SRAN) Program, Continued

3.2.4.1.2 SRAN System Illustration

Below is an illustration of SRAN system components.

See 3.2.4.1.3 for references to where in this section information about each component of the SRAN system may be found.



Continued on next page

3.2.4.1 Overview of the Short Range Aids-to-Navigation (SRAN) Program, Continued

3.2.4.1.3 SRAN System Components

The table below identifies where in this section information about various SRAN system components may be found.

For information on the following component …	See …
Aid Control and Monitor System (ACMS), which includes • Master Unit (MU) • Remote Units (RUs), and • Transfer Units (TU)	3.2.4.2 SRAN Aid Control and Monitor System (ACMS)
Navigational Aid (NAVAID) Sensor Module	3.2.4.3 SRAN NAVAID Sensor Module
Fog Detector	3.2.4.4 SRAN Fog Detector
Lighthouse Power Controller	3.2.4.5 SRAN Lighthouse Power Controller (LPC)
Audio Visual Controller (AVC)	3.2.4.6 SRAN Audio Visual Controller (AVC)
AC Flash Controller (ACFC)	3.2.4.7 SRAN AC Flash Controller (ACFC)
Battery Chargers	3.2.4.8 SRAN Battery Chargers
Radar Beacon (RACON)	3.2.4.9 SRAN Radar Beacon (RACON)
Cellular Digital Packet Data (CDPD) Sound Signals	3.2.4.10 SRAN Cellular Digital Packet Data (CDPD) Sound Signals
Range Light Controller (RLC)	3.2.4.11 SRAN Range Light Controller (RLC)

Continued on next page

3.2.4.1 Overview of the Short Range Aids-to-Navigation (SRAN) Program, Continued

3.2.4.1.4 SRAN Maintenance Philosophy

The maintenance philosophy for SRAN is described in the table below.

Note: The electronic equipment maintenance goal at an automated lighthouse is three months without failure.

See
- 3.2.4.1.5 for corrective maintenance guidelines, and
- 3.2.4.1.6 for SRAN service telephone numbers and Web site addresses.

Level	Maintenance Activities
Organizational	• Aids-to-Navigation Teams (ANTs) and/or A-76 contractors normally provide organizational level support for the repair and maintenance of SRAN equipment within their areas of responsibility. • The servicing Electronic Support Unit (ESU) or Electronic Support Detachment (ESD) may provide direct organizational (field) level maintenance support in some cases.
Intermediate	• An ESU or ESD provides additional logistical or technical assistance for electronic SRAN failures or discrepancies that exceed organizational level resource capabilities. • The cognizant Maintenance and Logistics Command (MLC) electronics support branch – assists with repair efforts for electronic or logistics problems, or upon a field request, provides assistance because the repair effort exceeds organizational level capabilities, or – directs repair personnel to contact the Command and Control Center (C2CEN) for additional assistance.
Depot	The Engineering Logistics Center (ELC) provides depot level support and equipment logistics.
Systems Management and Engineering Facility (SMEF)	The C2CEN is the SMEF and provides "last stop" technical assistance for corrective maintenance beyond the capabilities of the organizational and intermediate levels.

Continued on next page

3.2.4.1 Overview of the Short Range Aids-to-Navigation (SRAN) Program, Continued

3.2.4.1.4
SRAN Maintenance Philosophy (continued)

Level	Maintenance Activities
Headquarters (Commandant (CG-621))	The primary contact for SRAN problems or issues which are outside the scope of support provided by either the C2CEN or ELC.

3.2.4.1.5 SRAN Corrective Maintenance Guidelines

Weather may influence the maintenance schedule. Maintenance guidelines are listed below.

- In an emergency, corrective action must be taken at once.
- Any loss of monitor information due to link or remote monitor failure may not reflect a loss of service to the mariner, but does create a lack of confidence at the master station and must be casualty-reported (CASREPED) if not repaired within 24 hours.
- Occasional losses of the communications link may be caused by thunderstorms, thermal inversions, or telephone lines. Make every possible effort to verify that the problem does, in fact, exist at the remote site before sending a technician for repairs. The Aid Control and Monitor System (ACMS) provides a direct indication of the problem on the status page for the aid.
- Make every effort to expedite the process when a boat or helicopter crew is standing by for a technician to make repairs.

Reference: For specific guidelines for all SRAN equipment maintenance, refer to the Equipment/System Integrated Logistics Support Plan (EILSP) documents written and maintained by the C2CEN.

3.2.4.1.6 SRAN Service Contacts

Contacts available to provide SRAN service are listed in the table below.

Contact	Web Site	Telephone
C2CEN	CG Central	(757) 686-2156
ELC	CG Central	(410) 762-6688
Headquarters	CG Central	(202) 267-1271

3.2.4.2 SRAN Aid Control and Monitor System (ACMS)

Introduction

This topic contains information on the Short Range Aids-to-Navigation (SRAN) Aid Control and Monitor System (ACMS), including

- how the ACMS monitors and controls automated navigation aids at remote sites
- a description of ACMS components and equipment, as well as the location and history, and
- maintenance guidelines.

3.2.4.2.1 ACMS Description, Location, and History

The system components that comprise the Short Range Aids-to-Navigation (SRAN) Aid Control and Monitor System (ACMS) are described in the table below.

Feature	Description
Equipment, groups, and components	The AN/USQ-91(V) ACMS contains the units listed below. • Master Unit (MU): GCF-W-1204/USQ-91 (V) Control Display Group • Remote Units (RUs): – OA-9211(V)/USQ-91 (V) Monitor Group, DC, and – OA-9211(V)3/USQ-91 (V) Monitor Group, AC, and • Transfer Unit (TU): ON-267(V)/USQ-91(V) Interconnecting Group. **Note**: Several components make up each group. Most of the components are the same from group to group.
Physical description	• The equipment groups are designed for mounting in a 19-inch electronic equipment rack. • The Monitor Group and Interconnecting Group occupy three feet of vertical space in a 24-inch deep equipment rack. • Power supplies differ depending upon whether AC or DC power is used.

Continued on next page

3.2.4.2 SRAN Aid Control and Monitor System (ACMS), Continued

3.2.4.2.1
ACMS Description, Location, and History (continued)

Feature	Description
Printed circuit (PC) boards	• The PC boards, although the same, differ in the way they are jumpered. • The microprocessor board is programmed differently for the remote and transfer units, although it is the same board.
Location	• Remote units are located on automated aids. • Master units are typically installed at Coast Guard Operation Centers where 24-hour watches are maintained.
History	The ACMS is the newest monitor and was • designed for the Coast Guard by the Applied Physics Lab at John Hopkins University, and • built by AVW Electronic Systems, Inc. in Inglewood, CA.

Continued on next page

3.2.4.2 SRAN Aid Control and Monitor System (ACMS), Continued

3.2.4.2.2 ACMS Process

The process used by the ACMS to monitor and control automated navigation aids at remote sites is described in the table below.

<table>
<tr><th>Stage</th><th>Description</th></tr>
<tr><td>1</td><td>Monitor Group equipment at remote units monitors the automated navigation aids on which they are located.

The table below

• describes operations and activities that are monitored, and
• identifies where in this section detailed information on each piece of ancillary equipment that is monitored can be found.

<table>
<tr><th>Operation/Activity</th><th>For More Detail on Ancillary Equipment Used in the Operation/Activity, see …</th></tr>
<tr><td>Primary, secondary, and emergency light and sound signals</td><td>• 3.2.4.3 SRAN NAVAID Sensor Module
• 3.2.4.7 SRAN AC Flash Controller (ACFC)
• 3.2.4.9 SRAN Radar Beacon (RACON)
• 3.2.4.10 SRAN Cellular Digital Packet Data (CDPD) Sound Signals
• 3.2.4.11 SRAN Range Light Controller (RLC)</td></tr>
<tr><td>Power systems</td><td>• 3.2.4.5 SRAN Lighthouse Power Controller (LPC)
• 3.2.4.6 SRAN Audio Visual Controller (AVC)
• 3.2.4.8 SRAN Battery Chargers</td></tr>
<tr><td>Fog detectors</td><td>3.2.4.4 SRAN Fog Detector</td></tr>
</table>
</td></tr>
</table>

Continued on next page

3.2.4.2 SRAN Aid Control and Monitor System (ACMS), Continued

3.2.4.2.2
ACMS Process (continued)

Stage	Description
2	Remote units send data to the master unit via one of the following options: • phone links, radio links, or a combination of radio/phone links, or • a transfer unit, when distances between the remote unit and master unit exceed radio link capabilities. **Note**: Each master unit can monitor up to 24 remote units at the same time.
3	The Control Display Group at the master unit's watch stander station computer • displays the remote unit's monitoring information • reflects any changes that the remote unit reports, and • generates an alarm display if appropriate. **Notes**: The Control Display Group unit displays the status of up to 32 monitored functions and allows the control of eight functions at each remote unit.
4	A watch stander monitors the master unit to maintain constant surveillance and control of the remote units.

Continued on next page

3.2.4.2 SRAN Aid Control and Monitor System (ACMS), Continued

3.2.4.2.3 ACMS Maintenance Guidelines

Organizational maintenance is limited to replacing modules, subassemblies, and the mainframe components. Some replaceable modules in ACMS equipment are designated XB and are not to be repaired by the servicing unit.

Maintenance activity guidelines based on a module's designation are provided in the table below.

Reference: For more detail on maintenance guidelines, refer to
- Coast Guard Planned Maintenance System (CGPMS) procedures, and
- ACMS technical manuals.

Module Designation	Maintenance Activities
XB	When an XB designated module fails, the repair facility • requisitions a replacement from the Engineering Logistics Center (ELC), which is the Inventory Control Point (ICP) for logistics support, and • returns the defective module in accordance with – instruction received with the replacement modules, or – as directed by the ELC Support Gram at CG Central See 5.5.5 Mandatory Turn-In (MTI) Defective Equipment Program for information on returning defective equipment to the ELC. **Notes**: • XB designated items are listed in the Allowance Parts List (APL) without a breakdown of component parts. • General-purpose electronic test equipment (GPETE) is required for maintenance of XB designated equipment.

Continued on next page

3.2.4.2 SRAN Aid Control and Monitor System (ACMS), Continued

3.2.4.2.3
ACMS Maintenance Guidelines (continued)

Module Designation	Maintenance Activities
No XB designation	APL and Management Information for Configuration and Allowances (MICA) support is limited to assemblies which may be replaced at the organizational level. Spare parts kits for remote and transfer unit equipment are furnished at initial issue to units with maintenance responsibility. The remote and transfer unit spare parts kits consists of • one of each type of PC card used • a power supply • OPTO 22 modules, and • miscellaneous parts. **Note**: Use normal military standard transaction reporting and accounting procedures (MILSTRIP) to replenish spare parts other than XB materials.

3.2.4.3 SRAN NAVAID Sensor Module

Introduction

This topic contains information on the Short Range Aids-to-Navigation (SRAN) Navigational Aid (NAVAID) Sensor Module, including

- the purpose of the NAVAID Sensor Module
- a description of the equipment, its typical location, and history, and
- maintenance guidelines.

3.2.4.3.1 NAVAID Sensor Module Purpose

The Short Range Aids-to-Navigation (SRAN) Navigational Aid (NAVAID) Sensor Module performs the functions listed below.

- Converts contact closures originating from the aid-to-navigation into suitable signals to interface with the remote monitor equipment.
- Continuously monitors the operation of the light or sound signals in the aid-to-navigation system to ensure that they are “active” when required.
- Automatically switches the aid-to-navigation into the
  - secondary mode in the event of a primary signal failure, and
  - emergency operation when both primary and secondary modes fail.

3.2.4.3.2 NAVAID Sensor Module Description, Location, and History

NAVAID Sensor Module equipment, its typical location, and history are described in the table below.

Feature	Description
Equipment	The GCF-RWL-2241 NAVAID Sensor Panel • is used to interface the light or sound signal of the aid with the monitor and control equipment, and • contains two GCF-RWL-2076 NAVAID Sensor Modules (light and sound) plugged into edge connectors that fold out to facilitate testing and repair.
Physical description	The NAVAID Sensor Module is a small gray box approximately 12 inches square.
Weight	The complete system weighs about 10 pounds.
Location	The Coast Guard installs NAVAID Sensor Modules at locations where 24-hour light or sound signal control and monitoring is required, typically at Coast Guard lighthouses.

Continued on next page

3.2.4.3 SRAN NAVAID Sensor Module, Continued

3.2.4.3.2
NAVAID Sensor Module Description, Location, and History (continued)

Feature	Description
History	The NAVAID Sensor Module was designed and tested by the Coast Guard and is manufactured by Fidelity Technology in Reading, PA.

3.2.4.3.3 NAVAID Sensor Module Maintenance Guidelines

Some replaceable modules in the NAVAID Sensor Module are designated XB and are not to be repaired by the servicing unit. Maintenance activity guidelines based on a module's designation are provided in the table below.

Module Designation	Maintenance Activities
XB	When an XB designated module fails, the repair facility • requisitions a replacement from the Engineering Logistics Center (ELC), which is the Inventory Control Point (ICP) for logistics support, and • returns the defective module in accordance with – instruction received with the replacement modules, or – as directed by the ELC Support Gram at CG Central. See 5.5.5 Mandatory Turn-In (MTI) for Defective Equipment Program for information on returning defective equipment to the ELC. **Notes**: • XB designated items are listed in the APL without a breakdown of component parts. • General-purpose electronic test equipment (GPETE) is required for maintenance of XB designated equipment.
No XB designation	Allowance Part List (APL) and Management Information for Configuration and Allowances (MICA) support is limited to assemblies which may be replaced at the organizational level.

3.2.4.4 SRAN Fog Detector

Introduction

This topic contains information on Short Range Aids-to-Navigation (SRAN) Fog Detectors, including

- the purpose and functions of Fog Detectors
- a description of the equipment, its typical location, and history, and
- maintenance guidelines.

3.2.4.4.1 Fog Detector Purpose

The Short Range Aids-to-Navigation (SRAN) Fog Detector is used to interface with the aid (sound signal) and other monitoring and control equipment. The three functions of the Fog Detector and how each function is used are described in the table below.

Function	How It Is Used
Operates contact closures to control the sound signal on and off during low visibility	Measures visibility and provides on/off control of the local sound signal.
Operates contact closures to indicate alarm conditions to the remote monitor equipment	• The Fog Detector reports its operational status to the remote Coast Guard Aid Control and Monitor System (ACMS). • The alarm signal is utilized by the Navigational Aid (NAVAID) Sensor Module to control sound signals and provide a status signal to the ACMS remote monitoring equipment. Where there is no NAVAID Sensor Module installed, the Fog Detector is connected directly to the sound signal. **Note**: The Fog Detector contains three plugs to facilitate testing and repair. See 3.2.4.2 SRAN Aid Control and Monitor System (ACMS) for more detail on the ACMS monitoring process.
Provides a failure safe operation to turn on the primary, secondary and emergency sound signal, if a failure occurs	The watch stander monitors any failures of the Fog Detectors from the ACMS master unit. It provides him or her with the following information: • the status of primary, secondary and emergency sound signals, and • whether the Fog Detector is on/off or failed.

Continued on next page

3.2.4.4 SRAN Fog Detector, Continued

3.2.4.4.2 Fog Detector Description, Location, and History

Fog Detector equipment, its typical location, and history are described in the table below.

Feature	Description
Equipment	CEVV-VM100 Fog Detector
Physical description	A small white box approximately 18 inches square that is mounted to a 6-foot pedestal.
Printed circuit (PC) cards	Six PC cards monitor and control the operation of sound signals.
Weight	The complete system weighs about 60 pounds.
How it works	The electronics box has two tubes mounted on the front surface that transmit and receive visible light, which is reflected off the atmosphere and measured to indicate visibility in nautical miles.
Location	The Fog Detectors are located where 24-hour sound signal control and monitoring is required, typically at Coast Guard lighthouses.
History	• The CEVV-VM100 Fog Detector was designed, tested, and manufactured by Fidelity Technology in Reading, PA. • The Coast Guard also tested the sensor with the assistance of the National Weather Service in Steeling, VA. • The Command and Control Engineering Center (C2CEN) developed software and hardware changes to the Fog Detector in 2001 to improve operational reliability.

Continued on next page

3.2.4.4 SRAN Fog Detector, Continued

3.2.4.4.3 Fog Detector Maintenance Guidelines

The Fog Detector's electronics box is designated XB and is not to be repaired by the servicing unit. When an XB designated module fails, the repair facility

- requisitions a replacement from the Engineering Logistics Center (ELC) which is the Inventory Control Point (ICP) for logistics support, and
- returns the defective module in accordance with
  - instruction received with the replacement modules, or
  - as directed by the ELC Support Gram at CG Central.

See 5.5.5 Mandatory Turn-In (MTI) for Defective Equipment Program for information on returning defective equipment to the ELC.

Allowance Part List (APL) and Management Information for Configuration and Allowances (MICA) support is limited to the assembly, which may be replaced at the organizational level.

Note: General purpose electronic test equipment (GPETE) is required for maintenance of XB designated equipment.

3.2.4.5 SRAN Lighthouse Power Controller (LPC)

Introduction

This topic contains information on the Short Range Aids-to-Navigation (SRAN) Lighthouse Power Controller (LPC), including

- the purpose of LPCs
- a description of LPC equipment, its typical location, and history, and
- maintenance guidelines.

3.2.4.5.1 LPC Purpose

Short Range Aids-to-Navigation (SRAN) Lighthouse Power Controllers (LPCs) are used on aid-to-navigation sites to

- provide system status information to the Aid Control and Monitor System (ACMS) remote monitoring equipment, and
- monitor and control power source parameters, as described in the table below.

When the …	Then the LPC …
primary power source fails or is out of tolerance for a preset length of time	switches to the secondary generator.
secondary power source fails or stays out of tolerance	shuts the aid down. **Note**: The system must be reset after the failure conditions have been corrected.

3.2.4.5.2 LPC Description, Location, and History

LPC equipment, its typical location, and history are described in the table below.

Feature	Description
Equipment	• CEVV-LPC-20032 CONTROLLER • CEVV-LPC RELAY SWITCH BOX
Physical description	A combination of two gray boxes approximately 24 inches square.
Printed circuit (PC) cards	Five PC cards are used.
Weight	The complete system weighs about 100 pounds.

Continued on next page

3.2.4.5 SRAN Lighthouse Power Controller (LPC), Continued

3.2.4.5.2
LPC Description, Location, and History (continued)

Feature	Description
Functions	Monitors and controls the application of either commercial or generator power by controlling the relays in the Relay Switch Box.
Location	LPCs are located where 24-hour AC power control and monitoring is required, typically at Coast Guard lighthouses.
History	The LPCs were designed and tested by the Coast Guard and are manufactured by Fidelity Technology in Reading, PA.

3.2.4.5.3 LPC Maintenance Guidelines

The LPC's electronic box is designated XB and is not to be repaired by the servicing unit. When an XB designated module fails, the repair facility

- requisitions a replacement from the Engineering Logistics Center (ELC), which is the Inventory Control Point (ICP) for logistics support, and
- returns the defective module in accordance with
  – instruction received with the replacement modules, or
  – as directed by the ELC Support Gram at CG Central.

See 5.5.5 Mandatory Turn-In (MTI) for Defective Equipment Program for information on returning defective equipment to the ELC.

Allowance Part List (APL) and Management Information for Configuration and Allowances (MICA) support is limited to the assembly, which may be replaced at the organizational level.

Note: General purpose electronic test equipment (GPETE) is required for maintenance of XB designated equipment.

3.2.4.6 SRAN Audio Visual Controller (AVC)

Introduction

This topic contains information on the Short Range Aids-to-Navigation (SRAN) Audio Visual Controller (AVC), including

- purpose of AVC
- a description of the equipment, its typical location, and history, and
- maintenance guidelines.

3.2.4.6.1 AVC Purpose

The Short Range Aids-to-Navigation (SRAN) Audio Visual Controller (AVC) is used with all standard category I, II, and III light and sound signal systems to interface the power and signal data for various aid-to-navigation equipment.

3.2.4.6.2 AVC Description, Location, and History

AVC equipment, its typical location, and history are described in the table below.

Feature	Description
Equipment	GCF-RWL-2098 AVC
Physical description	One gray box approximately 24 inches square.
Printed circuit (PC) cards	Two PC cards are used to monitor and control the operation.
Weight	The complete system weighs about 40 pounds.
Functions	• Circuit breakers isolate all power going to each system in the aid. • Timers turn off all the equipment if the commercial power is lost and the DC power drops below the operational set point.
Location	AVCs are located where 24-hour control and monitoring is required, typically at Coast Guard lighthouses.
History	The AVCs were designed and tested by the Coast Guard and are manufactured by Fidelity Technology in Reading, PA.

Continued on next page

3.2.4.6 SRAN Audio Visual Controller (AVC), Continued

3.2.4.6.3 AVC Maintenance Guidelines

The AVC is designated XB and is not to be repaired by the servicing unit. When an XB designated module fails, the repair facility

- requisitions a replacement from the Electronics Logistics Center (ELC), which is the Inventory Control Point (ICP) for logistics support, and
- returns the defective module in accordance with
  - instruction received with the replacement modules, or
  - as directed by the ELC Support Gram at CG Central.

See 5.5.5 Mandatory Turn-In (MTI) for Defective Equipment Program for information on returning defective equipment to the ELC.

Allowance Part List (APL) and Management Information for Configuration and Allowances (MICA) support is limited to the assembly, which may be replaced at the organizational level.

Note: General purpose electronic test equipment (GPETE) is required for maintenance of XB designated equipment.

3.2.4.7 SRAN AC Flash Controller (ACFC)

Introduction

This topic contains information on the Short Range Aids-to-Navigation (SRAN) AC Flash Controller (ACFC), including

- purpose of the ACFC
- a description of the equipment, typical location, and history, and
- maintenance guidelines.

3.2.4.7.1 ACFC Purpose

The Short Range Aids-to-Navigation (SRAN) AC Flash Controller (ACFC) uses an internal CG-181 flasher to provide daylight control of the main light.

Note: The main light is up to 1,000 watts at 120 VAC.

3.2.4.7.2 ACFC Description, Location, and History

ACFC equipment, its typical location, and history are described in the table below.

Feature	Description
Equipment	GCF-RWL-2106 AC Flash Controller (ACFC)
Physical description	One gray box approximately 18 inches square.
Weight	The complete system weighs about 20 pounds.
Functions	• The printed circuit (PC) board monitors and controls the system. • Two circuit breakers isolate power going to each light at the aid.
Location	The ACFC is located where 24-hour control is required, typically at Coast Guard range lights.
History	The ACFC was designed and tested by the Coast Guard and manufactured by Delta Integrations in Lancaster, PA.

Continued on next page

3.2.4.7 SRAN AC Flash Controller (ACFC), Continued

3.2.4.7.3 ACFC Maintenance Guidelines

Maintenance of the ACFC, performed at the intermediate level for short-range aids-to-navigation (SRAN), are provided in the table below.

Note: There are no XB designated materials contained within the ACFC.

Reference: See 3.2.4.1.4 for detail on SRAN maintenance at the intermediate level.

Common Maintenance Problem	Troubleshooting Tips
Voltage is not on the correct setting.	Setting the CG-181 at a voltage of 12–13 volts usually ensures proper operation. **Note**: The ACFC contains a voltage adjustment in the power supply, which is measured on the + and – terminals of the CG-181. It is located inside the enclosure directly under the silver hole plug, which is in the center of the front cover of the power supply.
Solid-state relays, when subjected to gross overloads, usually short through. This results in a continuously ON main light.	The relay is conservatively rated for its application. Shorts in relays are generally caused by a faulty load or associated wiring.

3.2.4.8 SRAN Battery Chargers

Introduction

This topic contains information on Short Range Aids-to-Navigation (SRAN) Battery Chargers, including

- purpose of the Battery Charger
- a description of the equipment, typical location, and history, and
- maintenance guidelines and philosophy.

3.2.4.8.1 Battery Charger Purpose

The Short Range Aids-to-Navigation (SRAN) Battery Charger is used to automatically charge lead-acid and nickel-cadmium batteries in aids-to-navigation systems.

3.2.4.8.2 Battery Charger Description, Location, and History

Battery Charger equipment, its typical location, and history are described in the table below.

Feature	Description
Equipment	• CDSA-IBC-12-30A 12 Volt Battery Charger • CDSA-IBC-24-10A 24 Volt Battery Charger
Location	Battery Chargers are located where 24-hour battery control is required, typically at Coast Guard lighthouses.
History	The Battery Chargers were designed, tested and manufactured by Sab Nife and Saft Nite.

Continued on next page

3.2.4.8 SRAN Battery Chargers, Continued

3.2.4.8.3 Battery Chargers Maintenance Guidelines and Philosophy

This system is designated XB and is not to be repaired by the servicing unit. When an XB designated module fails, the repair facility

- requisitions a replacement from the Engineering Logistics Center (ELC), which is the Inventory Control Point (ICP) for logistics support, and
- returns the defective module in accordance with
  - instruction received with the replacement modules, or
  - as directed by the ELC Support Gram at CG Central.

See 5.5.5 Mandatory Turn-In (MTI) for Defective Equipment Program for information on returning defective equipment to the ELC.

Allowance Part List (APL) and Management Information for Configuration and Allowances (MICA) support is limited to the assembly, which may be replaced at the organizational level.

Note: General-purpose electronic test equipment (GPETE) is required for maintenance of XB designated equipment.

3.2.4.9 SRAN Radar Beacon (RACON)

Introduction

This topic contains information on Short Range Aids-to-Navigation (SRAN) Radar Beacons (RACONs), including

- purpose of RACONs and how they work
- a description of the equipment, typical location, and history, and
- maintenance guidelines.

3.2.4.9.1 RACON Purpose

The Short Range Aids-to-Navigation (SRAN) Radar Beacon (RACON) is a radar transponder which

- is an all-weather aid to marine navigation (either independent or co-located on an aid-to-navigation)
- responds to radar pulses in the marine 2900–3100 and 9300–9500 MHz microwave bands, and
- is particularly useful in marking
  - indistinct points of land
  - buoys in high traffic areas, and
  - channel boundaries under bridges.

Note: The Coast Guard operates and maintains combined X-band and S-band transponders, the functionality of which is housed together in one assembly. These devices offer the ability to be frequency agile and respond to the first signal interrogation, whether S or X band.

Continued on next page

3.2.4.9 SRAN Radar Beacon (RACON), Continued

3.2.4.9.2 RACON Description, Location, and History

RACON equipment, its typical location, and history are described in the table below.

Feature	Description
Equipment	CFAF-SEABEACON RACON
Physical description	• The RACON assembly is an integrated system comprised of a base housing/chassis, usually formed of aluminum or polycarbonate construction, containing the electronic circuitry and a polycarbonate structural foam radome. • The radome, which contains and protects the antennae, is highly transparent to microwave energy. • The exterior surface of the radome structural foam material is coated with a layer of white polyurethane enamel. • The base housing/chassis and radome are attached together and sealed by means of an airtight O-ring. This arrangement protects the internal electronic assemblies from salt-water intrusion. • The RACON assembly contains eight printed wiring boards, two antennae and assorted frequency-specific modules.
Weight	25 pounds
Length	Approximately 32 inches
Location	RACONs are generally located • in the vicinity of important harbor entrances • on large navigational buoys • on some light stands, and • on some specific geographic landmarks important to navigation, such as islands, jetties, and so on.
History	RACONs were designed, tested, and manufactured by Tideland Signal Corporation of Houston, TX.

Continued on next page

3.2.4.9 SRAN Radar Beacon (RACON), Continued

3.2.4.9.3 RACON Process

The RACON process is described in the table below.

Stage	Description
1	A ship transmits a surface-search radar pulse.
2	RACON • receives the surface-search radar pulse, and • transmits a Morse-coded response.
3	The ship's radar receives • the echo of its own pulse from the RACON's structure, and • a much stronger pulse a few microseconds later from the RACON's transmitter. **Result**: The identifier, commonly known as "paint," is displayed on the Planned Position Indicator (PPI) radially outward from the position of the RACON.

3.2.4.9.4 RACON Maintenance Guidelines

RACON equipment is designated XB and is not to be repaired by the servicing unit. When an XB designated module fails, the repair facility

- requisitions a replacement from the Engineering Logistics Center (ELC) which is the Inventory Control Point (ICP) for logistics support, and
- returns the defective module in accordance with
  - – instruction received with the replacement modules, or
  - – as directed by the ELC Support Gram at CG Central.

See 5.5.5 Mandatory Turn-In (MTI) for Defective Equipment Program for information on returning defective equipment to the ELC.

Allowance Part List (APL) and Management Information for Configuration and Allowances (MICA) support is limited to the assembly, which may be replaced at the organizational level.

Note: General purpose electronic test equipment (GPETE) is required for maintenance of XB designated equipment.

3.2.4.10 SRAN Cellular Digital Packet Data (CDPD) Sound Signals

Introduction

This topic contains information on Short Range Aids-to-Navigation (SRAN) Cellular Digital Packet Data (CDPD) Sound Signals, including

- purpose of CDPD Sound Signals
- a description of its equipment, typical location, and history, and
- maintenance guidelines.

3.2.4.10.1 CDPD Sound Signals Purpose

The Short Range Aids-to-Navigation (SRAN) Cellular Digital Packet Data (CDPD) Sound Signals transmit an audible tone to warn mariners of the proximity of a dangerous area, or an obstruction. Mariners may identify the signal by comparing the timing of the signal to a chart or light list.

3.2.4.10.2 CDPD Sound Signal Description, Location, and History

CDPD Sound Signal equipment, its typical location, and history are described in the table below.

Feature	Description
Equipment	• CDPD-CG-1000 Sound Signal Power Supply, AC • CDPD-ELG-300/02 Sound Signal Emitter, AC, 2MI, 300HZ • CDPD-ELG-500/02 Sound Signal Emitter, AC, 2MI, 500HZ • CDPD-FA-232/02 Sound Signal, DC, 1MI, 390HZ – 9010-0135 Power Module – 9055-0005 Driver Assembly • CDPD-SA-3C Sound Signal, DC, 2MI, 390HZ • CDPD-SA-850/01 Sound Signal, DC, 0.5MI, 850HZ • CDPD-SA-850/02 Sound Signal, DC, 1MI, 850HZ – 9010-0091 Program Timer – 9010-0061 Power Module – 9055-0025 Driver Assembly • CDPD-SA-850/04A Sound Signal, DC, 2MI, 850HZ
Physical description	• The CDPD Sound Signals come in various shapes, sizes, and sound levels. • The sound signal enclosure contains two assemblies used to control and monitor the operations of the signal. • There may be more than one signal "stacked" at a location to provide a longer-range audible signal.

Continued on next page

3.2.4.10 SRAN Cellular Digital Packet Data (CDPD) Sound Signals, Continued

3.2.4.10.2
CDPD Sound Signal Description, Location, and History (continued)

Feature	Description
Weight	A complete system can weigh as much as 230 pounds.
Location	• Located near natural obstructions such as rocks and points of land or man-made obstructions such as breakwaters. • CDPD Sound Signals are co-located at aid-to-navigation sites, or are themselves an aid-to-navigation.
History	The CDPD Sound Signals were designed, tested, and manufactured by Automatic Power Inc., in Houston, TX.

3.2.4.10.3 CDPD Sound Signals Maintenance Guidelines

The sound signal oscillator assemblies, power modules, driver assemblies and program timers are designated XB free issue and are not to be repaired by the servicing unit.

When an XB designated module fails, the repair facility

- requisitions a replacement from the Engineering Logistics Center (ELC) which is the Inventory Control Point (ICP) for logistics support, and
- returns the defective module in accordance with
  - – instruction received with the replacement modules, or
  - – as directed by the ELC Support Gram at CG Central.

See 5.5.5 Mandatory Turn-In (MTI) for Defective Equipment Program for information on returning defective equipment to the ELC.

Allowance Part List (APL) and Management Information for Configuration and Allowances (MICA) support is limited to the assembly, which may be replaced at the organizational level.

Note: General purpose electronic test equipment (GPETE) is required for maintenance of XB designated equipment.

3.2.4.11 SRAN Range Light Controller (RLC)

Introduction

This topic contains information on the Short Range Aids-to-Navigation (SRAN) Range Light Controller (RLC), including

- purpose of RLC
- a description of its equipment and typical location, and
- maintenance guidelines.

3.2.4.11.1 RLC Purpose

The Short Range Aids-to-Navigation (SRAN) Range Light Controller (RLC) controls the operation of high-power day/night range optics used to guide vessels entering a channel, harbor, or other navigable waterway based on the

- time of day
- visibility, and
- failure status.

Note: The RLC is remotely controlled and monitored by the Aid Control and Monitor System (ACMS).

3.2.4.11.2 RLC Description and Location

RLC equipment and its typical location are described in the table below.

Feature	Description
Equipment	GCF-W-1201 RLC-CU Range Light Controller
Physical description	• The RLC is a combination of two sets of gray boxes approximately 24 inches square. • One box at each light contains a processor used to monitor and control the operation of the range light both front and rear.
Weight	The complete system weighs about 60 pounds.
Location	RLCs are located where 24-hour control and monitoring is required, typically at Coast Guard range lights.

Continued on next page

3.2.4.11 SRAN Range Light Controller (RLC), Continued

3.2.4.11.3 RLC Maintenance

The RLC is designated XB and is not to be repaired by the servicing unit. When an XB designated module fails, the repair facility

- requisitions a replacement from the Engineering Logistics Center (ELC) which is the Inventory Control Point (ICP) for logistics support, and
- returns the defective module in accordance with
  - instruction received with the replacement modules, or
  - as directed by the ELC Support Gram at CG Central.

See 5.5.5 Mandatory Turn-In (MTI) for Defective Equipment Program for information on returning defective equipment to the ELC.

Allowance Part List (APL) and Management Information for Configuration and Allowances (MICA) support is limited to the assembly, which may be replaced at the organizational level.

Note: General purpose electronic test equipment (GPETE) is required for maintenance of XB designated equipment.

3.2.4.12 SRAN Installation Planning

Introduction

This topic contains information on Short Range Aids-to-Navigation (SRAN) installation planning, including

- a summary of the installation planning process
- how frequencies are assigned for a new SRAN installation, and
- requirements for submitting a frequency request.

3.2.4.12.1 SRAN Installation Planning Process

Maintenance and Logistics Commands (MLCs) coordinate all new or replacement Short Range Aids-to-Navigation (SRAN) electronic system installations. The SRAN installation planning process is described in the table below.

Stage	Description
	Electronic Systems Planning
1	The MLC • identifies the need for a new or replacement SRAN, and • notifies the Commandant (CG-621-2). **Note**: The Commandant (CG-62) is the primary contact when a new or replacement SRAN installation is required.
2	The Commandant (CG-62) forwards all electronic installation requests to the following, if required, for review and approval: • Headquarters program sponsor • Command and Control Engineering Center (C2CEN) • Engineering Logistics Center (ELC) • Commandant (CG-43), and • Commandant (CG-62).

Continued on next page

3.2.4.12 SRAN Installation Planning, Continued

3.2.4.12.1
SRAN Installation Planning Process (continued)

Stage	Description
Filing a Radio Frequency Request	
3	Each MLC or District Commander (e) submits a radio frequency request to the Commandant (CG-62) • at least 90 days prior to the first transmission, and • after the antenna installation planning is complete for a particular automated station. See • 3.2.4.12.2 or the frequencies assigned for use in the SRAN automation program, and • 3.2.4.12.3 for more detail on how the MLC/District Commander requests a radio frequency.
4	Commandant (CG-62) obtains clearance to use an assigned frequency at the requested location from the Interdepartmental Radio Advisory Committee (IRAC).

Continued on next page

3.2.4.12 SRAN Installation Planning, Continued

3.2.4.12.2 SRAN Frequency Assignments

Commandant (CG-62) has earmarked five frequencies for use in the SRAN automation program.

The table below identifies the five frequencies that are assigned to the Coast Guard.

Notes:
- The Commandant (CG-62) must obtain clearance from the IRAC for use at a particular location.
- Since monitor systems are designed for simplex operation, only one frequency is used with each group unless a repeater station is involved.
- If interference is expected due to more than one group using radios in the same region, then different frequencies are assigned.

Frequency	Assignment Criteria
The following four frequencies are in the 406–420 MHz Government UHF/FM band: • 407.625 MHz • 407.975 MHz • 415.625 MHz • 415.825 MHz	Allocated on an individual basis.
165.31250 MHz in the VHF/FM band	Designated for use where longer links exist. **Note**: This frequency is not currently in use by the Coast Guard.

Continued on next page

3.2.4.12 SRAN Installation Planning, Continued

3.2.4.12.3 Requests for Radio Frequency

Each MLC or District Commander (e) submits a radio frequency request to the Commandant (CG-62), which includes the following information:

- The date when operations will commence.
- For the antennae at both the transmitting and receiving sites:
  - station location (city and state)
  - antenna latitude and longitude
  - height of land at station location above mean low water (in the case of the Great Lakes, height above the lake level), and
  - height of the antenna above land.

IMPORTANT: The radio frequency request must be submitted at least 90 days prior to the first transmission.

Reference: For more detail, refer to the USCG Radio Frequency Plan, COMDTINST M2400.1 (series).

3.3 Navigation Sensors and Systems

Overview

3.3.01 Scope

This chapter describes navigation sensors and systems, including

- references to resources for more detailed information
- the purpose of each system
- a description of how the system works, and
- the system's maintenance philosophy.

Note: The information in this chapter is not intended to replace the appropriate technical manuals. The intent is to supplement existing manuals.

3.3.02 Support

The Command and Control Engineering Center (C2CEN) Navigation Sensor Branch is responsible for support and engineering for standard Coast Guard Radar and Navigation Sensor Systems, including

- Cutter primary RADAR System and secondary systems "Get Home RADAR"
- Shallow Water Depth Sounder, and
- Very High Frequency (VHF), Medium Frequency(MF)/High Frequency (HF), and Ultra High Frequency (UHF) Direction Finders.

See 3.2.2 Differential Global Positioning System (DGPS) for a description of the Global Positioning System (GPS) and the maintenance philosophy for GPS and DGPS receivers.

3.3.03 Reference

The C2CEN Intranet site at CG Central may be used to expand the information covered in this topic.

Continued on next page

Overview, Continued

3.3.04 Contents

This chapter contains the following topics.

3.3.1 Command and Control System (CCS)

Introduction

This topic contains information on the Command and Control System (CCS), including

- references to resources for more detailed information
- description of the systems that are integrated into CCS, and
- the system's maintenance philosophy.

3.3.1.1 Description of Integrated CCS Systems

The Command and Control System (CCS) provides system operators and decision-making personnel a display of the overall tactical situation by locating operator positions at key locations on the ship.

Systems Integrated into CCS	Description
Global Command and Control System–Maritime (GCCS–M) architecture	The CCS is based upon GCCS–M architecture, which is fully integrated into CCS. **Note**: Various Department of Defense (DoD) services and agencies utilize GCCS–M in their operations.
Command Display and Control Integrated Navigation System (COMDAC INS)	COMDAC INS enables all members of the team in the Combat Information Center (CIC) and the bridge to work from and see the same picture, which includes • dynamic tide and current vectors • continuously updated turn points • radar overlay for both navigation and collision avoidance, and • the fusion of Command and Control and Navigation information. **Notes**: • While available for use as a standalone system, the ship's capabilities are multiplied when COMDAC INS is used in conjunction with a DoD Command and Control system. These two capabilities exceed those of commercially available electronic navigation systems. • The COMDAC INS is designed to meet Coast Guard requirements and international, NATO, and U.S. Navy Standards.

Continued on next page

3.3.1 Command and Control System (CCS), Continued

3.3.1.2 CCS Maintenance Philosophy

The maintenance philosophy for CCS is described in the table below.

Level	Maintenance Activities
Organizational	Assigned unit personnel perform • preventive maintenance • troubleshooting and replacement of CCS's lowest repairable units (LRUs), and • system operability verification.
Intermediate	Electronic Support Detachments (ESDs) and Electronic Support Units (ESUs) have limited knowledge of the CCS and can provide only limited technical assistance. Their primary activity is to coordinate supply logistics for deployed cutters.
Depot/Inventory Control Point (ICP)	The Engineering Logistics Center (ELC) performs depot level maintenance for all repair items listed in the Allowance Parts List (APL).
Systems Management and Engineering Facility (SMEF)	The Command and Control Center (C2CEN) is the SMEF for CCS. SMEF responsibilities consist of • resolving – System Trouble Reports (STRs) – System Improvement Reports (SIRs), and – Engineering Change Proposals (ECPs) • developing field changes • overall system engineering • maintaining the installed CCS Engineering and Technical Support Mock-Up baseline systems (performed by technicians assigned to C2CEN), and • providing technical liaison to field units. **Reference**: For more information and CCS system documentation, refer to the C2CEN Intranet site at CG Central.

3.3.1.3 C2CEN SMEF Contact Information

To contact the C2CEN SMEF Desk, call (757) 686-2156.

3.3.2 Radar

Introduction

This topic contains information on radar, including

- references to resources for more detailed information
- a definition of radar, and
- descriptions of the types of radar systems used by the Coast Guard.

3.3.2.1 Radar References

The Electronics Installation and Maintenance Book (EIMB) references on radar listed below may be used to expand the information covered in this topic.

- EIMB, NAVSHIP 0967-000-0020, Radar
- EIMB, NAVSHIP 0967-000-0120, Electronic Circuits
- EIMB, NAVSHIP 0967-000-0130, Test Methods and Practices
- EIMB, NAVSHIP 0967-000-0160, General Maintenance

See 7.3.2.3 Maintaining Antennas and Transmission Lines for detail on organizational level maintenance of radar equipment.

3.3.2.2 Definition: Radar

Radar is an electronic device that

- detects and locates objects
- provides accurate target data (that is, range and bearing), and reliable information during those conditions when normal human vision fails, such as darkness, haze, fog, rain and snow, and
- displays, on a Plan Position Indicator (PPI), transmitted pulses that are reflected from a target(s).

Note: The PPI sweep is synchronized to track with the antenna so that target information is displayed
- in the direction the antenna is pointing, or
- if a true bearing input is used, relative to true north.

Continued on next page

3.3.2 Radar, Continued

3.3.2.3 Types of Radar Systems

The three different types of radar systems installed on Coast Guard cutters, boats, and shore systems are described in the table below.

Radar System	Description
Shipboard Radar	• Operate in the Very High Frequency (VHF), L-Band, and X-Band regions of the frequency spectrum. • Provide surface and/or air search capabilities. **Notes**: • Some radar installations have multiple indicators, which allow the presentation of target information at more than one place aboard the vessel. • Gyro inputs are required to indicate true bearing information.
Shore-based Radar	• Operate in the X-Band region of the frequency spectrum. • Is used for harbor surveillance in conjunction with Vessel Traffic Services (VTS). See 3.2.1 Vessel Traffic Service (VTS) System for more detail.
Radar Repeaters	Include PPIs that, in order to function, require an independent radar set to furnish the following: • trigger signals • video signals, and • azimuth synchro signals.

3.3.3 Identification Friend or Foe (IFF) Equipment

Introduction

This topic contains information on Identification Friend or Foe (IFF) equipment, including

- references to resources for more detailed information
- description and process of how IFF works
- a description of the five IFF challenge modes and examples of the operational uses of IFF modes
- IFF codes, and
- the equipment's maintenance philosophy.

3.3.3.1 IFF References

The references listed below on Identification Friend or Foe (IFF) equipment may be used to expand the information covered in this topic.

- Electronics Installation and Maintenance Book (EIMB), NAVSHIP 0967-000-0020, Radar
- EIMB, NAVSHIP 0967-000-0120, Electronic Circuits
- EIMB, NAVSHIP 0967-000-0130, Test Methods and Practices
- EIMB, NAVSHIP 0967-000-0160, General Maintenance
- NAVEDTRA 10197 Electronics Technician 3 and 2, Navy Electricity and Electronics Training Series (NEETS) Module 18, Radar Principles

Continued on next page

3.3.3 Identification Friend or Foe (IFF) Equipment, Continued

3.3.3.2 IFF Description and Process

Air Traffic Control (ATC) Radar Beacon IFF equipment is used with search radar to

- permit a friendly craft to automatically identify itself before approaching near enough to threaten the security of the other friendly craft, and
- provide other information, such as
  - type of craft
  - squadron
  - side number
  - mission, and
  - aircraft altitude.

The IFF process is described in the table below.

Note: Aviation IFF equipment includes AN/APX-72, AN/APX-100, and 621A-3.

Stage	Name	Description
1	Challenge	The IFF interrogator equipment • identifies a craft on search radar, and • challenges the craft to identify itself. See 3.3.3.3 for descriptions of IFF challenge modes.
2	Reply	The IFF transponder equipment replies automatically.
3	Recognition	When the IFF interrogator recognizes the craft as friendly, a decision is made outside the scope of this manual.

Continued on next page

3.3.3 Identification Friend or Foe (IFF) Equipment, Continued

3.3.3.3 IFF Challenge Modes

The IFF challenge modes are described in the table below.

Mode	Description	Number of Response Codes Available
1	Field Command: Determines type of aircraft or mission	32
2	Platform Identity: Identifies a specific airframe or ship	4096
3/A	AFC identity codes	4096
4	Secure identification of friendly platform	---
C	Barometric pressure altitude of aircraft in 100 foot increments. **Note**: The range for altitude measurement is from 100–125,500 feet mean sea level.	---

3.3.3.4 Operational Uses of IFF

The transponder provides the shipboard interrogator operator with special warnings, both audible and visual, upon receipt of any of the three special purpose replies described in the table below.

Purpose	Modes Used to Respond
Anti-Air Warfare	Modes 1, 2, 3/A, and 4 provide complete identification of airborne platforms.
Air Control	Modes 2, 3/A, and C provide necessary data for control of friendly aircraft.
Surface Identification	Modes 1, 2, 3/A, and 4 provide complete identification of friendly surface platforms.

3.3.3.5 IFF Codes

The IFF codes are defined in the table below.

Code	Meaning
7700	Emergency
7600	Communications Failure
Other codes	As assigned by the ATC or controlling ground/ship station

Continued on next page

3.3.3 Identification Friend or Foe (IFF) Equipment, Continued

3.3.3.6 IFF Maintenance Philosophy

The maintenance philosophy for IFF equipment is described in the table below.

Level	Maintenance Activities
Organizational	The repair facility performs • fault isolation • mainframe component replacement • module replacement, and • preventive maintenance required by the Coast Guard Planned Maintenance System (CGPMS) and Navy preventive maintenance schedules, such as – cleaning – lubrication, and – adjustments.
Intermediate	The supporting Electronics Support Unit (ESU) or a Maintenance and Logistics Command (MLC)-coordinated contractor provides intermediate level maintenance which is beyond the capability of the assigned organizational level.
Depot	The U.S. Navy repairs non-aviation depot level repairable modules.

3.3.4 Tactical Air Navigation (TACAN)

Introduction

This topic contains information on Tactical Air Navigation (TACAN), including

- references to resources for more detailed information
- a definition of TACAN and a description of how it works, and
- the equipment's maintenance philosophy.

3.3.4.1 TACAN References

The references listed below on Tactical Air Navigation (TACAN) may be used to expand the information covered in this topic.

- NAVEDTRA 10195-A, and
- Equipment Technical Manual.

3.3.4.2 Definition: TACAN

Tactical Air Navigation (TACAN) is a short-range, omni-bearing, distance-measuring navigation system that provides a continuous indication of the bearing and distance of the airplane from either a

- selected TACAN surface beacon located with a line-of-sight distance up to 390 nautical miles, or
- TACAN beacon from suitably equipped, cooperating aircraft located within a line-of-sight distance up to 200 nautical miles.

Note: Since the TACAN system operating limit is line-of-sight, the actual operating range is dependent on the airplane's altitude and terrain.

Continued on next page

3.3.4 Tactical Air Navigation (TACAN), Continued

3.3.4.3 TACAN Process

The airborne TACAN radio set and the surface beacon operate on interrogator-responder-transponder principles. The TACAN process is described in the table below.

Note: The system operates on a selected channel from the 252 TACAN channels available. The 252 channels are equally divided into 126 X channels, and 126 Y channels, with both X and Y channels spaced 1 MHz apart.

<table>
<tr><th>Stage</th><th>Description</th></tr>
<tr><td>1</td><td>The transmitter section transmits interrogation pulses in the 1,025–1,150 MHz frequency range.</td></tr>
<tr><td>2</td><td>The receiver section, operating in the 962–1213 MHz frequency range

• receives surface beacon pulses, and
• prepares the received information for display on the bearing and distance indicators.

<table>
<tr><th>The following type of information …</th><th>Is determined by measuring …</th></tr>
<tr><td>distance (range)</td><td>the elapsed time between the

• transmission of an interrogation pulse from the airborne radio set, and
• reception of a reply pulse from the surface beacon.</td></tr>
<tr><td>bearing</td><td>the phase difference between a

• reference bearing signal, and
• variable signal.

Note: Both signals are transmitted by the same surface beacon.</td></tr>
</table>
</td></tr>
</table>

Continued on next page

3.3.4 Tactical Air Navigation (TACAN), Continued

3.3.4.3
TACAN Process (continued)

Stage	Description
3	The receiver section provides a signal to the flight director computers for control of the command bars on the attitude direction indicator (ADI) during operation in the TACAN mode.
4	TACAN transmits aural signals identifying the selected surface beacon through the intercommunications system to the flight crew.

3.3.4.4
TACAN Maintenance Philosophy

The maintenance philosophy for TACAN is described in the table below.

Level	Maintenance Activities
Organizational	The repair facility performs • fault isolation • mainframe component replacement • module replacement, and • preventive maintenance required by the Coast Guard Planned Maintenance System (CGPMS) and Navy preventive maintenance schedules, such as – cleaning – lubrication, and – adjustments.
Intermediate	The applicable Maintenance and Logistics Command (MLC) and/or their subordinate units or contractors provide intermediate level maintenance that is beyond the capability of the assigned organizational level.
Depot	The U.S. Navy repairs non-aviation depot level repairable modules.

3.3.5 Depth Finders

Introduction

This topic contains information on depth finders, including

- references to resources for more detailed information
- description of how depth finders are used, and
- the equipment's maintenance philosophy.

3.3.5.1 Depth Finder References

The references listed below on Depth Finders may be used to expand the information covered in this topic.

- Equipment Technical Manuals
- Electronics Installation and Maintenance Book (EIMB):
  - EIMB NAVSEA 0967-LP-000-0040, for test equipment
  - EIMB NAVSEA 0967-LP-000-0130, for test methods and practices
- Web Sites:
  - manufacturer Web pages
  - the Command and Control Engineering Center (C2CEN) Intranet site at CG Central

3.3.5.2 Depth Finder Description

Depth Finders are installed on Coast Guard cutters and boats for navigating in both shallow and deep water. Depth Finder information is integrated with vessel plotting systems and other Command and Control systems to aid the crew in navigating the vessels.

Continued on next page

3.3.5 Depth Finders, Continued

3.3.5.3 Depth Finder Maintenance Philosophy

The maintenance philosophy for Depth Finders is described in the table below.

Level	Maintenance Activities
Organizational	Assigned vessel personnel perform preventive and corrective maintenance.
Intermediate	The applicable Maintenance and Logistics Command (MLC) and/or their subordinate units or contractors perform corrective maintenance that is beyond the capability of the assigned organizational level personnel.
Depot	The Engineering Logistics Center (ELC) performs most depot level maintenance, which consists of repairing and stocking the following items used in the Depth Finder: • modules • assemblies, and • components.
Systems Management and Engineering Facility (SMEF)	The C2CEN is the SMEF for Depth Finders and provides "last stop" technical assistance for corrective maintenance beyond the capabilities of the organizational and intermediate levels. SMEF responsibilities consist of • resolving – System Trouble Reports (STRs) – System Improvement Reports (SIRs), and – Engineering Change Proposals (ECPs) • developing field changes, and • overall system engineering.

3.3.6 Automatic Direction Finders (ADFs)

Introduction

This topic contains information on Automatic Direction Finders (ADFs) including

- references to resources for more detailed information
- description of ADFs
- ADF equipment, frequency capabilities, and features
- factors that affect ADF performance, and
- the equipment's maintenance philosophy.

Note: It is not the intent of this topic to provide full treatment of the theory of operation of ADFs. The service manual or instruction booklet for the specific equipment usually presents the theory of operation in sufficient detail.

3.3.6.1 ADF References

The references listed below on Automatic Direction Finders (ADFs) may be used to expand the information covered in this topic.

- For more information on specific direction finders, refer to NavSensors and the Equipment/System Integrated Logistics Support Plan (EILSP) on the Command and Control Engineering Center (C2CEN) Intranet site at CG Central
- NAVSHIP 0967-000-00 10, Electronics Installation and Maintenance Book (EIMB), Communications

Continued on next page

3.3.6 Automatic Direction Finders (ADFs), Continued

3.3.6.2 ADF Purpose

ADF equipment in the Coast Guard is used for

- locating persons in distress, and
- navigation.

3.3.6.3 ADF Description

An ADF installation normally consists of

- either a
  - loop or crossed loops and sense antenna, or
  - vertical array of two or four monopoles
- an antenna-to-receiver coupling unit, and
- a receiver and an indicator giving
  - relative bearing, or
  - in the case of two element vertical array antenna (Homer), a direction to turn.

Note: Antennae contain active circuitry that enables longer radio frequency (RF) cable runs and eliminates the transmission of phase sensitive information over long distances.

See 3.3.6.4 for ADF equipment capabilities.

Continued on next page

3.3.6 Automatic Direction Finders (ADFs), Continued

3.3.6.4 ADF Capabilities

Most of the ADF equipment on the Coast Guard shipboard inventory is able to take bearings throughout the 360-degree azimuth.

See 3.3.6.5 for specifications of the different types of ADFs used in Coast Guard vessels.

3.3.6.5 ADF Equipment Specifications

The table below contains specifications for the following types of ADFs that are used in Coast Guard vessels today:

- Medium Frequency (MH)/High Frequency (HF) ADF
- Very High Frequency (VHF) ADF, and
- Ultra High Frequency (UHF) ADF.

Notes:
- With ever-changing technology, it is not productive to list particular models due to the short equipment life spans.
- The number of antenna elements varies from four to as many as sixteen, depending on the application. Cost limits the amount of elements used on Coast Guard units.

Feature	MH/HF ADF	VHF ADF	UHF ADF
Frequency Coverage	200 kHz to 30.000 MHz in 100 Hz steps	1 10.000 to 179.999 MHz in 1 kHz steps	200 MHz to 4 10 MHz in 1 kHz steps
Frequency Scanning	Scanning frequency reception from preset ranges	Automatic and sequential frequency scanning	Automatic and sequential frequency scanning

Continued on next page

3.3.6 Automatic Direction Finders (ADFs), Continued

3.3.6.5
ADF Equipment Specifications (continued)

Feature	MH/HF ADF	VHF ADF	UHF ADF
Performance See 3.3.6.6 for factors that affect ADF performance	• Accuracy ≤ 15 degrees • Useful range ≤ 200 miles at 200 KHz and 50 miles at 2 MHz • Heavy atmospherics can reduce the useful range even further	Not recommended for navigation purposes	---
Typical configuration	Crossed loop	Four element doublet	Crossed dipole
Printed circuit board (PCB)	Built into base antenna PCB	Built-in base antenna switching PCB	Built into base antenna PCB
Receiver	Synthesizer double conversion super-heterodyne	Synthesizer double conversion super-heterodyne	Synthesizer double conversion super-heterodyne
Tuning	Automatic and manual	---	---
Channels	Scanning channel reception of stored channels	• Four U.S. weather channels • Aircraft distress channels, and • Class I11 Emergency Position Indicating Radiobeacon (EPIRB) or 121.500 MHz	---

Continued on next page

3.3.6 Automatic Direction Finders (ADFs), Continued

3.3.6.6 Factors that Affect ADF Performance

A number of factors can affect the performance of an ADF depending upon the frequency used and/or the antenna site. Some of the factors that affect ADF performance are described in the table below.

IMPORTANT: Antennae should be mounted at the highest point possible.

Frequency	Factors that Affect Performance
MH/HF	• Sky waves can interfere, especially during evening hours, and at times in daylight hours. • Nearby structures introduce errors in bearing by re-radiating signals and producing phase differences in the received signal. – In some cases, the direction finder indicates a bearing on this re-radiation or gives the vector sum of that bearing and the bearing of the actual emitter. This effect is most severe when the re-radiating element of the vessel or shore installation structure is near a quarter wavelength of the received signal. – Masts or other antennae may produce enough re-radiation to make taking a direction finder bearing impossible. • Taking bearings over land may produce errors due to the combination of – much higher ground wave attenuation – site errors – sky wave interference, and – atmospheric and polarization errors.
VHF	Performance is principally affected by re-radiating signals from nearby objects on ship or shore and line-of-sight considerations. To reduce bearing inaccuracies, use the following guidelines when selecting a mounting site: • use the highest and least obstructed antenna mounting site possible, and • maximize the vertical and horizontal separation of the antenna from other structures and antennae. **Note**: Increasing the aperture and the number of antenna elements may reduce susceptibility to re-radiation at a VHF frequency.

Continued on next page

3.3.6 Automatic Direction Finders (ADFs), Continued

3.3.6.6
Factors that Affect ADF Performance (continued)

Frequency	Factors that Affect Performance
UHF	High mounting points for UHF antennae are crucial due to bearing inaccuracies brought about by re-radiation of signals from other structures on ship or shore. **Note**: Increasing the aperture and the number of antenna elements may reduce susceptibility to re-radiation at a UHF frequency.

3.3.6.7 ADF Maintenance Philosophy

The maintenance philosophy for ADFs is described in the table below.

Level	Maintenance Activities
Organizational	Consult the following resources to perform maintenance and repairs: • individual equipment technical manuals, and • the Coast Guard Planned Maintenance System (CGPMS) for maintenance and alignment procedures.
Intermediate	Electronic Support Units (ESUs) and Electronic Support Detachments (ESDs) provide intermediate level support.
Depot	The Engineering Logistics Center (ELC) provides depot level support.
Systems Management and Engineering Facility (SMEF)	The Command and Control Engineering Center (C2CEN) is the SMEF for ADFs.

3.3.7 WLM/WLB Integrated Ship Control System (ISCS)

Introduction

This topic contains information on 175 foot Coastal Keeper Class Buoy Tenders (WLM)/225 foot Juniper Class Buoy Tenders (WLB) Integrated Shipboard Control System (ISCS), including

- references to resources for more detailed information
- a description of ISCS and its components, and
- the system's maintenance philosophy.

Note: The information in this topic is not intended to replace the appropriate technical manuals.

3.3.7.1 WLM/WLB ISCS References

- For more detailed information on 175 foot Coastal Keeper Class Buoy Tenders (WLM)/225 foot Juniper Class Buoy Tenders (WLB) Integrated Shipboard Control System (ISCS), refer to the Command and Control Engineering Center (C2CEN) Web site found on CG Central.

3.3.7.2 WLM/WLB ISCS Description

The WLM/WLB ISCS provides positive ship control with precise navigation and station keeping by automating methods of command, control, and monitoring of the following systems:

- steering
- navigation
- propulsion
- electric
- hydraulic, and
- auxiliary.

Note: ISCS is installed on WLM, WLB, and other Coast Guard vessels.

Continued on next page

3.3.7 WLM/WLB Integrated Ship Control System (ISCS), Continued

3.3.7.3 WLM/WLB ISCS Components

The technologies of the WLM/WLB ISCS components described in the table below enable all crews to operate and maintain the ship's propulsion and engine systems in an extremely safe manner.

See 3.3.7.4 for a diagram of the relationship between the WLM/WLB ISCS components.

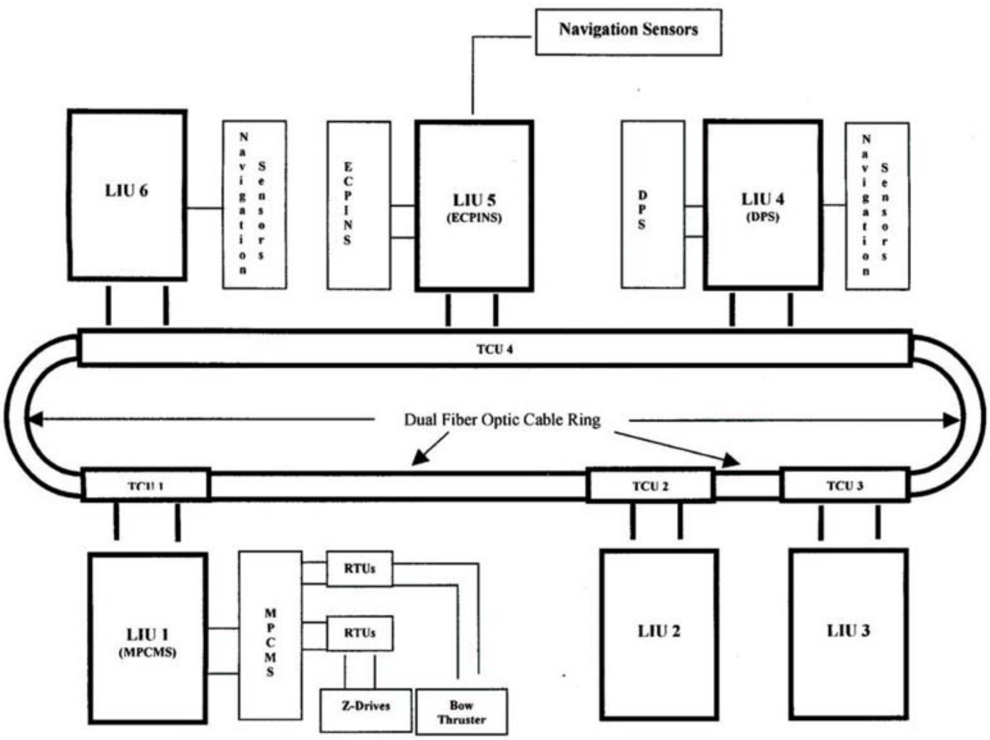
Component	Purpose
Dynamic Positioning System (DPS)	• Enables the vessel to – maintain position and heading automatically (hover over ground), and – either maintain speed and direction or follow and maintain track. • Measures deviations from set heading and reference position and compensates by using vectors and turning movements produced by thruster propulsion.
Machinery Plant Control and Monitoring System (MPCMS)	Provides remote control, monitoring, and alarm annunciation of the ship's propulsion and machinery systems.
Survivable Adaptable Fiber Optic Embedded Network (SAFENET) Local Area Network (LAN)	• Provides a distributed digital communications capability that enables data exchange among the connected systems. • Supports integration of ship control systems, including the – onboard navigational system sensors and DPS – MPCMS, and – Electronic Chart Precise Integrated Navigation System (ECPINS).
Electronic Chart Precise Integrated Navigation System (ECPINS)	ECPINS is a computerized navigational aid that displays • an electronic chart and data from navigation sensors • machinery plant information from the MPCMS (via SAFENET), and • buoy data that is derived from a buoy data base. **Note**: The electronic chart and data from navigation sensors and MPCMS data are received from SAFENET LAN.

Continued on next page

3.3.7 WLM/WLB Integrated Ship Control System (ISCS), Continued

3.3.7.4 WLM/WLB ISCS Diagram

The relationship between each of the ISCS components is shown in the diagram below.



Continued on next page

3.3.7 WLM/WLB Integrated Ship Control System (ISCS), Continued

3.3.7.5 WLM/WLB ISCS Maintenance Philosophy

The maintenance philosophy for WLM/WLB ISCS is described in the table below.

<table>
<tr><th>Level</th><th>Maintenance Activities</th></tr>
<tr><td>Organizational</td><td>Assigned vessel personnel perform preventive and corrective maintenance.</td></tr>
<tr><td>Intermediate</td><td>The applicable Maintenance and Logistics Command (MLC) and/or their subordinate units perform corrective maintenance that is beyond the capability of the assigned organizational level personnel.</td></tr>
<tr><td>Depot</td><td>The Engineering Logistics Center (ELC) performs all depot level maintenance, which consists of repairing and stocking the following items used in the WLM/WLB ISCS:

• modules
• assemblies, and
• components.</td></tr>
<tr><td>Systems Management and Engineering Facility (SMEF)</td><td>The SMEF provides “last stop” technical and engineering assistance for maintenance beyond the capabilities of the organizational and intermediate levels.

<table><tr><th>ISCS Components</th><th>Assigned SMEF</th></tr><tr><td>• ECPINS
• SAFENET LAN</td><td>C2CEN</td></tr><tr><td>• DPS
• MPCMS</td><td>ELC</td></tr></table></td></tr>
</table>

3.4 Optical Systems

Overview

3.4.01 Scope

This chapter describes administrative and technical information for standard video recording and display systems used on Coast Guard vessels and shore units.

Note: The information in this chapter is not intended to replace the appropriate technical manuals. The intent is to supplement existing manuals.

3.4.02 References

The references listed below on optical systems may be used to expand the information covered in this topic.

- Equipment/System Integrated Logistics Support Plan (EILSP)
- Technical Manuals
- C2CEN Web site

3.4.03 Contents

This chapter covers the following subjects.

3.4.1 Optical Surveillance Systems (OSS)

Introduction

This topic contains information on Optical Surveillance Systems (OSS), including

- references to resources for more detailed information
- a description of OSS and how it is used, and
- the system's maintenance philosophy.

3.4.1.1 OSS References

For more information on Optical Surveillance Systems (OSS), refer to the Command and Control Engineering Center (C2CEN) Intranet site at CG Central.

3.4.1.2 OSS Description

The OSS

- consists of a Low Light Level Television (LLLTV) and an Infrared/High Intensity searchlight mounted on a two-axis stabilized positioner that are remotely operated from the pilothouse
- is integrated with the Fire Control System and the Shipboard Command and Control System (SCCS)
- supplies video to the SCCS for display and recording purposes, and
- is used
  - for surveillance operations
  - for visual navigation, and
  - as a fire control check sight.

Continued on next page

3.4.1 Optical Surveillance Systems (OSS), Continued

3.4.1.3 OSS Maintenance Philosophy

The maintenance philosophy for OSS is described in the table below.

Level	Maintenance Activities
Organizational	Assigned vessel personnel perform preventive and corrective maintenance.
Intermediate	The applicable Maintenance and Logistics Command (MLC) and/or their subordinate units or contractors perform corrective maintenance that is beyond the capability of the assigned organizational level personnel.
Depot	The Engineering Logistics Center (ELC) performs all depot level maintenance, which consists of repairing and stocking the following items used in the OSS: • modules • assemblies, and • components.
Systems Management and Engineering Facility (SMEF)	The C2CEN is the SMEF for OSS and provides "last stop" technical assistance for corrective maintenance beyond the capabilities of the organizational and intermediate levels. SMEF responsibilities consist of • resolving – System Trouble Reports (STRs) – System Improvement Reports (SIRs), and – Engineering Change Proposals (ECPs) • developing field changes, and • overall system engineering.

3.4.2 Flight Deck Closed Circuit Television (CCTV) Systems

Introduction

This topic contains information on Flight Deck Closed Circuit Television (CCTV) systems, including

- references to resources for more detailed information
- a description of CCTV systems
- CCTV requirements for flight decks, and
- the system's maintenance philosophy.

3.4.2.1 CCTV References

The references listed in the table below may be used to expand the information on Closed Circuit Television (CCTV) systems covered in this topic.

Resource	Reference
Equipment/System Integrated Logistics Support Plan (EILSP)	• Flight Deck Pan/Tilt Equipment—0CUW5-AD-1240-24 Outdoor Unit, 0CUW5-AD-1200A Controller • Flight Deck Low Light Level Closed Circuit Television Cameras, GCF-C2-CCTV-LLL-16 (wide angle), GCF-C2-CCTV-LLL-22 (zoom) Both are available at CG Central.
Technical Manuals	• Depot Level Electronics Technical Manual for GCF-C2-CCTV-LLL-16 and 22 • AD1240 Pan/Tilt Installation and Operation Technical Manual • AD1200A Pan/Tilt Controller Installations and Operation Technical Manual
Allowance Parts List (APL)	• GCF-C2-CCTV-LLL-22: EAM 2BHM • GCF-C2-CCTV-LLL-16: EAM 2BHN • 0CUW5-AD-1240-24 Outdoor Unit: EAM Code 2BHP • 0CUW5-AD-1200A Controller: EAM Code 2 BHQ
Fleet Drawing	FL-6701-216
CCTV TM and TC Block & ISO Wiring Diagrams	• 378-FRAM-E-439-007 Rev G • 378-FRAM-W-431-007 Rev E • 901WMEC-439-001 Rev J • 905WMEC-439-001 Rev F • 618WMEC-439-002 Rev B • 627WMEC-439-001 Rev C • 482WMEC-439-001 Rev A
Command and Control Engineering Center (C2CEN) Intranet site	CG Central

Continued on next page

3.4.2 Flight Deck Closed Circuit Television (CCTV) Systems, Continued

3.4.2.2 CCTV Systems Description

CCTV systems consist of low light level television cameras and pan/tilt equipment, which provides day/night, extremely low light level imaging capability.

3.4.2.3 Flight Deck CCTV Requirements

All flight deck capable vessels are required to have a means of viewing the flight deck and Landing Signal Officer (LSO) during normal low light level conditions through a zoom camera system on a pan/tilt.

3.4.2.4 Flight Deck CCTV Systems Maintenance Philosophy

The maintenance philosophy for Flight Deck CCTV Systems is described in the table below.

Level	Maintenance Activities
Organizational	The repair facility performs the following activities: • system removal and replacement • re-test verification • cleaning and inspection • connector preservation, and • shipping.
Intermediate	Maintenance and Logistics Commands (MLCs) and Electronic Support Units (ESUs) have limited knowledge of Flight Deck CCTV systems, but may be able to coordinate supply logistics for deployed cutters.
Depot	Depot level personnel perform maintenance for all repair items listed on the Allowance Parts List (APL), which consists primarily of • replacing failed lowest repairable units (LRUs), and • repairing failed wiring.

Continued on next page

3.4.2 Flight Deck Closed Circuit Television (CCTV) Systems, Continued

3.4.2.4
Flight Deck CCTV Systems Maintenance Philosophy (continued)

Level	Maintenance Activities
Systems Management and Engineering Facility (SMEF)	C2CEN is the SMEF for Flight Deck CCTV systems and provides "last stop" technical assistance for corrective maintenance beyond the capabilities of the organizational and intermediate levels. SMEF responsibilities consist of • resolving – System Trouble Reports (STRs) – System Improvement Reports (SIRs) – Engineering Change Proposals (ECPs) • developing field changes • overall system engineering, and • being the technical liaison to field units through the C2CEN SMEF Desk.

3.4.2.5 C2CEN SMEF Desk Contact Information

C2CEN provides technical liaison to field units through the C2CEN SMEF Desk. Contact information is listed in the table below.

Support	Contact Information
Support and general SMEF Desk questions can be submitted via telephone.	(757) 686-2156
System documentation is posted on C2CEN's Intranet site.	CG Central

4.0 Safety Practices

Table of Contents

Continued on next page

Table of Contents, Continued

4.0 Safety Practices

Overview

4.0.01 Scope

This part describes the safety practices, policies, and procedures in place to protect electronics personnel in all United States Coast Guard (USCG) units.

[redacted]

When the safety practices contained in this part conflict with other publications, the information in this part takes precedence.

4.0.02 Contents

This part contains the following subjects.

4.1 General Safety Information

Overview

4.1.01
Scope

This chapter provides general safety information applicable to all personnel involved in electrical and electronics repair and maintenance, including

- safety responsibilities
- safety practices, and
- personnel protective equipment.

4.1.02
References

Additional safety information may be found in the following resources.

Resource	Location/Link
U.S. Coast Guard Organization Manual, COMDTINST M5400.7 (series), Chapter 2	CG Central
Safety and Environmental Health Manual, COMDTINST M5100.47 (series)	CG Central
Naval Engineering Manual, Electrical Safety Program, COMDTINST M9000.6 (series), Chapter 077	CG Central
Training, OSHA 29 CFR 1910.332	http://www.osha.gov/
Electronics Plant—General, Naval Ships' Technical Manual (NSTM), Chapter 300	CG Central

4.1.03
Contents

This chapter contains the following topics.

4.1.1 Safety Responsibilities

Introduction

This topic describes the safety responsibilities of

- commanding officers (COs)
- unit safety officers
- unit supervisors, and
- unit technical personnel.

4.1.1.1 Commanding Officer Safety Responsibilities

The chief responsibility of the Commanding Officer (CO) is to ensure the safety and health of all personnel under his/her command.

This responsibility includes

- issuing orders as necessary to ensure the safety and health of personnel, and
- requiring that Electronics Material Officers (EMOs), Electronics Technicians (ETs), and other personnel authorized to engage in electrical and electronics repair and maintenance, are thoroughly familiar with the safety practices contained in this chapter.

4.1.1.2 Unit Safety Officer Safety Responsibilities

The Unit Safety Officer is responsible for ensuring that all new reporting personnel receive safety and familiarization training before engaging in the operation, repair, and maintenance of electrical and electronic equipment.

Continued on next page

4.1.1 Safety Responsibilities, Continued

4.1.1.3 Unit Supervisor Safety Responsibilities

The Unit Supervisor must be thoroughly familiar with the safety practices contained in this part and is responsible for ensuring that all safety and health precautions are strictly observed in work areas.

The specific responsibilities of the Unit Supervisor are described in the table below.

Unit Supervisor Responsibility	Description
Familiarization of personnel with safety and health precautions	Ensures that unit personnel are • familiar with the location and proper use of – personal protective equipment – safety equipment and devices – equipment power switches, and – power line circuit breakers, and • trained in the current methods of first aid and cardiopulmonary resuscitation (CPR).
Observation of safety precautions	Ensures that • rubber floor matting is placed around electrical and electronic equipment, and • hazard warnings are posted.
Reporting of injuries and hazardous conditions	Ensures that injuries (even if minor) and any hazardous conditions in a work area are reported to his/her immediate supervisor. **Note**: Supervisory personnel are responsible through the chain of command to the CO.

4.1.1.4 Unit Technical Personnel Safety Responsibilities

Unit technical personnel who engage in electrical and electronics repair and maintenance work must be

- thoroughly familiar with the safety practices contained in this part, and
- constantly aware of health and safety precautions to protect themselves from injury or possible death.

Continued on next page

4.1.1 Safety Responsibilities, Continued

4.1.1.5 Responsibilities for Specific Work and Hazards

References to information on the safety responsibilities that apply to specific work and hazards are provided in the table below.

For detail on responsibilities for …	See …
safety procedures and training for personnel working aloft	4.3.1 Safety Responsibilities and Practices for Working Aloft
radio frequency (RF) radiation hazard awareness and compliance	4.9.2 Responsibilities for RF Radiation Hazard Training and Compliance

4.1.2 General Safety Practices

Introduction

This topic contains information on

- the major causes of accidents from energized electrical equipment
- the training required before working on electrical and electronic equipment
- personal protective equipment
- restrictions on personal apparel
- repair and maintenance safety rules
- wire and antenna safety
- prevention of high voltage and power line filter electrical hazards, and
- the required use of electrical equipment tag out/lock out procedures.

[redacted]

The safety practices in this topic and the corresponding Commandant Instructions are applicable to all units. When there is a conflict, however, OSHA requirements take precedence.

4.1.2.1 Major Causes of Accidents

Most of the injuries and fatalities that occur when working on, or in the vicinity of, energized electrical equipment are attributed to human failure.

Following are some of the major causes of accidents:

- failure to observe posted safety observations
- failure to *immediately* repair unsafe equipment
- use of unauthorized test equipment for repair work
- installation of unauthorized equipment modifications
- failure to test equipment after repair to ensure that it is safe to operate, and
- failure to remove unused or obsolete cabling and equipment hardware after completion of new installations or field changes.

4.1.2.2 Required Safety Training

Before working on electrical and electronic equipment, personnel must receive training in

- the hazards inherent in working with electrical and electronic equipment, and
- accident prevention, CPR, and first aid procedures.

Continued on next page

4.1.2 General Safety Practices, Continued

4.1.2.3 Personal Protective Equipment

Personal protective equipment must be available for use in work areas and is *required* for working on electrical and electronics equipment.

See 4.1.3 Personal Protective Equipment for detail on eye, face, and body protection.

4.1.2.4 Restrictions on Personal Apparel

Restrictions on the personal apparel that may be worn when working on electrical and electronic equipment are identified in the table below.

Personal Apparel	Restrictions
Clothing	Do *not* wear • loose or wet clothing, or • clothing with *exposed* metal zippers, buttons, or fasteners.
Shoes	Do *not* wear • thin-soled shoes, or • shoes with *exposed* metal parts or hobnails.
Metal jewelry, metal-framed eyewear, and other similar metal items	*When working within four feet* of exposed energized circuits, do *not* wear metal items, such as • rings • watches • bracelets • dog tags, or • metal-framed eyewear.

Continued on next page

4.1.2 General Safety Practices, Continued

4.1.2.5 General Repair and Maintenance Safety Rules

The general safety rules for all repair and maintenance jobs are described in the table below.

Safety Rule	Description
Do not work alone	A safety observer, qualified in CPR and first aid, must • be present at all times, and • have unobstructed access to the power panel circuit breakers for the equipment being repaired or maintained.
Ensure that the safety observer is provided with the necessary information and instructions	The safety observer must • know where the circuits and switches are that control the equipment, and • have instructions to disconnect the controls immediately if necessary.
Inform your supervisor, or those in authority, about the work to be done	Your supervisor, or those in authority, should be informed of the • location of the work to be done • equipment to be repaired or maintained • estimated length of time to complete the work, and • actual time you begin and complete the work.

Continued on next page

4.1.2 General Safety Practices, Continued

4.1.2.6 Wire and Antenna Safety

The rules for working with, or in the vicinity of, wires and antennae are described in the table below.

Equipment Type	Safety Rules
Wires	• Insulate all wires and lead-ins, and • ensure that screw threads, label plates, hinges (and so on) on electrical fittings are paint-free in order to maintain electrical contact and keep information readable. Do *not* • place energized bare wires in close proximity to flammable fuels and chemicals or in the path of personnel, or • use metal pike poles, pruning poles, or ladders in the vicinity of energized open wires or antennae.
Antennae	Do *not* • lean against or grasp an antenna • touch a radio or television antenna lead-in • touch an antenna lightning arrestor while in contact with electrical ground, or • pass under power lines when operating vehicular equipment if the antenna on the vehicle does not have adequate clearance.

Continued on next page

4.1.2 General Safety Practices, Continued

4.1.2.7 Working Around High Voltage Circuits or RF Voltage

All safety practices must be followed when working in the vicinity of

- high voltage circuits, or
- ship riggings and structures where radio frequency (RF) voltages may be induced.

For safety precautions specific to these operations, see

- 4.1.3 Personal Protective Equipment
- 4.5 Working with Energized Electrical Equipment , and
- 4.9 Radio Frequency (RF) Radiation Hazards.

4.1.2.8 Preventing Power Line Filter Electrical Hazards

When filtering primary power lines to reduce electromagnetic interference (EMI), provide bleeder circuitry to prevent an electrical hazard.

Unless bleeder circuitry is provided, power line filter capacitors remain charged after power is withdrawn, creating an electrical hazard.

IMPORTANT: Ensure that
- terminals are shorted *before* touching capacitors, and
- safety decals are affixed to and clearly visible on all power line filters.

4.1.2.9 Electrical Equipment Tag Out/Lock Out Procedures

The use of standard electrical equipment tag out procedures for Coast Guard cutters and boats are required to prevent improper operation of any systems or equipment that are isolated or in are in an abnormal condition because of preventative maintenance or a casualty.

Locking out equipment is the preferred safeguard to prevent inadvertent operation of control switches.

Reference: For more detail on the standard procedures and caution and danger tags, refer to Equipment Tag Out Procedures, COMDTINST 9077.1 (series), Chapter 077 found on CG CENTRAL (http://cgcentral.uscg.mil)

Note: The standard procedures may be customized for each unit.

4.1.3 Personal Protective Equipment

Introduction

This topic contains information on

- face protective shields, safety goggles, rubber insulating gloves, leather protective gloves, and protective footwear, and
- rules for inspecting and storing rubber insulating gloves.

4.1.3.1 Compliance With Unit Regulations and Electrical Safety Program

Personal protective equipment use aboard Coast Guard vessels and shore stations must comply with unit safety regulations and the Electrical Safety Program.

Reference: For details on the Electrical Safety Program, refer to the Naval Engineering Manual, COMDTINST 9000.6 (series), Chapter 077 on CG CENTRAL (http://cgcentral.uscg.mil).

4.1.3.2 Face Protective Shields

A face protective shield must be used when handling, cutting, or grinding hazardous materials.

The General Services Administration (GSA) order information for face protective shields is listed below:

- Clear plastic headgear type with crown protector
- National Stock Number (NSN): GSA 4240-00-542-2048
- Size 4, 10 inches by 18 inches

Note: Face protective shields may be ordered from a source other than GSA if the size requirements are met.

4.1.3.3 Safety Goggles

Safety goggles must be used when working with hazardous materials.

The GSA order information for safety goggles is listed below:

- Coverall type with flexible frame of molded plastic and plastic lenses
- NSN: GSA 4240-00-052-3776

Continued on next page

4.1.3 Personal Protective Equipment, Continued

4.1.3.4 Rubber Insulating Gloves

Rubber insulating gloves are

- used to protect against electric shock, and
- rated for
  - voltages less than 5,000 volts alternating current (VAC) to ground, and
  - high voltages of 7,500 and 17,000 VAC to ground.

The GSA order information for gloves rated for high voltages is listed in the table below.

Note: For both men and women, gloves rated for high voltages must be 14 inches in total length with a 4-inch gauntlet.

VAC Rating	NSN
Size 9	
7,500	8415-01-158-9449
17,000	8415-01-158-9446
Size 10	
7,500	8415-01-158-9450
17,000	8415-01-158-9447
Size 11	
7,500	8415-01-158-9451
17,000	8415-01-158-9448

4.1.3.5 Leather Protective Gloves

Leather protective gloves, or glove shells, must be used over rubber insulating gloves to protect them from damage.

The GSA order information for leather protective gloves is listed below:

- Universal size
- NSN: 9D 8415-00-264-3618

Continued on next page

4.1.3 Personal Protective Equipment, Continued

4.1.3.6 Rules for Inspecting and Storing Rubber Gloves

Rubber insulating gloves must be

- inspected before using
- discarded and replaced if any defects are found, and
- stored properly.

The rules for inspecting and storing rubber gloves are described in the table below.

Rule	Description
Inspect gloves for pinholes before using	The procedure for inspecting gloves for pinholes is to • trap air inside the glove, and • squeeze the glove to increase the air pressure and magnify any pinholes.
Inspect gloves for tears and damage before using	Visually inspect gloves for cracks, cuts, blisters, and chemical damage in accordance with American Society for Testing and Materials (ASTM) Specification D1700. **Reference**: For detail on ASTM D1700, refer to http://www.astm.org.
Store gloves properly	Store gloves in • the original box or a canvas glove bag, unfolded, with the leather protective gloves, and • a location that is – conspicuous and close to where they will be used – away from sunlight, steam pipes, radiators, and other heat sources, and – free from ozone. **Note**: Check with your Unit Safety Officer for information on ozone sources.

Continued on next page

4.1.3 Personal Protective Equipment, Continued

4.1.3.7 Protective Footwear

Electrically insulated shoes must be worn when working with electrical and electronic equipment.

When working on live electrical circuits of 30 volts or more, non-conductive shoes that meet American National Standards Institute (ANSI)-Z41 requirements must be worn.

Note: For more detail on protective footwear, refer to Personnel Protection, Protective Footwear, ANSI-Z41.

4.1.3.8 Protective Equipment for Specific Work and Hazards

References to information on the personal protective equipment used for specific work and hazards is provided in the table below.

For detail on personal protective equipment used for ...	See ...
working aloft	4.3.2 Personal Fall Arrest System
handling lead acid batteries and battery acid	4.6.1.3 Personal Protective Equipment When Handling Lead Acid Batteries
working with portable electric tools	4.5.4.1 Rules for Use of Portable Electric Tools
working with equipment that may be a chemical or explosive hazard	4.7.1.2 Personal Protective Equipment for Chemical and Explosive Hazards
responding to radioactive contamination and decontaminating the area	4.8.2.5 Radioactive Tube Cleanup Kit

4.2 Safety Equipment, Devices, and Signs

Overview

4.2.01 Scope

This chapter describes the safety equipment, devices, and signs that are used to prevent injury or death when working with electrical and electronics equipment.

All personnel engaged in electrical and electronics repair and maintenance must be thoroughly familiar with the safety equipment, devices, and signs described in this chapter.

4.2.02 References

Additional information on safety equipment, devices, and signs may be found in the following resources.

Resource	Description	Location/Link
Electronics Plant—General, Naval Ships' Technical Manual (NSTM), Chapter 300	Information on the features of, and safety precautions for, working with electrical equipment.	CG Central
Matting or Sheet, Floor Covering Insulating for High Voltage Application, MIL-DTL-15562 (series)	Specifications for rubber or plastic matting and sheet floor coverings used around electrical apparatus or circuits to prevent accidental exposure to electrical potentials not exceeding 3000 volts.	http://assist.daps.dla.mil/docimages/0001/52/84/15562G.PD1
Coatings and Color Manual, COMDTINST M10360.3 (series)	Policy and procedures for use of coatings and colors on all vessels, buildings, structures, fixed equipment, and aids to navigation.	CG Central

4.2.03 Contents

This chapter contains the following topics.

4.2.1 Safety Equipment and Devices

Introduction

This topic contains information on

- shorting probes
- antenna safety equipment, and
- the safety devices incorporated in some electrical equipment.

4.2.1.1 Safety Equipment Maintenance Requirement

The safety equipment and devices described in this topic must be maintained in a ready-to-use state at all times.

See 7.3 Maintenance Activities for detail on preventive and corrective maintenance practices for various types of equipment.

4.2.1.2 Shorting Probes

Shorting probes, rated at 25,000 volts, must be located conspicuously in all spaces where electronic equipment is installed.

The General Services Administration (GSA) order information for shorting probes is National Stock Number (NSN) 5975-01-029-4176.

4.2.1.3 Antenna Safety Equipment

Antenna safety equipment includes protection cages and fences. High voltage signs must be displayed on, or immediately next to, protection cages and fences.

See 4.2.3 High Voltage, Danger, and Warning Signs for detail on the requirements for high voltage signs.

Antenna protection cages and fences are described in the table below.

Protection Cages/Fences	Description
Protection cages for antennae and antenna lead-ins	Protection cages are grounded and placed around antennae or antenna lead-ins wherever personnel might come in contact with the electrical hazard.
Protection fences for transmitting antennae or towers	Single-gated protection fences, constructed of non-conductive material, are installed to completely enclose the immediate area around the base of transmitting antennae or towers on shore.

Continued on next page

4.2.1 Safety Equipment and Devices, Continued

4.2.1.4 Electrical Equipment Safety Devices

Various safety devices (such as interlock switches) are incorporated in some electrical equipment. These devices automatically interrupt the power source to the equipment when the access door, cover, or plate is removed.

Safety devices must be inspected and tested periodically to ensure that they are functioning properly.

Reference: For more detail on safety devices, refer to Electronics Plant—General, Naval Ships' Technical Manual (NSTM), Chapter 300 found on CG CENTRAL (http://cgcentral.uscg.mil).

4.2.1.5 Rules for Modifying/ Disconnecting Safety Devices

The rules for modifying or disconnecting safety devices are described in the table below.

Safety Device	Rule
Interlock switches, overload relays, and fuses	These safety devices must not be modified or defeated except when replacement is required. Approved procedures must be followed to replace safety devices.
Safeguard circuits	Safeguard circuits must not be modified except when specific authorization to do so has been given.

4.2.2 Rubber Floor Matting

Introduction

This topic contains information on the

- approval and compliance requirements for rubber floor matting
- requirements for installing matting
- protection and testing of matting, and
- General Services Administration (GSA) order information.

The rubber matting described in this topic is designed to protect personnel from accidental exposure to electric potentials not exceeding 3,000 volts.

For equipment operating at higher voltages, other built-in safety measures must be used to protect personnel.

See 4.5 Working with Energized Electrical Equipment for additional safety practices.

4.2.2.1 Rubber Floor Matting Approval and Compliance Requirements

Rubber floor matting must be approved and in compliance with the specifications contained in Matting or Sheet, Floor Covering Insulating for High Voltage Application, MIL-DTL-15562 (series). For more detail, refer to http://assist.daps.dla.mil/docimages/0001/52/84/15562G.PD1.

The Commandant, Office of Naval Engineering (CG-45) approves the type of rubber floor matting used by the Coast Guard.

Note: Currently, two types of matting for covering an entire space have been approved for use. See 4.2.2.5 for information on ordering rubber floor matting.

4.2.2.2 Rubber Floor Matting Installation Requirements

Rubber floor matting must be installed in open spaces around electrical and electronic equipment aboard ships and at shore facilities.

The seams between the matting must be sealed according to manufacturer instructions. At a minimum, four-inch wide 3M electrical insulating tape should be used for sealing the seams.

Continued on next page

4.2.2 Rubber Floor Matting, Continued

4.2.2.3 Protection of Rubber Floor Matting

The insulating properties of rubber floor matting must be protected from damage.

IMPORTANT: Matting with cracks, tears, or any type of deterioration must be replaced.

The methods for protecting rubber floor matting are described in the table below.

Protect matting …	By …
in high traffic areas (such as areas in front of workbenches and switchboards or panels)	covering the high traffic areas with runner strips of matting of the same type as the permanently installed matting.
on a routine basis	• removing materials such as moisture, dust, and metal chips from the matting immediately, and • ensuring that materials such as rugs or waxes are not placed or used on rubber matting.

4.2.2.4 Testing of Rubber Floor Matting

When testing of rubber floor matting is necessary, it must be done in accordance with the American Society for Testing and Materials (ASTM) D178 requirements or manufacturer instructions.

Note: ASTM D178 testing requirements are available for a fee at http://www.astm.org/cgi-bin/SoftCart.exe/DATABASE.CART/REDLINE_PAGES/D178.htm?L+mystore+pjda2445.

Continued on next page

4.2.2 Rubber Floor Matting, Continued

4.2.2.5 Order Information

General Services Administration (GSA) order information for rubber floor matting is listed in the table below.

Color	Unit of Issue	NSN
• Blue • Marbelized Blue	Roll, 3 feet by 75 feet	9Q 7220-00-267-4630
• Green • Marbelized Green	Roll, 3 feet by 75 feet	9Q 7220-00-913-8751
Black	Roll, 2 feet by 75 feet	9Q 7220-00-255-0765

4.2.3 High Voltage, Danger, and Warning Signs

Introduction

This topic contains information on

- high voltage warning and danger signs
- labels used on equipment with multiple power sources
- danger signs used when personnel are working aloft
- warning signs used for explosive hazards, and
- safety tags used on equipment when personnel are working on circuits.

4.2.3.1 High Voltage Signs

High voltage warning and danger signs (such as the one illustrated below) must be posted, where appropriate, aboard ships and at shore facilities.

Appropriate lettering and color markings must be used on high voltage signs used with electrical and electronic equipment.

Reference: For detail on the lettering and color marking requirements for high voltage signs, refer to the Coatings and Color Manual, COMDTINST M10360.3 (series) on CG CENTRAL (http://cgcentral.uscg.mil).

General Services Administration (GSA) order information for high voltage warning and danger signs is listed below.

Size	Colors	Material	NSN
10 inches by 14 inches	Black/white/red	Fiberglass for inside/outside use	9905-01-050-7960
10 inches by 14 inches	Black/white/red	Steel with baked enamel finish for inside/outside use	9905-00-971-7168

Continued on next page

4.2.3 High Voltage, Danger, and Warning Signs, Continued

4.2.3.2 Labeling Requirement for Equipment With Multiple Power Sources

A labeling plate must be affixed to equipment with more than one power source (that is, 12 volts or more).

The labeling plate must indicate that the equipment has multiple power sources and be affixed to the equipment in a conspicuous place.

Reference: For more detail on labeling equipment with multiple power sources, refer to Electronics Plant—General, Naval Ships' Technical Manual (NSTM), Chapter 300 on CG CENTRAL (http://cgcentral.uscg.mil).

4.2.3.3 Safety Tag Required When Working on Circuits

A 7 ½ inch by 4 inch cardboard safety tag, with an attached cord, must be attached to equipment when personnel are working on circuits.

An example of the required wording for safety tags is shown below.

"Do Not Throw Switch, Men at Work on Circuits"

4.2.3.4 Danger Sign Required When Working Aloft

The danger sign for working aloft must be posted whenever personnel are servicing equipment on masts or towers.

The size and material requirements for this sign are listed below:

- Size: 10 inches by 18 ½ inches
- Material: Steel with a baked enamel finish

An example of the requiring wording for the danger sign for working aloft is shown below.

[redacted]

Personnel are cautioned to guard against poisonous effects of smoke pipe gases while servicing equipment aloft. When servicing equipment in the way of smoke pipe gases use oxygen breathing apparatus and a chest telephone or throat microphone set for communication with others in working party. Obtain necessary equipment before going aloft.

See 4.3 Working Aloft for additional safety precautions that must be followed when working aloft.

Continued on next page

4.2.3 High Voltage, Danger, and Warning Signs, Continued

4.2.3.5 Warning Sign for Explosive Hazards

A warning sign must be posted in all spaces where explosive vapors (such as fuel vapor, paint fumes, cleaning primers, and battery gases) may accumulate.

This sign can be ordered from the Naval Supply Depot in Philadelphia. When ordering

- use military standard requisitioning and issue procedures (MILSTRIP), and
- specify Navy Ship (NAVSHIP) Drawing Number RE 10A 589.

An example of the required wording for the warning sign for explosive hazards is shown below.

[redacted]

Do not energize electronic equipment until ventilation blowers have been operating a minimum of five minutes to expel explosive vapors.

4.2.3.6 Radiation Hazard Signs

See 4.9 Radio Frequency (RF) Radiation Hazards for detail on the various warning signs used for radiation hazards.

4.3 Working Aloft

Overview

4.3.01 Scope

This chapter describes the

- responsibilities, safety practices, personal protection equipment, and safety devices that are specific to working aloft, and
- rules for ascending, descending, and working aloft a mast or tower.

4.3.02 References

Additional information on working aloft may be found in the following resources.

Resource	Description	Location/Link
Shipboard Regulations Manual, COMDTINST M5000.7 (series)	A “one stop” reference and guidance manual that includes standard regulations.	CG Central
Tower Manual, COMDTINST M11000.4 (series)	• Policy and criteria for the preservation of towers, and • minimum standards for organizing and managing comprehensive inspection and maintenance of towers.	CG Central

4.3.03 Contents

This chapter contains the following topics.

4.3.1 Safety Responsibilities and Practices for Working Aloft

Introduction

This topic contains information on

- the hazards of working aloft
- who is responsible for safety procedures and training
- requirements for complying with applicable guidelines and obtaining permission to work aloft
- safety practices followed when personnel are working aloft, and
- permission and notification that must be obtained prior to going aloft.

4.3.1.1 Hazards of Working Aloft

Personnel working aloft must be aware of the hazards, which include

- falling
- exposure to excessive electromagnetic radiation (EMR), and
- radio frequency (RF) burns.

Reference: For more detail on the hazards of working aloft, refer to the Naval Ships' Technical Manual (NSTM), Chapter 400, 3.5.1.

4.3.1.2 Safety Responsibilities for Working Aloft

The responsibilities for safety procedures and training are described in the table below.

Who is Responsible	Description
Electronics Material Officer (EMO) or Senior Technician	Ensures that a Working Aloft Program and Bill are established at all underway units. **Exception**: Shore units should refer to the Tower Manual, COMDTINST M11000.4 (series) for working aloft safety procedures on CG Central
EMO	• Maintains the Working Aloft Bill, and • provides annual training to all personnel in underway units involved in working aloft.

Continued on next page

4.3.1 Safety Responsibilities and Practices for Working Aloft, Continued

4.3.1.3 Compliance With Guidelines for Working Aloft

Personnel are required to comply with the applicable guidelines in order to work aloft.

Responsibilities for compliance with guidelines for working aloft are described in the table below.

Who is Responsible	Description
Underway units	Must comply with the guidelines in • this chapter, and • the unit's Organization and Regulations Manual.
• Shore units, and • personnel involved in working on energized towers, including Loran towers	Must comply with guidelines in the Tower Manual, COMDTINST M11000.4 (series)

4.3.1.4 Permission and Notification Requirements for Working Aloft

Permission to work aloft is *required* and must be obtained from the Officer of the Deck (OOD).

After permission is given to work aloft, the OOD notifies the applicable personnel so that safety practices will be followed.

Note: The common practice is to notify personnel by sending a "man aloft chit" signed by the OOD and supervisory personnel.

The personnel notified and the safety practices followed are described in the table below.

Personnel to Notify	Purpose
Radio and radar operators	Rotation and radiation must be suspended while personnel are working aloft.
Engineering watch	Stack gas must be minimized while personnel are working aloft.

Continued on next page

4.3.1 Safety Responsibilities and Practices for Working Aloft, Continued

4.3.1.4 Permission and Notification Requirements for Working Aloft (continued)

Personnel to Notify	Purpose
All personnel on deck	Personnel must avoid deck areas under which personnel are working aloft and remain alert for falling objects, such as tools.
Other units in the vicinity	Radiation must be suspended and stack gas minimized while personnel are working aloft.
Commanding Officer (CO)	The CO must be notified of any unsafe conditions or safety violations.

4.3.2 Personal Fall Arrest System

Introduction

This topic contains information on the

- requirements for using a personal fall arrest system, and
- components of a personal fall arrest system with a brief description of each component.

4.3.2.1 Requirements for Using a Personal Fall Arrest System

Personnel must

- use the personal fall arrest system approved for use by the Coast Guard whenever they work aloft, and
- be familiar with the proper use of each component of the system.

Reference: For details on the proper use of a personal fall arrest system, refer to the Tower Manual, COMDTINST M11000.4 (series) on CG CENTRAL (http://cgcentral.uscg.mil).

4.3.2.2 Components of a Personal Fall Arrest System

A personal fall arrest system consists of the following components:

- full body harness, which includes a parachute harness, safety harness, and safety line
- deceleration lanyard, and
- safety climbing device.

Continued on next page

4.3.2 Personal Fall Arrest System, Continued

4.3.2.3 Full Body Harness

The full body harness is

- worn as a vest
- constructed *only* of materials that meet American National Standards Institute (ANSI) Z359.1-199 requirements with
  - the strength components made of synthetic fibers, and
  - a D-ring located at the center of the back near the shoulder level
- sized for each individual, and
- rated for all fall arrests.

Notes:
- A deceleration lanyard must be attached to the safety harness (see 4.3.2.4 for lanyard specifications).
- ANSI Z359.1-199 requirements for the full body harness are available for a fee at http://www.ansi.org.

The order information for the full body harness is listed in the table below.

Full Body Harness	National Stock Number (NSN)
Parachute harness	9G 4240-01-421-0859
Safety harness	9G 4240-00-022-2518
Safety line	9G 4240-00-022-2521

4.3.2.4 Deceleration Lanyards

A deceleration lanyard is a shock absorbing fall restraint device that attaches to the body harness.

Deceleration lanyards must

- meet ANSI Z359.1-1992 and A10.14.1991 requirements
- be no more than six feet in total length to limit free falls to six feet, and
- be attached to the mast or tower point closest to the wearer's body.

Note: The ropes, straps, and webbings of lanyards must be made from synthetic fibers.

Continued on next page

4.3.2 Personal Fall Arrest System, Continued

4.3.2.5 Safety Climbing Devices

Safety climbing devices are installed on permanently mounted topside ladders, masts, kingposts, and other similar topside structures to provide access to hazardous locations where a safety harness is expected to be worn.

4.3.3 Ascending and Descending a Mast or Tower

Introduction

This topic contains the rules for

- inspecting your fall arrest system before ascending a mast or tower, and
- ascending, descending, and working aloft a mast.

4.3.3.1 Inspecting Your Fall Arrest System Prior to Ascending

Before you ascend a mast or tower, ensure that your full body harness is in good condition by inspecting the

- webbing
- buckles
- D-ring
- tail line, and
- snap hook.

4.3.3.2 Rules for Ascending, Descending, and Working Aloft a Mast

The rules for ascending, descending, and working aloft a ship's mast are described in the table below.

When you …	You must …
• ascend • move through the mast rigging and structure, and • descend	keep your harness snap hook progressively clamped to a firm safe closed-loop hold. **Note**: Safe holds include closed-loop mast ladder rungs and pipe railings.
ascend and descend	keep the following three points of contact with the mast at all times: • one hand • one foot, and • the personal fall arrest system.
perform your work in the work area	keep your snap hook clamped to a firm safe closed-loop hold.

4.4 Working in Confined Spaces and Cold Weather

Overview

4.4.01 Scope

This chapter describes the safety practices for working in confined spaces and cold weather.

4.4.02 References

Additional information on working in confined spaces and cold weather may be found in the following resources.

Resource	Description	Location/Link
Shore Confined Space Entry, COMDTINST M5100.48 (series)	Policy and procedures for administration of the Coast Guard Confined Space Entry Program.	CG Central
Permit Required Confined Space, OSHA 29 CFR 1910.146	Requirements for practices and procedures to protect personnel in general industry from the hazards of entry into permit-required confined spaces.	http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9797

4.4.03 Contents

This chapter contains the following topics.

4.4.1 Working in Confined Spaces

Introduction

This topic contains information on the safety practices for working in confined spaces.

4.4.1.1 Description: Confined Space

A confined space is defined as any space having one of the following characteristics:

- limited opening for entry and exit
- unfavorable natural ventilation, or
- unfavorable design for continuous occupancy of workers.

Example: Underground communications maintenance holes and crawl spaces under buildings are considered confined spaces.

4.4.1.2 Establishment of Unit Confined Space Policy

The establishment of a confined space policy, in accordance with the Shore Confined Space Entry, COMDTINST 5100.48 (series), is required for each unit involved in working in confined spaces.

Reference: For more detail, refer to COMDTINST 5100.48 (series).

Continued on next page

4.4.1 Working in Confined Spaces, Continued

4.4.1.3 Responsibilities for Work in Confined Spaces

The responsibilities associated with work in confined spaces are described in the table below.

Who is Responsible	Description
• Maintenance and Logistics Commands (MLCs), and • the cognizant Integrated Support Commands (ISCs)	• Maintains the unit confined space policy, and • provides training for entering and working in confined spaces. **Note**: For training sources, contact the appropriate MLC(k).
Entry and supervisory personnel	• Complies with – the unit confined space policy, and – Occupational Safety and Health Administration (OSHA) 29 CFR 1910.146 requirements, and • receives training before entering and working in confined spaces.
Unit Commanding Officer (CO) or designee	Ensures that training certificates documenting the training received by personnel are completed and available for inspection. **Note**: The following information must be documented on training certificates: • employee's name • dates of training, and • signatures or initials of trainers.

4.4.2 Working in Cold Weather

Introduction

This topic contains information on the safety practices for working in cold weather.

4.4.2.1 Dressing Safely for Cold Weather

Guidelines for dressing safely for cold weather are described in the table below.

Guidelines	Rationale
Wear several layers of thin clothing	To avoid becoming overheated, you can remove a layer of clothing when your body heat rises.
Avoid becoming overheated	Perspiration from overheating causes your • body to cool as it evaporates, and • clothing to become damp resulting in poor insulation. **Note**: It is better to be slightly chilly than to perspire heavily.
Wear loose clothing and footwear	Tight clothing and footwear can restrict blood circulation putting you at risk for frostbite and trench foot.
Wear water-repellent outer clothing	In the event of rain or snow, your inner clothing will remain dry.

4.4.2.2 Protecting Your Eyes in Cold Weather

Wear sunglasses or goggles with tinted lenses to protect your eyes from eyestrain and snow blindness.

Continued on next page

4.4.2 Working in Cold Weather, Continued

4.4.2.3 Preventing Frostbite

An individual is often unaware that their skin is frostbitten. To prevent frostbite, work in pairs and check each other for symptoms of frostbite.

The symptoms of frostbite are skin that is

- blueish in color, and
- numb but not painful.

IMPORTANT: To prevent tissue damage, do not rub or manipulate skin when frostbite is suspected.

4.4.2.4 Working on Exposed Equipment in Cold Weather

When working on exposed equipment in cold weather

- use windshields and screens
- wear gloves to handle very cold metal objects (skin will instantly freeze to very cold metal even if the metal is dry), and
- take frequent breaks with hot drinks and food to maintain your efficiency.

4.4.2.5 Working With Volatile Liquids in Cold Weather

Be careful not to spill or splash volatile liquids (such as gasoline) on your skin. Skin will freeze in seconds after contact with a volatile liquid.

4.5 Working With Energized Electrical Equipment

Overview

4.5.01 Scope

This chapter describes the

- safety practices and training responsibilities specific to working with energized electrical equipment
- policies and procedures that pertain to
  – energized circuits
  – electronic workbenches
  – portable electric and hand tools, and
  – commercial AC/DC equipment, and
- procedures for the rescue and resuscitation of electric shock victims.

4.5.02 References

Additional information on working with energized electrical equipment may be found in the following resources.

Resource	Description	Location/Link
Safety Precautions for Shore Activities, Electricity and Electronics General, Chapter 15, NAVELEX 0967-LP-624-6010 NAVSO P-2455	---	---
Electric Shock–Its Causes and Its Prevention, NAVSHIP 250-660-42	---	---
Electric Shock and Its Prevention, NAVSHIP 250-660-45	---	---
Electronics Plant—General, Section II, Electrical Safety Precautions, Naval Ships' Technical Manual (NSTM), Chapter 300	Information on the features of, and safety precautions for, working with electrical equipment.	CG Central

Continued on next page

Overview, Continued

4.5.02
References (continued)

Resource	Description	Location/Link
Electronics Installation and Maintenance Book (EIMB), Section III, Safety, NAVSHIP 0967-000-100	A 13-volume series of books containing safety information, maintenance policies, installation standards and practices, and basic electronic equipment and materials handling procedures.	CG Central

4.5.03
Contents

This chapter contains the following topics.

4.5.1 Energized Equipment Safety Practices and Training

Introduction

This topic contains information on the

- general safety practices that apply to all personnel who work with energized electrical equipment, and
- responsibilities for ensuring that personnel are trained in resuscitation techniques.

4.5.1.1 General Safety Practices When Working with Energized Electrical Equipment

When working with energized electrical equipment, do not

- work with wet hands or clothing
- stand on a wet floor or deck, or
- smoke in the work area.

4.5.1.2 CPR Training Requirement

The Electronics Material Officer (EMO), senior technician, or supervisor is responsible for ensuring that all personnel who work with energized electrical equipment receive cardiopulmonary resuscitation (CPR) training.

Personnel are required to

- demonstrate proficiency in mouth-to-mouth resuscitation, closed chest cardiac massage, and alternate methods of resuscitation, and
- participate in periodic training.

Descriptions of CPR techniques must be posted in all work areas.

4.5.2 Working on Energized Circuits

Introduction

This topic contains the

- procedure for closing electrical power and lighting circuits before working on the circuits
- safety precautions to follow when working
  - with fuses or other types of wiring equipment, and
  - on capacitors
- safety practices for working on energized circuits rated at 30 to 300 volts
- procedure for measuring voltages of 300 volts or more prior to work, and
- safety practices for working on damaged electrical equipment or circuits.

4.5.2.1 Safety Precautions When Working on Electrical Power and Lighting Circuits

Before working on electrical power and lighting circuits, switches and circuit breakers designed as a means of disconnection must be used to close the circuits.

The procedure for closing electrical power and lighting circuits is described in the table below.

Step	Action
1	Before you begin, notify all personnel in the immediate area of the circuit.
2	Install the appropriate fuses to protect the circuit from damage.
3	Ensure that the circuit is ready and all parts are free from contact with personnel.
4	Place one hand behind you away from the circuit.
5	• Use the *other* hand to touch the switch or circuit breaker, and • turn your face away while closing the circuit to prevent an eye injury from flashover. **IMPORTANT**: Touch only one switch or circuit breaker at a time.

Continued on next page

4.5.2 Working on Energized Circuits, Continued

4.5.2.2 Safety Precautions When Working With Fuses or Wiring Equipment

The cover of a fuse box or other type of wiring equipment must be securely *closed* unless you are working with the fuse or equipment.

When working with fuses or other types of wiring equipment

- always use appropriate fuses
- never bridge a fuse, and
- never replace a fuse with one of higher amperage rating without the proper authority.

4.5.2.3 Safety Precautions When Working on Capacitors

Before working on a capacitor, you must

- short circuit (short) or ground the terminals of the capacitor, and
- ensure that no residual charge remains in the capacitor.

The procedure for shorting the terminals of a capacitor are described in the table below.

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Use the information in the table below to determine the appropriate first step.

IMPORTANT: Use caution when performing this procedure.

<table>
<tr><th>If the capacitor is …</th><th>Then …</th></tr>
<tr><td>connected to a de-energized circuit</td><td>• turn the power off, and
• use a shorting probe to short the terminal and the case to ground.

Note: A large capacitor usually has a shorting wire across the terminal.</td></tr>
<tr><td>entirely disconnected (including one from a spare)</td><td>use a suitable insulated lead to short the terminal.

Note: Capacitors in storage may accumulate a static charge.</td></tr>
</table>
</td></tr>
</table>

Continued on next page

4.5.2 Working on Energized Circuits, Continued

4.5.2.3
Safety Precautions When Working on Capacitors (continued)

Step	Action
2	Ensure that no residual charge remains in the capacitor after the terminals have been shorted by • holding a shorting bar on the terminals for 30 seconds or more, and • using a voltmeter to test for residual voltage.

A residual charge may remain in a capacitor after the power is turned off. Momentarily grounding or shorting the terminals of the capacitor does not always provide sufficient protection.

Although a capacitor will discharge immediately after the terminals are shorted, a residual charge can develop in a short time and cause injury when the leads are connected for testing.

4.5.2.4 Safety Practices for Working on Circuits Rated at 30 to 300 Volts

The safety practices for working on energized circuits rated at 30 to 300 volts are described in the table below.

Safety Practice	Description
Circuits must be de-energized before work is performed.	Energized circuits must be completely de-energized before repair or test work is performed. **Note**: Work on energized circuits is performed *only* when absolutely necessary.
The work area must meet safety requirements.	The work area must be well-lighted with insulated rubber matting installed around the equipment. See 4.2.2 Rubber Floor Matting for details.

Continued on next page

4.5.2 Working on Energized Circuits, Continued

4.5.2.4 Safety Practices for Working on Circuits Rated at 30 to 300 Volts (continued)

Safety Practice	Description
Gloves and insulated hand tools are required.	When working on energized circuits, you must use • rubber insulating gloves, and • insulated hand tools.
Personal safety precautions must be followed.	• Use *one* hand only whenever possible, and • always maintain a position that allows free exit when you test or adjust equipment. **Examples**: You may not be able to exit quickly if you are wedged between a piece of equipment and a steel bulkhead or if your arms and shoulders are inside the access door.
Only qualified technicians may perform tests.	All testing work must be supervised and performed by qualified technicians who • are fully aware of the dangers involved, and • follow all safety procedures. **Note**: The use of external test equipment is often required during the repair of electrical equipment.

Reference: For details on additional safety practices, refer to Energized Circuit Working Procedures, Naval Ships' Technical Manual (NSTM), Chapter 300, Section 2.5.2.

Continued on next page

4.5.2 Working on Energized Circuits, Continued

4.5.2.5 Measuring Voltages of 300 Volts or More Prior to Work

Before working on energized circuits rated at more than 300 volts, tests to measure the voltages must be performed.

The procedure for measuring voltages in excess of 300 volts is described in the table below.

Step	Action
1	De-energize the equipment to be tested.
2	• Attach the appropriate warning signs to the equipment, and • lock out the equipment. See • 4.2.3 High Voltage, Danger, and Warning Signs for detail on high voltage signs and safety tags for working on circuits, and • 4.1.2.9 Electrical Equipment Tag Out/Lock Out Procedures or detail on locking out equipment.
3	Use an approved safety shorting probe to discharge the high voltage capacitors. See 4.2.1.2 Shorting Probes for more detail.
4	Attach the test leads for measurement.
5	Ensure that the controls of the measurement device are properly configured for the voltage level and polarity being measured.
6	Stand clear of the equipment but in a position that allows you to read the measurement device.
7	• Energize the equipment, and • take the measurement.
8	• De-energize the equipment, and • discharge the high-voltage capacitors.
9	Remove the test leads.
10	Repeat Steps 1–9 for each measurement that is applicable.

Continued on next page

4.5.2 Working on Energized Circuits, Continued

4.5.2.6 Precautions for Working on Damaged Electrical Equipment or Circuits

A *maximum* degree of alertness and care is required when working on damaged electrical equipment or circuits. The equipment or circuits may be internally deranged and create a safety hazard.

Observe all

- safety precautions for working on electrical equipment, and
- maintenance precautions for working on energized equipment until it is verified that all portions of the circuit are deenergized.

Note: Equipment or circuits that are not operating properly—but have not had a casualty—are most likely not internally deranged and not considered to be damaged.

4.5.3 Safety Standards for Electronic Workbenches

Introduction

This topic contains information on the

- requirements for
  - compliance with electronic workbench standards, and
  - a means of disconnection for all workbenches, and
- responsibility for determining the appropriate workbench installation in specific situations.

4.5.3.1 Compliance With Electronic Workbench Standards

All electronic workbenches must comply with, or exceed, the standards contained in Chapter 300-H of the Electronic Plant-General, Section II, Electrical Safety Precautions, Naval Ships' Technical Manual (NSTM).

The type of materials that comply with workbench standards are listed in Table 300-H-1 in Chapter 300-H the Electronic Plant-General, Section II, Electrical Safety Precautions, NSTM.

Reference: For electronic workbench standards, refer to Chapter 300-H of the NSTM.

Existing workbenches must either be modified to comply with the standards or replaced.

4.5.3.2 Required Means of Workbench Disconnection

A means of disconnection that is easily accessible from each workbench and piece of electronic equipment is required.

If power panels or circuit breakers are not located in the same room and easily accessible from the workbench, power kill switches or disconnects must be installed.

Power kill switches or disconnects must be

- located at, or easily accessible from, each workbench, and
- marked conspicuously.

4.5.3.3 Responsibility for Workbench Installations

The Unit Safety Officer and Shop Supervisor are responsible for jointly determining the most practical and safe workbench installation in specific situations.

4.5.4 Safe Handling of Portable Electric and Hand Tools

Introduction

This topic contains

- rules for using portable electric tools
- the procedure for maintaining portable electric tools
- rules for using portable electric drills and hand tools, and
- information on maintaining and replacing hand tools.

4.5.4.1 Rules for Use of Portable Electric Tools

Portable electric tools must be used properly to prevent serious injury or death.

The rules for the proper use of portable electric tools are described in the table below.

Rule	Description
Properly ground portable electric tools before use.	Before using portable electric tools, they must be properly grounded to prevent electric shock.
Use personal protective equipment when working with portable electric tools.	You must use • rubber insulated gloves when using tools in hazardous conditions • leather protective gloves over the rubber gloves when work involves chipping or grinding • safety goggles when necessary to protect your eyes from particles, and • hearing protection when necessary.
Do not use spliced cables or tools that are damaged.	To not use • spliced cables, or • tools with a frayed cord or damaged plug.

Continued on next page

4.5.4 Safe Handling of Portable Electric and Hand Tools,
Continued

4.5.4.2 Maintaining Portable Electric Tools

Portable electric tools must be maintained quarterly to prevent serious injury and death.

The procedure for maintaining electric tools is described in the table below.

Step	Action
1	Remove dirt and chips to keep the ventilating holes of the tool clear for proper cooling.
2	Remove old or hardened grease with an approved solvent.
3	Lubricate the tool with the appropriate lubricant.
4	Smooth the commutators with fine sandpaper. **Note**: *Never* use a metallic dust abrasive or emery cloth to smooth the commutators.
5	Replace any worn or defective components (such as the brushes, brush holders, springs, on-off switch, or power cord).
6	When necessary, inspect and repair the entire motor section of the tool. **Note**: This action must be performed under the supervision of the Electrical Department.

IMPORTANT: After any repair work, trained personnel must test portable electric tools to ensure their safe electrical and mechanical operation.

Continued on next page

4.5.4 Safe Handling of Portable Electric and Hand Tools, Continued

4.5.4.3 Rules for Use of Portable Electric Drills

The rules for safely operating portable electric drills are described in the table below.

Rule	Description
Ensure that personnel, unless assisting, move away from the partition where an electric drill is being used.	Only personnel assisting with the work are allowed near the partition. Assisting personnel must follow all safety procedures and be fully aware of the dangers.
• Securely clamp the work to be drilled, and • mark the point to be drilled.	• Clamp the work to be drilled securely in a vise or some other suitable device, and • use an appropriate center punch to mark the point to be drilled.
Follow all safety precautions when using the portable electric drill.	• Always check for hidden wires and other obstructions *before* you drill through partitioning • hold the drill perpendicular to the work as much as possible • avoid undue pressure on the drill • keep your hands away from rotating drill bits, and • never drill a part while holding it.

4.5.4.4 Rules for Use of Hand Tools

The rules for using hand tools are described in the table below.

When using …	Then …
pliers on electrical or electronic equipment	insulate the plier handles with sleeving.
a file	hold the file by the handle.
tools in areas where sparking must be avoided	use *only* non-sparking tools.

Continued on next page

4.5.4 Safe Handling of Portable Electric and Hand Tools,
Continued

4.5.4.5 Maintaining and Replacing Hand Tools

Hand tools must be properly maintained to prevent accidents resulting from the use of defective tools.

Defective hand tools that cannot be repaired or sharpened must not be used. These tools must be properly discarded and new tools requisitioned.

4.5.5 Shipboard Electrical Systems

Introduction

This topic contains the

- safety rules for tools and equipment used on ships, and
- procedure for grounding AC/DC equipment to prevent electric shock.

4.5.5.1 Safety Rules for Tools and Equipment Used on Ships

Electrical systems on all ships are ungrounded. Both conductors of an ungrounded system are ungrounded (hot). If a fault occurs, the system continues to provide a limited amount of power if one phase is faulted to ground.

Note: Electrical systems on shore units are grounded, characterized by one hot and one grounded (neutral) conductor in a single phase system.
A fault in a grounded system results in a high current and breaker trip.

The safety rules for tools and equipment used on ships are described in the table below.

Safety Rule	Description
Avoid using commercial AC/DC equipment	Commercial AC/DC equipment is a *deadly shock hazard*, especially aboard ships where • the AC power lines are electrically above the ship's ground, and • 115 VAC may exist between the receiver chassis and ground. If the presence of commercial AC/DC equipment cannot be avoided, safety precautions must be followed by • installing an isolation transformer (if one is not already installed), and • grounding the equipment chassis. See 4.5.5.2 for the proper AC/DC equipment grounding procedure.

Continued on next page

4.5.5 Shipboard Electrical Systems, Continued

4.5.5.1
Safety Rules for Tools and Equipment Used on Ships (continued)

Safety Rule	Description
Use tools and equipment equipped to prevent electric shock	• Electric tools and equipment must be equipped with a ground wire and three-prong plug, and • double insulated tools must have a non-conducting shell and two-prong plug. See 4.5.4 Safe Handling of Portable Electric and Hand Tools for detail on the use and maintenance of portable electric tools.

4.5.5.2 Grounding AC/DC Equipment

The procedure for grounding commercial AC/DC equipment to prevent electric shock is described in the table below.

See 4.5.5.3 for a diagram of a properly grounded AC/DC installation.

Step	Action
1	Install the isolation transformer in the AC power line between the receiver and the power source. **Note**: An isolation transformer adapted to a three-wire system is preferable.

Continued on next page

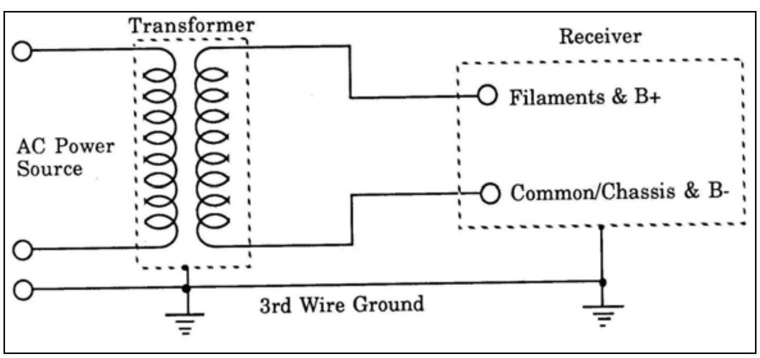
4.5.5 Shipboard Electrical Systems, Continued

4.5.5.2 Grounding AC/DC Equipment (continued)

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>2</td><td>Use the information in the table below for your next step.
<table>
<tr><th>If you have installed an isolation transformer …</th><th>Then ground the equipment chassis by …</th></tr>
<tr><td>adapted to a three-wire system</td><td>connecting the
ground wire of a three-wire power cord to the chassis, and
the other end of the ground wire to a proper ground point.</td></tr>
<tr><td>not adapted to a three-wire system</td><td>using solid copper grounding strap(s) to ground the
case of the isolation transformer, and
equipment chassis.</td></tr>
</table></td></tr>
</table>

4.5.5.3 AC/DC Equipment Grounding Installation Diagram

The diagram below illustrates the proper grounding of an AC/DC equipment installation.



4.5.6 Rescue and Resuscitation of Shock Victims

Introduction

This topic contains the

- symptoms of electric shock
- general rules for rescue and resuscitation of electric shock victims, and
- the procedures for rescue and resuscitation.

4.5.6.1 Symptoms of Electric Shock

Some or all of the following symptoms are present in electric shock victims:

- person is unconscious
- body is stiff or rigid
- face is pale and blueish in color
- pulse is extremely weak or absent, and/or
- electric burns are present and skin smells burnt.

4.5.6.2 General Rules for Rescue and Resuscitation

To save the life of an electric shock victim, you must

- quickly remove the person from the energized electrical equipment while protecting your safety (see 4.5.6.3 for details), and
- begin cardiopulmonary resuscitation (CPR) immediately (see 4.5.6.4 for details).

Records show that seven of ten electric shock victims revive when CPR is begun immediately (*less than three minutes*) after the shock occurred.

Continued on next page

4.5.6 Rescue and Resuscitation of Shock Victims, Continued

4.5.6.3 Rescuing an Electric Shock Victim

When a person has come in contact with a live wire or circuit, *immediately* turn off the power in the circuit.

If you cannot turn off the power

- do *not* touch the victim, and
- use one of the methods in the table below to remove the victim from the wire or circuit.

To …	Use …
pry the victim from the wire or circuit	an insulated pole or stick of non-metallic, non-conductive material free of dirt, grease, paint, and varnish.
pull the victim from the wire or circuit	a piece of dry rope, belt, or clothing looped over the victim’s arm or leg.

4.5.6.4 Resuscitating an Electric Shock Victim

The procedure for using CPR to resuscitate an electric shock victim is described in the table below.

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Use the information in the table below to begin applying CPR.
<table>
<tr><th>If there is no …</th><th>Then apply …</th></tr>
<tr><td>sign of breathing</td><td>mouth-to-mouth artificial respiration.</td></tr>
<tr><td>pulse</td><td>external heart massage.</td></tr>
</table></td></tr>
<tr><td>2</td><td>Send for a doctor or corpsman while continuing to apply CPR techniques.

IMPORTANT: Do not leave or move the person—shout for help if necessary.</td></tr>
</table>

4.6 Safe Handling of Batteries

Overview

4.6.01 Scope

This chapter describes safe handling practices for

- lead acid batteries
- nickel cadmium (NiCad) batteries, and
- lithium batteries.

4.6.02 References

Additional information on safe handling of batteries may be found in the following resource.

Resource	Description	Location/Link
COMDTINST M16478.1 (series)	Hazardous Waste Management Manual	CG Central

4.6.03 Contents

This chapter contains the following topics.

4.6.1 Lead Acid Batteries

Introduction

This topic contains information on

- the use of lead acid batteries
- preventing an explosive hazard from lead acid batteries
- personal protective equipment to use when handling lead acid batteries
- connecting and disconnecting battery terminals and cables
- maintaining the temperature in battery compartments
- ventilating battery compartments
- opening batteries
- safety practices to follow when
  - charging lead acid batteries
  - mixing electrolyte solution, and
  - handling and storing battery acid
- treating accidental exposure to battery acid, and
- disposing of lead acid batteries.

4.6.1.1 When Lead Acid Batteries are Used

Lead acid batteries are used when a high current of short duration is required, such as starting engines for emergency power generators.

These batteries normally come under the cognizance of the Engineering Department. In some instances, however, Electronics Technicians (ETs) may be responsible for working with, or around, lead acid batteries.

4.6.1.2 Preventing an Explosive Hazard from Lead Acid Batteries

Lead acid batteries are an explosive hazard. Hydrogen gas, which is highly explosive, is released when lead acid batteries are charged.

When working with, or around, lead acid batteries, do *not*

- smoke or light a flame, or
- generate sparks from electric or hand tools.

Continued on next page

4.6.1 Lead Acid Batteries, Continued

4.6.1.3 Personal Protective Equipment When Handling Lead Acid Batteries

The following personal protective equipment must be used when handling lead acid batteries and battery acid:

- safety goggles
- insulated rubber gloves, and
- a rubber apron.

See 4.1.3 Personal Protective Equipment for details on safety goggles and rubber gloves.

4.6.1.4 Connecting and Disconnecting Battery Terminals and Cables

The safety practices for connecting and disconnecting battery terminals and cables are described in the table below.

Safety Practice	Rationale
When connecting or disconnecting battery terminals, unscrew the battery filler cap *completely* but do not remove it.	If hydrogen gas was accidentally ignited by a spark, a loosened cap would only blow off but a tightly closed cap would explode, possibly causing severe injury.
When • connecting battery cables, connect the ground cable *last*, and • disconnecting battery cables, disconnect the grounded cable *first*.	This practice prevents sparks if the wrench accidentally contacts the ground frame.

4.6.1.5 Maintaining the Temperature in Lead Acid Battery Compartments

The temperature in battery compartments must be maintained at *less* than 95^{o} Fahrenheit (F).

Continued on next page

4.6.1 Lead Acid Batteries, Continued

4.6.1.6 Ventilating Lead Acid Battery Compartments

Always ventilate a sealed lead acid battery compartment before

- turning on a light
- making or breaking electrical connections, or
- performing work in the compartment.

Ensure that the ventilating apparatus is operating *before* starting a charge. *Stop* the charge if ventilation ceases.

4.6.1.7 Opening Lead Acid Batteries

Open lead acid batteries

- only in a well-ventilated space, and
- if the room temperature is *more* than 125° F only in an extreme emergency.

4.6.1.8 Safety Practices for Charging Lead Acid Batteries

Lead acid batteries must be stored in a charged state. The rules for charging lead acid batteries are listed below:

- turn off the charging current *before* batteries are connected or disconnected in the charging line
- observe polarity when connecting the charger and/or additional batteries in the charging line
- maintain the recommended electrolyte level (see 4.6.1.9 for more detail), and
- do not repair battery connections while the circuit is energized.

4.6.1.9 Safety Practices for Mixing Battery Electrolyte Solution

When mixing battery electrolyte solution

- wear safety goggles, rubber insulating gloves, and a rubber apron, and
- slowly pour the acid into distilled water while stirring the solution.

It is extremely dangerous to pour water into acid. Never add water to battery electrolyte.

Continued on next page

4.6.1 Lead Acid Batteries, Continued

4.6.1.10 Safety Practices When Handling and Storing Battery Acid

To prevent battery acid from coming in contact with your eyes or skin, *always* wear

- safety goggles
- insulated rubber gloves, and
- a rubber apron.

See 4.1.3 Personal Protective Equipment for details on safety goggles and rubber gloves.

IMPORTANT: Do not store sulfuric acid where freezing temperatures might occur.

4.6.1.11 Treating Eye/Skin Exposures to Battery Acid

The procedure for treating accidental exposure to battery acid is described in the table below.

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Immediately flush the affected area(s) with large quantities of water at an emergency eyewash facility.</td></tr>
<tr><td>2</td><td>Use the information in the table below for eye and skin exposures.
<table><tr><th>If the exposure is to the …</th><th>Then …</th></tr><tr><td>eyes</td><td>continuously flush the eyes for 15–20 minutes.</td></tr><tr><td>skin</td><td>• continuously flush the affected skin until the acid is washed away (5–20 minutes), and
• apply a sterile compress to the area.</td></tr></table></td></tr>
<tr><td>3</td><td>Call for medical support.</td></tr>
</table>

4.6.1.1.12 Disposing of Lead Acid Batteries

You must review and follow the required hazardous materials (HAZMAT) procedures before disposing of lead acid batteries.

4.6.2 Nickel Cadmium (NiCad) Batteries

Introduction

This topic contains information on

- the advantages and disadvantages of using nickel cadmium (NiCad) batteries
- the safety practices specific to NiCad batteries
- the rules for the use and storage of NiCad batteries
- cleaning NiCad batteries, and
- maintaining the high performance and maximum service life of NiCad batteries.

4.6.2.1 Advantages of Using NiCad Batteries

Nickel cadmium (NiCad) batteries are excellent storage batteries that provide a reliable source of power over a wide range of operating environments.

The characteristics of NiCad batteries include

- an extremely long life
- individual replaceable cells
- no exudation of corrosive fumes
- no failure when vibrated or severely jolted, and
- the ability to
  - withstand extremely cold temperatures
  - remain idle for indefinite periods without damage, and
  - maintain a steady output voltage even when discharging at a high current rate.

4.6.2.2 Disadvantages of Using NiCad Batteries

The disadvantages of using NiCad batteries include the

- necessity to fully charge a battery before adjusting the electrolyte
- inability to determine the state of charge by a test of the electrolyte or voltage, and
- necessity to monitor the charging input to the completely discharged battery in current and time until the ampere-hour capacity of the battery is reached.

Note: The state of charge cannot be determined by a voltage test because the voltage remains constant over ninety percent of the total discharge time.

Continued on next page

4.6.2 Nickel Cadmium (NiCad) Batteries, Continued

4.6.2.3 Safety Practices When Handling NiCad Batteries

In general, the safety practices for handling lead acid batteries described in 4.6.1 Lead Acid Batteries apply to NiCad batteries.

The safety practices specific to handling NiCad batteries are described in the table below.

Safety Practice	Rationale
Prevent potassium hydroxide (KOH), the electrolyte used in NiCad batteries, from contacting • your eyes, skin, or clothing, or • any metal object.	KOH is corrosive and the vapors are explosive.
When servicing NiCad batteries, do *not* wear metal jewelry or watches, metal-framed eyewear, or other similar metal items.	Severe burns can result when a metal item touches an intercellular link of opposite polarity.

4.6.2.4 Rules for Use and Storage of NiCad Batteries

The rules for using and storing NiCad batteries are described in the table below.

Rule	Rationale
Do not use NiCad batteries for maintenance or troubleshooting.	Indiscriminate usage of NiCad batteries will lower the capacity and increase the possibility of failure.
Maintain separate battery shops for lead acid and NiCad batteries.	A small amount of acid from a lead acid battery will cause irreversible damage to a NiCad battery. **Note**: A tool used on a lead acid battery is considered to be contaminated.
Store NiCad batteries in a fully *discharged* state.	Recharge batteries just before placing in service. **Note**: Before charging, a battery must be in a fully discharged state.

Continued on next page

4.6.2 Nickel Cadmium (NiCad) Batteries, Continued

4.6.2.5 Cleaning NiCad Batteries

The procedure for cleaning NiCad batteries is described in the table below.

Step	Action
1	Use a clean, dry cloth or brush (plastic or nylon) to remove potassium carbonate deposits from the vent caps to prevent plugging. **Note**: Potassium carbonate deposits are white and powdery. **IMPORTANT**: Never use a wire brush to remove the deposits.
2	Check screws and cell links for loose connections to prevent overheating.
3	Check for cracked • cell terminals, and • cell cases.

4.6.2.6 Maintaining the Service Life of NiCad Batteries

To maintain high performance and the maximum service life of NiCad batteries, it is important to know how to handle certain features of these batteries.

Information on maintaining the service life of NiCad batteries is provided in the table below.

Feature of NiCad Batteries	How to Maintain Service Life
Capable of high discharge rates due to low internal resistance	Do not short circuit NiCad batteries. The high temperatures produced by the heavy current flow can damage the cells.
Capable of operating in temperatures ranging from -140° F to $+140^{\circ}$ F	Although there is a wide operating temperature range, the temperature of the *charging* environment should range from $+32^{\circ}$ F to $+113^{\circ}$ F. Extended overcharging at high and low temperature extremes will adversely affect battery life.

Continued on next page

4.6.2 Nickel Cadmium (NiCad) Batteries, Continued

4.6.2.6 Maintaining the Service Life of NiCad Batteries (continued)

Feature of NiCad Batteries	How to Maintain Service Life
Self-discharging	NiCad batteries must be fully charged before use.
High capacity	It is essential to regularly maintain NiCad batteries at the required capacity. The recommended constant current charging rate is C/2 (where "C" is the ampere-hour capacity of the battery) at the ten hour rate. A completely discharged battery requires 14–16 hours of charging. **Example**: The charging rate for a 14.0 ampere-hour NiCad battery or cell is 0.14 amperes at a maximum voltage of 1.5 volts per cell.
NiCad cells can be "floated" or "trickle charged" to maintain a charged condition in standby for emergency power applications	The "trickle charge" rate should be C/100 unless the manufacturer recommends otherwise.

4.6.2.7 Disposing of NiCad Batteries

You must review and follow the required hazardous materials (HAZMAT) procedures before disposing of NiCad batteries.

4.6.3 Lithium Batteries

Introduction

This topic contains information on the

- hazards of lithium batteries and cells, and
- storage and disposal of lithium batteries and cells.

4.6.3.1 Hazards of Lithium Batteries

Lithium batteries or cells are potential hazards if tampered with or misused before, during, and after discharge. Lithium batteries can explode while rapidly discharging and up to thirty minutes after discharge.

Lithium batteries, whether fresh or discharged, must not be

- carelessly handled
- pierced, crushed, burned, or intentionally dropped
- dismantled, cannibalized, or modified
- short circuited or charged, or
- used in equipment other than that specified.

4.6.3.2 Storage and Disposal of Lithium Batteries

Lithium cells are defined as hazardous material.

Follow the instructions in the Hazardous Waste Management Manual, COMDTINST M16478.1 (series) to store and dispose of lithium batteries and cells.

4.7 Chemical and Explosive Hazards

Overview

4.7.01 Scope

This chapter

- provides information on protection from chemical and explosive hazards, including
  - polychlorinated biphenyls (PCBs)
  - cathode ray tubes (CRTs), and
- describes how to treat chemical-related injuries.

See 4.6.1 Lead Acid Batteries for details on the explosive hazards of lead acid batteries and the chemical hazards of lead battery acid.

4.7.02 References

Additional information on chemical and explosive hazards may be found in the following resources.

Resource	Description	Location/Link
COMDTINST M5100.47 (series)	Safety and Environmental Health Manual	CG Central
COMDTINST M16478.2 (series)	Handling and Disposal of Polychlorinated Biphenyls (PCBs)	CG Central
COMDTINST M16478.1 (series)	Hazardous Waste Management Manual	CG Central
Electronics Plant—General, Naval Ships' Technical Manual (NSTM), Chapter 300	Information on the features of, and safety precautions for, working with electrical equipment.	CG Central

Continued on next page

Overview, Continued

4.7.03 Contents

This chapter contains the following topics.

4.7.1 Protection from Chemical and Explosive Hazards

Introduction

This topic contains information on

- personal protective equipment that is required when working around chemical and explosive hazards
- safety equipment used for protection against chemical and explosive hazards, and
- proper storage of dangerous chemicals and gases.

4.7.1.1 Working Around Chemical and Explosive Hazards

Personnel who work with electrical and electronics equipment may come into contact with various dangerous chemical and explosive hazards. If not handled properly, these hazards can be deadly.

Electronics personnel must be familiar with and follow all safety and health practices when working with, or around, these hazards.

4.7.1.2 Personal Protective Equipment for Chemical and Explosive Hazards

Personal protective equipment must be used, as applicable, when working with chemical and explosive hazards.

The personal protective equipment used in specific situations is described in the table below.

When working …	**Then use …**
with acids and alkalis	• safety goggles and a face shield • corrosion-resistant rubber gloves, and • a rubber apron.
around flying glass, metal, or other particles	safety goggles and a face shield.
with high vacuum tubes	• rubber insulating gloves rated at 5,000 volts, and • leather protective gloves (glove shells).
on a job that requires you to immerse your hands in a solvent	synthetic rubber or plastic coated gloves.

See 4.1.3 Personal Protective Equipment for details on safety goggles, face shields, rubber insulating gloves, and leather protective gloves.

Continued on next page

4.7.1 Protection from Chemical and Explosive Hazards, Continued

4.7.1.3 Safety Equipment for Chemical and Explosive Hazards

The safety equipment used for protection from chemical and explosive hazards is described in the table below.

Safety Equipment	Description
Ventilating equipment	Ventilating equipment must be used to remove dangerous gases and vapors from • confined or unventilated work areas, and • rooms or spaces containing wet cell lead acid batteries. The equipment must be maintained in good working order at all times. **Note**: Hydrogen gas (which is extremely explosive) is emitted from wet cell lead acid batteries when charging.
Explosion-proof or non-sparking equipment	When working in the vicinity of volatile gases or other combustibles, you *must* use equipment designated as explosion-proof or non-sparking. **Note**: The use of portable electric tools or spark producible hand tools could cause a fire and/or explosion.
Neutralizers	These products must be available to neutralize a corrosive liquid that accidentally comes into contact with the body.

Continued on next page

4.7.1 Protection from Chemical and Explosive Hazards,
Continued

4.7.1.4 Emergency Eyewash Facilities

Emergency eyewash facilities that meet American National Standards Institute (ANSI) Z358-1-1981 requirements must be provided in all areas where chemicals are used and stored.

Eyewash facilities must be easily accessible and visibly marked.

4.7.1.5 Proper Storage of Chemicals and Gases

Dangerous chemicals and gases must be stored properly to protect personnel from spills and evaporation.

Refer to your unit's regulations manual for information on the proper storage of chemical and gases.

4.7.2 Handling Polychlorinated Biphenyls (PCBs)

Introduction

This topic contains information on

- testing for polychlorinated biphenyls (PCBs)
- handling PCB-contaminated transformers, capacitors, and equipment parts
- the responsibility for arranging disposal of hazardous materials, and
- using recovery drums to ship hazardous materials.

4.7.2.1 PCB Screening Kits

The PCB screening kits used by the Coast Guard include the

- CHLOR-N-OIL-50 kit, which tests for the presence of PCBs from 0–50 parts per million (PPM), and
- CHLOR-N-500 kit, which tests for the presence of PCBs up to 500 PPM.

These kits test for the presence of PCBs (positive test) or no PCBs (negative test) only. To identify the exact type and amount of PCBs, further tests are required. Commandant, Office of Command, Control (C2), and Navigation Systems (CG-64) determines how a local unit arranges further testing.

Note: PCB screening kits can be ordered from the Dexsil Corporation
- by mail at 295 Treadwell Street, Hamden, CT 06514
- by phone at (203) 288-3509, or
- online at http://www.dexsil.com.

4.7.2.2 Handling PCB-Contaminated Transformers and Capacitors

Transformers and capacitors that are contaminated with PCBs may be installed in operating equipment or stored as spares.

The policies for handling PCB-contaminated transformers and capacitors are described in the table below.

Policy	Guideline/Requirement
PCB-contaminated transformers and capacitors installed in operating equipment or stored as spares may continue to be used until they fail.	Transformers and capacitors must be • identified as containing PCBs, and • inspected weekly for signs of leakage.

Continued on next page

4.7.2 Handling Polychlorinated Biphenyls (PCBs), Continued

4.7.2.2 Handling PCB-Contaminated Transformers and Capacitors (continued)

Policy	Guideline/Requirement
PCB-contaminated transformers may be flushed and refilled to allow reclassification.	The process of flushing and refilling a transformer to reduce the amount of PCBs in the unit is usually performed on site with the unit in operation.
PCB-contaminated transformers and capacitors that have failed must be disposed of and replaced.	Failed transformers and capacitors • may *not* be reworked or rebuilt, and • must be disposed of in compliance with Environmental Protection Agency (EPA) regulations. **Reference**: For details on the disposal procedures for PCB-contaminated transformers and capacitors, refer to Handling and Disposal of PCBs, COMDTINST M16478.2 (series).

4.7.2.3 Handling Contaminated Equipment Parts

When accessing or surveying equipment containing PCB-contaminated parts, the parts must be

- removed from the equipment
- segregated, and
- disposed of in compliance with EPA regulations.

4.7.2.4 Responsibility for Arranging Disposal of Hazardous Materials

Maintenance and Logistics Commands (MLCs), District Commanders, and Commanding Officers (COs) are responsible for arranging the disposal of hazardous materials as required in the Hazardous Waste Management Manual, COMDTINST M16478.1 (series).

Continued on next page

4.7.2 Handling Polychlorinated Biphenyls (PCBs), Continued

4.7.2.5 Using Recovery Drums to Ship Hazardous Materials

Effective January 1980, the use of recovery drums to ship hazardous materials was authorized by the Code of Federal Regulations (CFR).

Appropriate recovery drums must be used to ship hazardous chemicals and damaged, defective, or leaking packages to facilities for disposal or repacking.

IMPORTANT: Do not ship PCBs or PCB-contaminated equipment to the local DRMO or ELC.

Reference: For information on the statute regulations for shipping hazardous materials, refer to 49 CFR 172.3(c).

4.7.2.6 Ordering Recovery Drums

Use the following information to order recovery drums:

- Description: removable head, 85-gallon capacity
- National Stock Number (NSN): 8110-01-1010-4056

4.7.3 Handling Cathode Ray Tubes (CRTs)

Introduction

This topic contains information on the

- hazards of cathode ray tubes (CRTs)
- personal protective equipment that is required when handling CRTs
- rules for handling CRTs, and
- methods for disposing of CRTs.

4.7.3.1 Cathode Ray Tube Hazards

The trend toward larger cathode ray tubes (CRTs) has increased the danger of implosion, flying glass, and the possibility of injury or severe shock from high voltages.

In addition, some CRTs use phosphors, which contain small amounts of the harmful chemical beryllium.

CRTs are not dangerous if handled properly. However, they can cause severe injury or death when not handled carefully.

4.7.3.2 Personal Protective Equipment When Handling CRTs

When handling CRTs, the following personal protective equipment is required:

- a face mask or shield with side and front protection and clear glass lenses, and
- rubber insulating gloves rated at 5,000 volts with leather protective gloves (glove shells).

Ensure that your clothing leaves no part of your body exposed to glass splinters in case the CRT implodes. The coating on some tubes is poisonous when absorbed into the blood stream.

Continued on next page

4.7.3 Handling Cathode Ray Tubes (CRTs), Continued

4.7.3.3 Rules for Handling CRTs

The rules for handling CRTs are described in the table below.

Rule	Description
Do not expose cathode ray tubes unnecessarily.	When a tube is needed, cautiously remove it from the packing box being careful not to strike or scratch the envelope.
Cautiously insert and remove tubes from equipment sockets.	When inserting and removing tubes, use only moderate pressure being careful not to jar the tube.
Carefully place tubes on a surface.	When placing a tube on a surface, place it face down on clean soft padding.
Do not stand directly in front of the tube face.	If the tube implodes, it could be propelled forward with a velocity sufficient to cause severe injury.

4.7.3.4 Disposing of CRTs

CRTs must be disposed of only in locations where the public will not be exposed to the hazard.

Note: Contact the Marine Technical and Hazardous Materials Division (G-MSO-3) for questions and instructions about the disposal of CRTs.

The three methods for disposing of CRTs are described in the table below.

Method	Description
1	• Place the CRT face down in an empty carton • carefully break off the locating pin from the base of the CRT, and • use a small screwdriver or probe to break off the tip of the glass vacuum seal.

Continued on next page

4.7.3 Handling Cathode Ray Tubes (CRTs), Continued

4.7.3.4 Disposing of CRTs (continued)

Method	Description
2	• Place the CRT face down in an empty carton, and • use a long, thin rod to pierce through the – carton, and – side of the CRT.
3	Submerge the CRT in water and crush it with a blunt instrument. The crushed glass must be • kept wet at all times during handling, and • disposed of in accordance with Commandant (G-M) policies and procedures.

4.7.4 Treating Chemical-Related Injuries

Introduction

This topic contains the procedure for treating chemical exposure to the eyes and skin.

4.7.5.1 Treating Eye/Skin Chemical Exposures

The procedure for treating exposure to an acid, alkali, or any other chemical is described in the table below.

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Immediately flush the affected area(s) with large quantities of water at an emergency eyewash facility.</td></tr>
<tr><td>2</td><td>Use the information in the table below to determine the appropriate action to take.
<table><tr><th>If the exposure is to the …</th><th>Then …</th></tr><tr><td>eyes</td><td>continuously flush the eyes for 15–20 minutes.</td></tr><tr><td>skin</td><td>• continuously flush the affected skin until the chemical is washed away (5–20 minutes), and
• apply a sterile compress to the area.</td></tr></table></td></tr>
<tr><td>3</td><td>Call for medical support.

IMPORTANT: Do not provide medical treatment or neutralize the chemical without supervision.</td></tr>
<tr><td>3</td><td>Until support arrives, monitor cardiac rhythm (heart beat).

IMPORTANT: Do not
• give the individual epinephrine (adrenalin), or
• let water get in the individual's eyes as it could cause burns to the cornea.</td></tr>
</table>

4.8 Radioactive Material Hazards

Overview

4.8.01 Scope

This chapter

- provides an introduction to
  - ionizing radiation exposure, and
  - the radioactive material contained in radioactive electron tubes
- describes the requirements for handling radioactive electron tubes, and
- contains the process and procedures for
  - responding to radioactive contamination
  - treating injuries, and
  - decontaminating an area.

4.8.02 References

Additional information on radioactive material hazards may be found in the following resources.

Resource	Description	Location/Link
COMDTINST M16478.1 (series)	Hazardous Waste Management Manual,	CG Central
Electromagnetic Radiation Hazards to Personnel, Fuel, and Other Flammable Material, OSHA 29 CFR 1910.268	---	---

4.8.03 Contents

This chapter contains the following topics.

4.8.1 About Exposure to Ionizing Radiation

Introduction

This topic contains information on

- external and internal exposure to ionizing radiation, and
- ionizing radiation and internal emitters.

4.8.1.1 Description: Ionizing Radiation

Radioactive materials are sources of ionizing radiation.

Ionizing radiation exists in two forms—electromagnetic radiation (consisting of photons) and particulate radiation (consisting of particles).

4.8.1.2 Sources of Ionizing Radiation Exposure

Exposure to ionizing radiation can occur

- externally from a source in the environment, and
- internally by inhaling, ingesting, or absorbing airborne particles of radioactive material into the body.

The biological damage to body cells and tissues is the same whether radiation exposure is external or internal.

4.8.1.3 External Source of Radiation

Radioactive materials are used in components of electronic equipment. The most common source of ionizing radiation is the radioactive electron tube.

If a tube breaks, the radioactive material is released into the environment.

Continued on next page

4.8.1 About Exposure to Ionizing Radiation, Continued

4.8.1.4 Internal Exposure to Radiation

When radioactive particles are inhaled, ingested through contaminated food or drink, or absorbed through cuts or sores on the body, the particles either concentrate in certain areas of the body or are dispersed throughout the body.

The extent of damage to cells and tissues depends upon the concentration and distribution of the radioactive material, the sensitivity of the tissues and organs, the route of entry, the solubility of the material, and the route and rate of elimination from the body.

4.8.1.5 Description: Internal Emitter

An ***internal emitter*** is a radioactive material that has entered the body.

The greatest biological damage from an internal emitter results from the alpha and beta particles, which are completely absorbed by body tissues before the radioactive material is eliminated.

4.8.2 Working With Radioactive Electron Tubes

Introduction

This topic contains information on

- ionized radiation particles in electron tubes
- the radiation hazard created when a tube breaks
- the requirements for
  - – safety supplies in areas where radioactive electron tubes are handled, and
  - – radiation hazard labels on electron tubes
- monitoring tubes in storage and the recommended monitoring equipment
- the responsibility for arranging disposal of radioactive material, and
- tubes that are exempt from disposal as radioactive material.

4.8.2.1 Ionized Radioactive Particles in Tubes

The radioactive material in tubes ensures the reliable performance of the tubes at a given operating voltage.

Because the radioactive material in a tube constantly undergoes a process of disintegration, a supply of ionized radioactive particles is always present.

Radioactive particles, therefore, are present in tubes

- installed in equipment (whether or not voltage is applied), and
- placed in storage or in waste containers.

[redacted]

Exercise care when handling radioactive electron tubes to protect yourself and others from exposure to radiation.

4.8.2.2 Types of Radioactive Material in Tubes

The types of radioactive materials contained in tubes include carbon (C4), cobalt (Co60), cesium (Cs37), nickel (Ni63), and radium (Ra226).

Some tubes may contain as much as 5 microcuries of radioactive material.

Definitions:

- A ***microcurie*** is a unit of radioactivity equal to one millionth of a curie.
- A ***curie*** is a unit of radioactivity equal to 3.7 multiplied by 10^{10} disintegrations per second.

Continued on next page

4.8.2 Working With Radioactive Electron Tubes, Continued

4.8.2.3 Radiation Hazard From a Broken Tube

A radiation hazard is created when a tube breaks and radioactive material is released into the environment.

As long as the radioactive electron tubes remain intact, they do not present a radiation hazard.

4.8.2.4 Required Safety Supplies in Spaces Where Radioactive Tubes are Handled

The following supplies must be available in spaces where radioactive electron tubes are handled:

- first aid supplies for treating wounds from a broken tube, and
- radioactive tube cleanup kit to decontaminate an area in which a tube has broken.

See 4.8.2.5 for a description of the contents of a radioactive tube cleanup kit.

4.8.2.5 Radioactive Tube Cleanup Kit

Each radioactive tube cleanup kit must include a copy of the decontamination instructions.

Note: Most items can be procured from local sources.

The items included in a radioactive tube cleanup kit are described in the table below.

Items	Description
Personal protective equipment	• One surgical mask • two pairs of surgical rubber gloves, and • two sets of coveralls.
Items for isolating the area	• Rope with attached Radiation Hazard warning signs, and • one roll of masking tape, 1–3 inches wide.
Tool for retrieving broken glass	One pair of forceps or tweezers.
Items for cleaning the area	• A minimum of fifty 4 inch by 4 inch gauze pads, and • 6–12 ounces of fresh water in an unbreakable container.

Continued on next page

4.8.2 Working With Radioactive Electron Tubes, Continued

4.8.2.5 Radioactive Tube Cleanup Kit (continued)

Items	Description
Items for disposing of contaminated waste	• Sealable (Ziploc type) plastic bags, approximately 12 inches by 12 inches • Radiation Hazard labels, and • Radioactive Material stickers.

4.8.2.6 Required Radiation Hazard Labels

Radioactive electron tubes must be labeled as a radiation hazard in accordance with Military Specification MIL-M-9590C requirements.

The labels used on radioactive electron tubes, where labels are placed on tubes, and what the labels indicate are described in the table below.

Label	Placement on Tube	What the Label Indicates
Atomic Energy Commission (AEC) warning symbol	Placed next to the number printed on the tube that indicates the level of radioactive material in the tube	Indicates that the tube is a radiation hazard.
CAUTION label	Placed above the AEC warning symbol	Indicates that the tube contains • cesium (Cs37) or nickel (Ni63) that exceeds the level of 4.0 microcuries, or • cobalt (Co60) that exceeds the level of .0 microcuries.

4.8.2.7 Ordering Radiation Hazard Labels

Use military standard requisitioning and issue procedures (MILSTRIP) to order radiation hazard labels from the Naval Forms and Publications Center in Philadelphia, PA.

Continued on next page

4.8.2 Working With Radioactive Electron Tubes, Continued

4.8.2.8 Monitoring Radioactive Tubes in Storage

All areas used to store radioactive material must be monitored every 30 days or when new stock is placed in the area.

The standard safe permissible level for each storage area is 7/2 milliroentgens per hour at one meter, which is based on 300 milliroentgens per 40 hour week.

When the safe permissible level per hour is exceeded in a storage area, the stacks of items in the area must be

- broken down into smaller quantities, or
- moved to another area.

Definitions:
- A ***milliroentgen*** is one thousandth of a roentgen.
- A ***roentgen*** is the international unit of x-radiation or gamma radiation equal to the amount of radiation that produces in one cubic centimeter of dry air at 0^{o} centigrade (C) and standard atmospheric pressure ionization of either sign equal to one electrostatic unit of charge.

4.8.2.9 Recommended Radioactive Materials Monitoring Equipment

A low intensity beta-gamma survey meter, such as the AN/PDR-27 series, is recommended for monitoring radioactive materials in storage areas.

Continued on next page

4.8.2 Working With Radioactive Electron Tubes, Continued

4.8.2.10 Disposal of Radioactive Tubes

Radioactive electron tubes containing radium are retained locally to determine whether they contain a less hazardous form of radium (Ra226).

The appropriate disposal method for radioactive electron tubes, based on the outcome of the Ra266 analysis, is described in the table below.

If it is determined that the tubes …	Then …
do *not* contain Ra266	Maintenance Logistics Commands (MLCs), District Commanders, and Commanding Officers are responsible for arranging the disposal of hazardous materials and waste in accordance with the Hazardous Waste Management Manual, COMDTINST 16478.1 (series).
contain Ra266	may be disposed of as normal solid waste, as long as the rules for disposal listed below are followed: • *only* ten tubes per year may be disposed of as normal solid waste, and • the radioactive hazard warning labels on the tubes must be removed or completely obscured before disposal. **Note**: Tubes containing Ra226 are exempt from disposal as radioactive material in accordance with the Code of Federal Regulations (CFR), Part 30, Title 10.

4.8.3 Responding to Radioactive Contamination From a Broken Radioactive Electron Tube

Introduction

This topic describes the

- safety rules that must be following when an area is contaminated by radiation from a broken radioactive electron tube, and
- process for responding to radioactive contamination.

4.8.3.1 Safety Rules for Contaminated Areas

The safety rules listed below must be followed:

- Personnel involved in treating injuries and decontaminating an area must wear personal protective equipment at all times.
- Any food or drink in a contaminated area must be discarded.

4.8.3.2 Process for Handling Radioactive Contamination

The stages of the process and responsibilities for handling radioactive contamination are described in the table below.

Stage	Who is Responsible	Description
1	Unit Supervisor and/or Electronics Technician (ET)	• Treats any wounds resulting from the broken radioactive electron tube (see 4.8.3.3 for details) • evacuates and isolates the area, and • turns off the ventilation to control the spread of contamination.
2	Unit Supervisor and/or ET	Notifies the Officer of the Deck, Commanding Officer, or Damage Control Center.
3	Unit Supervisor and/or ET	Retrieves the fragments of the broken tube. **Note**: Any fragment of glass that caused a wound should be provided to radiological personnel for analysis and monitoring. See 4.8.3.5 for details.
4	Unit Supervisor and/or ET	Cleans the radiation-contaminated area. See 4.8.3.6 for details.

Continued on next page

4.8.3 Responding to Radioactive Contamination From a Broken Radioactive Electron Tube, Continued

4.8.3.2
Process for Handling Radioactive Contamination (continued)

Stage	Who is Responsible	Description
5	Radiation Monitoring Team	• Monitors the level of radiation in the area, and • determines when personnel can return to the area. See 4.8.3.7 for details.
6	Unit Supervisor and/or ET	Prepares the area for re-entry of personnel. See 4.8.3.8 for details.
7	Unit Supervisor or ET	Reports the completion of the radioactive cleanup to the Officer of the Deck (OOD), Commanding Officer (CO), or Damage Control Center.

Continued on next page

4.8.3 Responding to Radioactive Contamination From a Broken Radioactive Electron Tube, Continued

4.8.3.3 Treating a Wound From a Broken Radioactive Tube

The procedure for treating a wound from a broken radioactive electron tube is described in the table below.

[redacted]

Never suck a wound by mouth as this can result in the ingestion of radioactive material.

Step	Action
1	Don a surgical mask, gloves, and coveralls.
2	Stimulate free bleeding of the wound by • applying pressure around the wound, and • massaging the skin toward the wound.
3	Is the wound bleeding freely? • If *yes*, go to Step 4. • If *no* – make an incision near the wound, and – use a *suction bulb* to stimulate free bleeding. **IMPORTANT**: Free bleeding of the wound is stimulated to minimize the absorption of radioactive particles into the body.
4	• Wash the wound thoroughly with mild soap and water, and • continuously flush the wound with large amounts of running water. **IMPORTANT**: Do not use a detergent or alkaline soap to wash the wound.
5	Notify medical personnel. **Note**: Medical personnel will evaluate and monitor the wound to determine if further treatment is needed.

Continued on next page

4.8.3 Responding to Radioactive Contamination From a Broken Radioactive Electron Tube, Continued

4.8.3.4 Isolating the Radiation Contaminated Area

The procedure for isolating the radiation-contaminated area is described in the table below.

Step	Action
1	• Evacuate personnel from the area, and • turn off the ventilation to control the spread of contamination.
2	Obtain the radioactive tube cleanup kit. See 4.8.2.5 for a description of the kit.
3	• Don the surgical mask, gloves, and coveralls, and • fold a one inch cuff in each glove.
4	• Surround the area with the rope and Radiation Hazard signs, and • place the radioactive tube cleanup kit outside the roped off area.
5	Notify the • Officer of the Deck (OOD) or Commanding Officer (CO), or • Damage Control Center, if the incident occurred at General Quarters.

Continued on next page

4.8.3 Responding to Radioactive Contamination From a Broken Radioactive Electron Tube, Continued

4.8.3.5 Retrieving Fragments of a Broken Radioactive Tube

The procedure for retrieving the fragments of a broken tube is described in the table below.

Step	Action
1	Cover the broken tube with a damp cloth.
2	Tape off a 6-8 inch perimeter around the broken tube.
3	Place the forceps and two plastic bags inside the perimeter.
4	• Use the forceps to retrieve large fragments of broken glass • place the fragments in one of the plastic bags, and • seal the bag.
5	• Cut a piece of masking tape, 8 inches by 10 inches long, and • form a tab at each end of the tape by folding the ends of the tape back. **Note**: The tabs will allow you to pick up the tape at each end when small fragments of glass have adhered to the tape.
6	Repeat Step 5 until you have approximately four pieces of tape with tabs at each end.
7	• Place the strips of tape over the small fragments of broken tube, and • use the forceps to press the tape to the glass fragments until they adhere to the tape.
8	• Pick up each strip of tape by the tabs at each end • fold the tape so the contaminated side is inside, and • discard the tape in the other plastic bag.
9	Place the plastic bags at the edge of the perimeter.

Continued on next page

4.8.3 Responding to Radioactive Contamination From a Broken Radioactive Electron Tube, Continued

4.8.3.6 Cleaning the Radiation Contaminated Area

The procedure for cleaning the radiation-contaminated area is described in the table below.

Step	Action
1	• Dampen the 4 inch by 4 inch pieces of gauze with water, and • place them in an overlapping fashion around the inside of the perimeter.
2	• Wipe a piece of dampened gauze towards the center of the area • fold the gauze in half with the contaminated part inside, and • repeat this step until there is no more clean gauze to use.
3	Place the contaminated gauze in the plastic bag with the tape.
4	Repeat Steps 2 and 3 until the entire area is cleaned.
5	Place the forceps in a plastic bag.
6	• Remove one glove by grasping the cuff and pulling if off inside out, and • place it in a plastic bag.
7	• Remove the other glove by slipping your index finger inside and pulling it off inside out, and • place it in the plastic bag.
8	• Remove the mask and coveralls • place them in the plastic bag, and • seal the bag.
9	• Place a Radioactive Material sticker on the sealed bag that contains the large fragments of the broken tube, and • write the type of material (if known) on the sticker.
10	• Contact the Radiation Monitoring Team, and • leave the area.
11	• Dispose of any clothing that may be contaminated, and • shower thoroughly with soap and water.
12	Continue the showering process until the Radiation Monitoring Team determines that your radiation level is safe.

Continued on next page

4.8.3 Responding to Radioactive Contamination From a Broken Radioactive Electron Tube, Continued

4.8.3.7 Determining When the Radiation Level is Safe

The radiation monitoring team uses low intensity beta-gamma survey equipment (AN/PRC-27 series) to determine when the radiation levels of the area, personnel involved in the cleanup, and tools and equipment used in the cleanup or housed in the area are safe.

The area is considered safe from contamination when less than 0.1 milliroentgen per hour is emitted at the surface of the area.

Tools or equipment that display more than 0.1 milliroentgen per hour must be decontaminated with soap and water.

4.8.3.8 Preparing the Area for Reentry

The procedure for preparing the area for re-entry is described in the table below.

Step	Action
1	• Remove the – tape from around the perimeter, and – rope from around the area • place the tape and rope in a plastic bag, and • seal the bag.
2	Turn on the ventilation.
3	• Place all the sealed plastic bags in a steel container • seal the container, and • place a “Radioactive Hazard” label on the container.
4	Give the container to the supply officer for disposal. **Reference**: For more detail on disposal of radioactive material, refer to Electronics, Section V, Safety, Naval Ships’ Technical Manual (NSTM), Chapter 9670, Paragraph 9670.34.

4.8.3.9 Reporting the Radioactive Cleanup

Report the completion of the radioactive cleanup to the OOD, CO, or Damage Control Center.

4.9 Radio Frequency (RF) Radiation Hazards

Overview

4.9.01 Scope

This chapter describes the

- radio frequency (RF) radiation hazards that exist at Coast Guard units
- responsibilities for radiation hazard training and compliance
- safety practices to limit exposure to RF radiation, and
- use of the appropriate warning signs in areas where an RF radiation hazard exists.

4.9.02 References

Additional information on RF radiation hazards may be found in the following resources.

Resource	Description	Location/Link
Protection of Department of Defense (DoD) Personnel From Exposure to Radio Frequency Radiation, DODINST 6055.1	Updated policies, procedures, and responsibilities for administering a comprehensive DoD Safety and Occupational Health (SOH).	http://www.dtic.mil/whs/directives/corres/pdf/i60551_081998/i60551p.pdf
Federal Communications Commission (FCC) Office of Engineering and Technology (OET) Bulletin 65, Edition 97-01, Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields, August 1997	Complete information on FCC policies, guidelines, and compliance-related issues concerning human exposure to radio frequency (RF) fields. **Note**: Users of this resource should also refer to Supplement C of OET Bulletin 65.	http://www.fcc.gov/oet/info/documents/bulletins/#65

Continued on next page

Overview, Continued

4.9.02 References (continued)

Resource	Description	Location/Link
OET Bulletin 65, Edition 97-01, Supplement C	Provides additional guidance to applicants for FCC equipment authorization in the evaluation of mobile and portable devices for compliance with FCC guidelines for human exposure to RF electromagnetic fields.	http://www.comsearch.com/articles/oet65c.pdf
FCC OET Bulletin 56, Questions and Answers About Biological Effects and Potential Hazards of Radio Frequency Electromagnetic Fields, August 1999	Provides factual information and answers to commonly asked questions on this topic.	http://www.fcc.gov/Bureaus/Engineering_Technology/Documents/bulletins/oet56/oet56e4.pdf
Navy Occupational Safety and Health Program Manual, OPNAVINST 5100.23 (series)	Navy Occupational Safety and Health Program	http://www.safetycenter.navy.mil/instructions/osh/510023/default.htm

Continued on next page

Overview, Continued

4.9.03 Contents

This chapter contains the following subjects.

4.9.1 RF Radiation-Related Acronyms and Terms

Introduction

This topic defines the acronyms and terms related to radio frequency (RF) radiation that are used in this chapter.

4.9.1.1 ATU

Antenna Tuning Unit

4.9.1.2 Averaging Time

The maximum time, defined in the maximum permissible exposure (MPE) limits, that an individual can be exposed to RF radiation without injury.

4.9.1.3 E-Field

A field vector that represents the forces between electrical charges.

4.9.1.4 Exposure

The condition of being subject to the effects of electric, magnetic, or electromagnetic fields that are not naturally occurring.

4.9.1.5 Far-Field Region

The region that is far enough from an antenna so that the radiated power per unit area decreases with the square of the distance.

In the far-field region, the field has a predominantly plane-wave character; that is, the electric and magnetic fields are uniformly distributed in the planes transverse to the direction of propagation.

4.9.1.6 FCC

Federal Communications Commission

4.9.1.7 General Population/ Uncontrolled Exposure

A category that includes the general population and employees (through their employment) who

- may be exposed to radiation
- may not be aware of the risk, and
- cannot exercise control over their exposure.

4.9.1.8 HERF

Hazards of Electromagnetic Radiation to Fuels

Continued on next page

4.9.1 RF Radiation-Related Acronyms and Terms, Continued

4.9.1.9 HERO

Hazards of Electromagnetic Radiation to Ordnance

4.9.1.10 Hertz (Hz)

The unit for expressing RF frequency. One hertz equals one cycle per second.

4.9.1.11 HF

High Frequency

Note: HF is part of the RF band in the range of approximately 3 megahertz (MHz)–30 MHz. Many ship-to-shore communication systems use the HF band.

4.9.1.12 H-Field

A field vector that is equal to the magnetic flux density divided by the permeability of the medium (usually air).

4.9.1.13 Human Resonance Range

The frequency range where absorption of RF energy in the body is enhanced.

4.9.1.14 LF

Low Frequency

Part of the RF band in the range of approximately 30 kilohertz (kHz)–300 kHz.

Note: The Loran Broadcast frequency (100 kHz) falls within this band.

4.9.1.15 Magnetic-Flux Density

The maximum electric field strength, magnetic field strength, or power densities associated with these fields to which a person may be exposed

- without harmful effect, and
- with an acceptable safety factor.

Continued on next page

4.9.1 RF Radiation-Related Acronyms and Terms, Continued

4.9.1.16 MF

Medium Frequency

Part of the RF band in the range of approximately 300 kHz–3 MHz.

Note: The DGPS Broadcast frequencies (285.5 kHz–325 kHz) fall within this band.

4.9.1.17 MPE

Maximum permissible exposure.

4.9.1.18 Near-Field Region

A region near an antenna in which the electric and magnetic fields

- vary considerably from point to point, and
- do not exhibit a plane-wave relationship.

Generally, the near-field region extends to a distance of one-half wave length from the antenna.

4.9.1.19 Occupational Population/ Controlled Exposure

A category that includes employees who

- may be exposed to radiation through their employment
- are aware of the risk, and
- can exercise control over their exposure.

4.9.1.20 Partial Body Exposure

Partial body exposure occurs when RF fields are substantially non-uniform over the body.

Non-uniform fields may occur from highly directional sources, standing waves, re-radiating sources, or in the near field.

4.9.1.21 PEL

Permissible Exposure Limit

Continued on next page

4.9.1 RF Radiation-Related Acronyms and Terms, Continued

4.9.1.22 Power Density

A measurement of the RF radiation per area that is normal for the direction of propagation.

For plane-waves, the power density and electric field strength (E) and magnetic field strength (H) are related by the impedance of free space (377 ohms).

4.9.1.23 Re-Radiated Field

A re-radiated field is RF radiation resulting from currents induced in a secondary, predominantly conducted object by RF waves on that object from one or more primary radiating antennae.

4.9.1.24 RF "Hot Spot"

A highly localized area, or relatively more intense RF radiation, that is manifested when

- the presence of intense electric or magnetic fields, immediately adjacent to conductive objects, are immersed in lower intensity ambient fields (re-radiation), or
- localized areas, not necessarily adjacent to conductive objects, in which a concentration of RF fields exists as a result of reflections and/or narrow beams produced by high-gain radiation antennae or other highly directional sources.

4.9.1.25 RF Spectrum

The terms of frequency that extend from 0–3000 gigahertz (GHz).

The frequency range for the purpose of exposure guidelines is 300 kHz–100 GHz.

4.9.1.26 SHF

Super High Frequency

SHF is part of the RF band in the range of approximately 3 GHz–30 GHz.

Note: S-band and X-band radar systems operate within this RF band.

4.9.1.27 Short-Term Exposure

Exposure for durations that are less than the corresponding averaging time.

Continued on next page

4.9.1 RF Radiation-Related Acronyms and Terms, Continued

4.9.1.28
UHF

Ultra High Frequency

Part of the RF band in the range of approximately 300 MHz–3 GHz that is used for ship-to-aircraft communications.

4.9.1.29
VHF

Very High Frequency

Part of the RF band in the range of approximately 30 MHz–300 MHz that is used for ship-to-ship communications.

4.9.2 Responsibilities for RF Radiation Hazard Training and Compliance

Introduction

This topic describes the responsibilities for

- RF radiation hazard awareness training
- identification of radiation hazards, and
- compliance with radiation safety practices.

4.9.2.1 Command Responsibilities for RF Radiation Hazard Training and Compliance

The Command is responsible for ensuring that

- RF radiation hazard awareness training is provided to Coast Guard personnel and contractors before they are assigned to areas where RF radiation levels exceed the maximum permissible exposure (MPE) limits
- RF radiation levels are measured, and
- permissible exposure limit (PEL) boundaries are established and consistently maintained.

4.9.2.2 RF Radiation Hazard Awareness Training

Personnel must receive radiation awareness training before being assigned to work in an environment, or directly with equipment, where RF radiation levels exceed the MPE limits.

The training provides information on the

- potential hazards of RF radiation exposure
- established procedures and restrictions to control exposure, and
- responsibility of personnel to limit their own exposure.

Periodic refresher courses must be conducted and may be incorporated in other safety training programs.

Continued on next page

4.9.2 Responsibilities for RF Radiation Hazard Training and Compliance, Continued

4.9.2.3 Responsibilities for Radiation Hazard Identification and Compliance

The responsibilities for identification of radiation hazards and compliance with radiation hazard standards are described in the table below.

Who is Responsible	Description
Maintenance and Logistics Command (MLC)	Identifies radiation hazards in the unit.
Telecommunication and Information Systems Command (TISCOM)	Creates PEL boundaries.
Unit contractor (for units requiring RF measurement systems)	• Installs RF measurement system • completes electromagnetic interference (EMI) and radiation hazard (RADHAZ) surveys, and • ensures compliance with the standards contained in the – Protection of DoD Personnel From Exposure to Radio Frequency Radiation and Military Exempt Lasers, DODINST 6055.1 (series) – Navy Occupational Safety and Health Program Manual, OPNAVINST 5100.23 (series). **Reference**: For the standards contained in • DODINST 6055.1 (series), refer to http://www.dtic.mil/whs/directives/corres/pdf/i60551_081998/i60551p.pdf, and • OPNAVINST 5100.23 (series), refer to http://www.safetycenter.navy.mil/instructions/osh/510023/default.htm.

4.9.3 RF Radiation Exposure Hazards

Introduction

This topic contains information on

- the hazards of RF radiation, and
- safety practices for preventing injury from related hazards.

4.9.3.1 RF Radiation Exposure Hazards

The hazards of exposure to RF radiation are described in the table below.

RF Radiation Hazard	Description
Thermal effect	The thermal effect on the human body from high levels of RF radiation is tissue damage. Tissue damage results primarily from the body's inability to cope with or dissipate excessive heat. The eyes and testes are particularly susceptible to tissue damage from high frequencies.
Potential biological effects	Evidence from experimental research indicates that immunological, neurological, and behavioral changes may result from lower levels of RF radiation.
Burns	RF radiation can induce a current on improperly grounded, or ungrounded, conductors, such as metal objects (poles, fences, or wires) or wet objects. If you touch a conductor with an induced current, a discharge path is created that could result in burns to your skin.

Continued on next page

4.9.3 RF Radiation Exposure Hazards, Continued

4.9.3.1
RF Radiation Exposure Hazards (continued)

RF Radiation Hazard	Description
Electric shock	Electric shock (and possibly burns) can occur when the • voltages at the transmitter, antenna feed cables, and the antenna are large enough to create a discharge path, and • distance between two conductors (that is, the antenna and your hand) exceed the breakdown voltage of the dielectric (the air). **Note**: This potential hazard exists because ionization occurs and a very low impedance path develops between the conductors.

4.9.3.2
Safety Practices for Preventing Injury From Related Hazards

The safety practices for preventing injury from related hazards are described in the table below.

Safety Practice	Rationale
Avoid extended exposure, even if exposure is at lower power levels and frequencies. **Note**: The electromagnetic frequency of RF radiation is as important as the radiation level in determining the magnitude of the hazard.	The maximum rate of absorption by the human body can occur within the maximum permissible exposure (MPE) limit frequency range of 30–300 MHz (VHF band). Extended exposure at the frequency range of 30–300 MHz is dangerous. See 4.9.5 Maximum Permissible Exposure (MPE) Limits for more detail.

Continued on next page

4.9.3 RF Radiation Exposure Hazards, Continued

4.9.3.2
Safety Practices for Preventing Injury From Related Hazards (continued)

Safety Practice	Rationale
Use extreme caution when working near energized broadcast equipment.	Various hazards exist within the proximity of broadcast antennae. Although these hazards become greater the closer you are to an antenna, you should assume that hazards exist wherever MPE limits are exceeded.
The most effective way to prevent the "startle" effect is to be aware of all hazards involved in working with energized broadcast equipment.	Additional injuries can occur from a reflexive reaction ("startle" effect) after sustaining burns or electric shock. **Example**: Injuries from falling off a ladder after sustaining a shock.

4.9.4 HERF and HERO Safety Practices

Introduction

This topic contains information on the

- occurrence of
  - Hazards of Electromagnetic Radiation to Fuel (HERF), and
  - Hazards of Electromagnetic Radiation to Ordnance (HERO)
- HERF safety instructions in each unit
- HERO safety plans in applicable units, and
- HERF/HERO safety practices for fueling aircraft and vehicles and conducting an evolution.

4.9.4.1 Occurrence of HERF and HERO

Hazards of Electromagnetic Radiation to Fuel (HERF) and Hazards of Electromagnetic Radiation to Ordnance (HERO) occur when the operation of electronic transmitters used for radio and radar

- induce RF voltages in the standing rigging, parts of the superstructure, and other antennae and/or cables, and
- arc between closely spaced conductive metal objects or cause sparks when contact is made or broken by personnel, *or*
- contain sufficient energy so that the heat of the arc (or spark) ignites fuel vapors or other explosive mixtures.

4.9.4.2 HERF Safety Instructions in Each Unit

Each unit should have HERF safety instructions to prevent explosions or fires

- in areas where gasoline vapors are present
- during fueling of aircraft, and
- when handling volatile liquids or gases.

4.9.4.3 HERO Safety Plans in Applicable Units

A HERO safety plan should be in place in applicable units to limit the exposure of ordnance to RF energy.

During loading and unloading of ordnance, RF energy can enter a weapon as a wave radiated through a hole or crack or be conducted into the weapon by the firing leads or other wires penetrating the weapon enclosure.

Although the most likely effect is dudding and reduction of reliability, there is a low probability of detonation.

Continued on next page

4.9.4 HERF and HERO Safety Practices, Continued

4.9.4.4 Safety Practices for Fueling Aircraft and Vehicles

The HERF/HERO safety practices for fueling aircraft or vehicles are described in the table below.

HERF/HERO Safety Practice	Description
Make connections *before* the aircraft or vehicle is fueled.	Electrical, static ground wire, tie-down, or any other metallic connections must be made before the aircraft or vehicle is fueled.
Do *not* energize a radar or communications transmitter *during* fueling.	A radar or communications transmitter on an aircraft or vehicle being fueled, or on adjacent aircraft or vehicles, must not be energized during the fueling.
Break connections *after* fueling is completed.	Do not break electrical, static ground wire, tie-down, or any other metallic connections to the aircraft or vehicle while it is being fueled.

4.9.4.5 Safety Practices for Conducting an Evolution

HERF/HERO safety practices must be followed when conducting an evolution that requires the handling of ammunition and volatile liquids or gases.

The procedure for safely conducting an evolution is described in the table below.

Step	Action
1	Inform the personnel involved with the evolution of the potential hazards of HERF/HERO.
2	Secure all transmitting antennae located within the quadrant of the ship in which the evolution will be conducted. **IMPORTANT**: If transmitting antennae cannot be secured • relocate the evolution to a different area, *or* • reduce the transmitting power during the evolution.
3	Ensure that the area is adequately ventilated.

Continued on next page

4.9.4 HERF and HERO Safety Practices, Continued

4.9.4.5
Safety Practices for Conducting an Evolution (continued)

Step	Action
4	Request that the use or presence of tools and metal objects in the area be minimized.
5	If possible, insulate the loading hook from crane or boom cables with • manila rope, or • RF insulators.
6	Use an insulated steering hook to guide boom or hook cables.

4.9.5 Maximum Permissible Exposure (MPE) Limits

Introduction

This topic contains information on

- maximum permissible exposure (MPE) limits
- the averaging exposure time limits for individuals in the occupational and general population categories to be exposed to RF radiation without injury
- maximum permissible electric and magnetic fields and power densities from which the averaging exposure time limits are derived, and
- compliance with the averaging exposure time limits for the occupational and general population categories.

4.9.5.1 Description: Maximum Permissible Exposure Limits

Maximum permissible exposure (MPE) limits define the maximum time and intensity of RF fields that an individual can be exposed to without sustaining injury.

The Federal Communications Commission (FCC) has published guidelines to be used for evaluating human exposure to RF emissions, which include MPE limits for the following categories:

- for equipment operating at frequencies between 300 kHz and 100 GHz, and
- in terms of
  - electric and magnetic field strengths, and
  - power density.

The MPE limits are based on

- recommendations of the National Council on Radiation Protection and Measurements (NCRP), and
- limits developed by the Institute of Electrical and Electronics Engineers (IEEE) that were adopted by the American National Standards Institute (ANSI).

Continued on next page

4.9.5 Maximum Permissible Exposure (MPE) Limits, Continued

4.9.5.2 Averaging Exposure Time Limits for Population Categories

The averaging exposure time limits—that is, the maximum time that an individual can be exposed to RF radiation without injury—for individuals in the occupational and general population categories are described in the table below.

Population Category	Description	Averaging Exposure Time Limit
Occupational Population/Controlled Exposure	This category applies to all Coast Guard personnel who • work, or might work, near RF fields • may be exposed to radiation as a consequence of their employment • are fully aware of the risk, and • are able to exercise control over their exposure. **Note**: When Coast Guard personnel work near RF fields that exceed the occupational population MPE limits, specific safety procedures must be instituted.	6 minutes See 4.9.5.4 for more detail.
General Population/ Uncontrolled Exposure	This category is used for the general public or employees (as a result of their employment) who • do not work, or will not work, near RF radiation • may be exposed to radiation • may not be aware of the risks, and • cannot exercise control over their exposure.	30 minutes See 4.9.5.5 for more detail.

Continued on next page

4.9.5 Maximum Permissible Exposure (MPE) Limits, Continued

4.9.5.3 Maximum Permissible Electric and Magnetic Fields and Power Densities

The maximum permissible electric and magnetic field strengths and power densities from which the averaging exposure time limits are derived are described in the table below.

Note: f = frequency in MHz

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H)_(A/m)	Power Density (S) (mW/em$^{2)}$
Occupational Population/Controlled Exposure			
0.3–3.0	614	1.63	(100)
3.0–30	1,842/f	4.89/f	(900/f^2)
30–300	61.4	0.163	1.0
300–1,500	---	---	f/300
1,500–100,000	---	---	5
General Population/Uncontrolled Exposure			
0.3–1.34	614	1.63	(100)
1.34–30	824/f	2.19/f	(180/f^2)
30–300	27.5	0.073	0.2
300–1,500	---	---	f/1,500
1,500–100,000	---	---	1.0

Continued on next page

4.9.5 Maximum Permissible Exposure (MPE) Limits, Continued

4.9.5.4 Compliance With Averaging Exposure Time Limit for Occupational Population

Because MPE time limits are very restrictive for higher powers and frequencies, extensive work cannot be accomplished while equipment is energized.

The planned maintenance system (PMS) procedures must be adapted to comply with the MPE time limits.

Example: The procedure could be adapted to
- restrict the time near the RF field, or
- require that work on or near the RF field is performed when the power is appropriately reduced.

Exposure to an electric or magnetic field or power density higher than the occupational population MPE limits cannot exceed 6 minutes.

Examples of how to comply with the averaging exposure time limit are provided in the table below.

When a worker is exposed to a power density limit …	Then the worker must be away from the field for …
two times higher than the limit	3 minutes before or after exposure.
three times higher than the limit	4 minutes before or after exposure.

4.9.5.5 Compliance with Averaging Exposure Time Limit for General Population

In areas accessed by the general public, exposure to an electric or magnetic field or power density must *never* be higher than the general population MPE limit of 30 minutes. Maximum exposure could be reached in 15 minutes if individuals were exposed to a field three times the MPE limits.

When Coast Guard personnel in the general population category are in areas where they may be exposed (such as passage and transit areas), their time in the area must not exceed 30 minutes.

4.9.6 Permissible Exposure Limit (PEL) Boundaries

Introduction

This topic contains information on

- the permissible exposure limit (PEL) boundaries established at shore units and ships
- PEL fences used at shore units and broadcast sites
- typical PEL boundaries for different classes of ships and Coast Guard and Navy supported radar antennae, and
- how PEL boundaries are determined for ships, radar antennae, and broadcast sites.

4.9.6.1 Description: Permissible Exposure Limit Boundary

A ***permissible exposure limit (PEL) boundary*** physically marks an area as a radiation hazard zone.

A PEL boundary is used to

- define and restrict areas where RF radiation may exceed the general population MPE limits, and
- alert Electronics Technicians (ETs) of their averaging time limits.

IMPORTANT: RF radiation hazard (RADHAZ) warning signs must be posted at all PEL boundaries.

See 4.9.7.1 for detail on the requirement for posting RF warning signs at PEL boundaries.

Continued on next page

4.9.6 Permissible Exposure Limit (PEL) Boundaries, Continued

4.9.6.2 PEL Boundaries at Shore Units

PEL boundaries at shore units should restrict access to areas where exposure exceeds the MPE limits for the general population.

The methods for restricting access include

- locking doors to the restricted areas, or
- installing a PEL fence with a lockable gate.

Notes:
- At remote sites, not generally visited by the general population, a RF RADHAZ sign may be considered as the PEL boundary.
- PEL fences are generally used at shore-based broadcast sites, such as DGPS broadcast sites, VTS radar sites, and communication stations (COMMSTA).

See 4.9.7.1 for detail on posting RF warning signs at PEL boundaries.

Continued on next page

4.9.6 Permissible Exposure Limit (PEL) Boundaries, Continued

4.9.6.3 PEL Fence Requirements

The requirements for PEL fences are described in the table below.

Note: Determining the location and size of PEL fences is the responsibility of the

- Telecommunication and Information Systems Command (TISCOM)
- Systems Management and Engineering Facility (SMEF), and
- Civil Engineering Unit (CEU).

Requirement	Description
PEL fences must be properly grounded or made of non-conducting material.	Proper installation of a PEL fence is essential to • reduce the potential for radio frequency (RF) burns and electric shock, and • limit undesirable effects on the broadcast signal.
Warning signs must be appropriately posted on PEL fences.	At a minimum, the following signs must be posted on a PEL fence: • Type 1 RF radiation hazard (RADHAZ) warning signs posted on each face of the fence (see 4.9.7.2 for more detail), and • Type 2 RF RADHAZ signs posted on each gate or entry way (see 4.9.7.3 for more detail). Other warning signs should be posted as needed.

Continued on next page

4.9.6 Permissible Exposure Limit (PEL) Boundaries, Continued

4.9.6.4 PEL Boundaries on Ships

The cognizant MLC assists the crew of each ship to determine and establish the PEL boundaries.

Generally, the PEL boundary to mark a restricted area on a ship is a painted red line or circle, four inches in width, on the deck.

Other methods, based on the extent and level of the radiation hazard, include

- temporarily restricting access to a section of the ship where equipment is operating, or
- limiting the power or frequency range when the general population is in the area.

IMPORTANT: Because each unit has a different layout and equipment, the PEL boundaries for ships vary (even for ships within the same class). For this reason, a radiation hazard policy for each ship must be promulgated.

See 4.9.6.5 for typical PEL boundaries for different classes of ships.

4.9.6.5 Typical PEL Boundaries for Different Classes of Ships

Radiation hazard surveys were conducted on several classes of cutters and shore units to determine the distance from transmitting antennae for typical PEL boundaries.

Note: When an antenna is used for more than one frequency range, differing power levels, or there are overlapping PEL boundaries, the PEL boundary should mark the largest area of the restricted zone.

The typical PEL boundaries for different classes of ships are listed in the table below.

Equipment	Watts	Frequency	Distance/Radius
99 foot WAGB Platform			
CCEM-229F	100 W	MF/HF	15 feet
Long Wire	1000 W	HF	6 feet
CDFL-MLA-324	100 W	MF/HF	12 feet
CDFL-MLA-115	1000 W	MF/HF	10 feet
378 foot WHEC Platform			
CCEM-390-2	100 W	HF	4 feet
CDFL-MLA-324	1000 W	HF	12 feet
CDFL-MLA-115	1000 W	HF	10 feet
5/16 inch Wire Rope	1000 W	HF	13 feet

Continued on next page

4.9.6 Permissible Exposure Limit (PEL) Boundaries, Continued

4.9.6.5
Typical PEL Boundaries for Different Classes of Ships (continued)

Equipment	Watts	Frequency	Distance/Radius
270 foot WMEC Platform			
CCEM-229F	1000 W	MF/HF	10 feet
CDFL-MLA-324	1000 W	HF	10 feet
CDFL-MLA-115	1000 W	HF	12 feet
210 foot WMEC Platform			
CCEM-229A	100 W	MF/HF	6 feet
CCE-390-2	100 W	MF/HF	6 feet
CDFL-MLA-115	1000 W	MF/HF	12 feet
CCEM-229	1000 W	HF	10 feet
180 foot WLB Platform			
CCEM-390-2	100 W	HF	6 feet
CCEM-229F	1000 W	HF	12 feet
110 foot WPB Platform			
CCEM-390-2	100 W	HF	6 feet
82 foot WPB Platform			
CCEM-390-2	100 W	HF	4 feet

The minimum distance of a PEL boundary, in all directions, is the distance farthest from the transmitting antenna that exceeds MPE limits in any direction.

Continued on next page

4.9.6 Permissible Exposure Limit (PEL) Boundaries, Continued

4.9.6.6 PEL Boundaries at Radar Sites

Most Coast Guard radar sites operate in the super high frequency (SHF) band with output powers as high as 30 kW and antennae with very high gains (+25 dB). However, due to the narrow bandwidth and pulse nature of radar operations, the radiation hazard from radar antennae is relatively small.

A PEL boundary is generally determined by measuring the distance of the radiation hazard when the radar antenna is rotating.

The exact level of RF energy and data used to establish PEL boundaries for radar antennae are determined by using a

- radiation hazard meter, and
- Holaday induced current meter and probe.

The established PEL boundary should ensure that the general population can work within the area during normal radar operations.

See
- 4.9.6.7 for typical PEL boundaries for Coast Guard radar antennae, and
- 4.9.6.8 for typical PEL boundaries for Navy radar antennae.

4.9.6.7 Typical PEL Boundaries for Coast Guard Radar Antennae

The typical PEL boundaries for Coast Guard radar antennae are listed in the table below.

Radar	Maximum Power	Antenna Size	Non-Rotating PEL	Rotating PEL
SPS-69	4 kW	3.9 feet	3.6 feet	Not applicable (NA)
Bridge Master	30 kW	6 feet	35 feet	NA
SPS-73	30 kW	12 feet	20 feet	10 feet
VTS Furuno	25 kW	10 feet	25 feet	10 feet

Continued on next page

4.9.6 Permissible Exposure Limit (PEL) Boundaries, Continued

4.9.6.8 Typical PEL Boundaries for Navy Radar Antennae

The typical PEL boundaries for Navy supported radar antennae are listed in the table below.

Mode	Non-Rotating PEL	Rotating PEL
Radar—MK-92 CAS		
CWI	320 feet	NA
Search	160 feet	NA
Track	120 feet	NA
Radar—AN/SPS-40		
Search	60 feet	NA
Radio—AN/WSC-3		
SATCOM	4 feet	NA
Radar—CIWS		
Track	90 feet	NA
Search	60 feet	NA

4.9.6.9 PEL Boundaries at Broadcast Sites

The conditions for determining PEL boundaries at Loran, DGPS, and communication station (COMMSTA) broadcast sites are described in the table below.

Broadcast Site Conditions	PEL Boundaries
Loran Broadcast Sites	
Loran Broadcast equipment operates in the LF band with a peak power of 1,400 kW for some transmitters. The potential for electric shock is extremely high.	No PEL boundaries are required for Loran equipment because of the frequencies used. However, because of the electric shock hazard, tube transmitting stations must comply with maximum permissible exposure (MPE) limits and requirements. See 4.9.5 Maximum Permissible Exposure (MPE) Limits for details.
DGPS Broadcast Sites	
DGPS Broadcast sites use several different types of antennae that broadcast on an MF frequency from 250 to 2,500 watts.	The standard PEL boundary at all sites is 25 feet from the broadcast antenna. **Note**: The DGPS SMEF is responsible for determining standard PEL boundaries.

Continued on next page

4.9.6 Permissible Exposure Limit (PEL) Boundaries, Continued

4.9.6.9
PEL Boundaries at Broadcast Sites (continued)

Broadcast Site Conditions	PEL Boundaries
COMMSTA Sites	
COMMSTA sites use different antenna types due to varying environmental conditions and surrounding structures.	Generic radiation hazard controls cannot be established at COMMSTA sites due to the varying antenna types, environmental conditions, and surrounding structures. Each site must conduct a radiation hazard survey and establish the appropriate PEL boundaries for the site.

4.9.6.10 Safety Procedure for Working Aloft

The standard radiation hazard safety procedure for most antennae is to suspend operations whenever personnel are working aloft.

See <u>4.3.1 Safety Responsibilities and Practices for Working Aloft</u> for detail on the personnel notified to suspend operations when personnel will be working aloft.

4.9.7 Radio Frequency (RF) Radiation Hazard (RADHAZ) Warning Signs

Overview

4.9.7.01 Scope

This section

- describes the eight types of radio frequency (RF) radiation hazard (RADHAZ) warning signs, including
  - how the signs are used
  - where signs should be posted, and
  - how to order signs, and
- includes an example of each type of RF RADHAZ warning sign.

4.9.7.02 Reference

Additional information about RF RADHAZ warning signs may be found in the following resource.

Resource	Description	Location/Link
Coatings and Color Manual, COMDTINST M10360.3 (series)	Policy and procedures for use of coatings and colors on all vessels, buildings, structures, fixed equipment, and aids to navigation.	CG Central

4.9.7.03 Contents

This section contains the following topics.

4.9.7.1 Requirements and Specifications for RF RADHAZ Warning Signs

Introduction

This topic contains requirements for

- posting radio frequency (RF) radiation hazard (RADHAZ) warning signs
- determining which types of signs to post at permissible exposure limit (PEL) boundaries
- RF RADHAZ warning sign design specifications, and
- procuring RF RADHAZ warning signs.

4.9.7.1.1 Requirements for Posting RF RADHAZ Warning Signs

Post radio frequency (RF) radiation hazard (RADHAZ) warning signs in locations where they are clearly visible and mark, as precisely as possible, the area of the radiation hazard.

In areas where multiple hazards exist, it may be necessary to post more then one type of warning sign.

Note: Do not post warning signs indiscriminately. The effectiveness of the warning is reduced when there are an excessive number of signs.

4.9.7.1.2 Determining Types of RF RADHAZ Warning Signs to Post at PEL Boundaries

To determine which types of RF RADHAZ warning signs to post at a PEL boundary, all entries to restricted areas from the PEL boundary (such as scuttles or hatchways from inside the superstructure of the ship or ladders installed topside) must be inspected.

IMPORTANT: Metallic Type 3 signs are a burn hazard. Use only *non-metallic* Type 3 signs within a PEL boundary or in the near-field of antennae.

See 4.9.3 About RF Radiation Exposure Hazards for details on how metal objects can cause RF burns.

Continued on next page

4.9.7.1 Requirements and Specifications for RF RADHAZ Warning Signs, Continued

4.9.7.1.3 Required Design Specifications for RF RADHAZ Warning Signs

The required design specifications for RF RADHAZ warning signs are described in the table below.

Specification	Description
Base material	Outdoor white vinyl, 0.004 inches thick, with permanent acrylic adhesive backing.
Shape	Triangle
Colors	• Red and yellow checked border on upper section of triangle, and • black lettering on lower section of triangle.
Sizes	• Five inch size for normal shipboard use, and • twelve inch size for shore installations, flight decks, and DGPS and Communication Station (COMMSTA) broadcast sites.
Print process	• Black ink for lettering • ultra violet ink for screen printed labels (for maximum durability), and • bleeds if requested by artwork.

Continued on next page

4.9.7.1 Requirements and Specifications for RF RADHAZ Warning Signs, Continued

4.9.7.1.4 Requirement for Procuring RF RADHAZ Warning Signs

RF RADHAZ warning signs must be procured through the appropriate government program.

Note: The national stock number (NSN) for each type of RF RADHAZ warning sign can be found in this section and in the Federal Logistics (FEDLOG) system.

4.9.7.2 Type 1 RF RADHAZ Warning Sign

Introduction

This topic

- describes the appropriate usage and placement of the Type 1 radio frequency (RF) radiation hazard (RADHAZ) warning sign, and
- provides the order information and an example of the Type 1 sign.

4.9.7.2.1 Use of Type 1 RF RADHAZ Warning Signs

Type 1 RF RADHAZ warning signs are used in areas surrounding RF antennae to advise personnel not to remain within the permissible exposure limit (PEL) boundary longer than the maximum permissible exposure (MPE) time limit allows.

See 4.9.5.2 for details on the occupational population MPE time limit.

4.9.7.2.2 Placement of Type 1 RF RADHAZ Warning Signs

Type 1 RF RADHAZ warning signs should be posted

- outside the PEL boundary at eye level (or where they can be seen easily), and
- at each end of the boundary, if applicable.

4.9.7.2.3 Order Information for Type 1 RF RADHAZ Warning Signs

The order information for Type 1 RF RADHAZ warning signs is provided in the table below.

Size	Form Number	NSN
Five inch	101/5	7690-01-377-5893
Twelve inch	101/12	7960-01-377-5894

Continued on next page

4.9.7.2 Type 1 RF RADHAZ Warning Sign, Continued

4.9.7.2.4 Example of Type 1 RF RADHAZ Warning Sign

An example of the Type 1 RF RADHAZ warning sign is provided below.

4.9.7.3 Type 2 RF RADHAZ Warning Sign

Introduction

This topic

- describes the appropriate usage and placement of the Type 2 radio frequency (RF) radiation hazard (RADHAZ) warning sign, and
- provides the order information and an example of the Type 2 sign.

4.9.7.3.1 Use of Type 2 RF RADHAZ Warning Signs

Type 2 RFRADHAZ warning signs are used to restrict personnel from proceeding past a designated point unless they are in compliance with the established radiation hazard safety procedures.

Note: Units are responsible for instituting radiation hazard safety procedures.

4.9.7.3.2 Placement of Type 2 RF RADHAZ Warning Signs

Type 2 RF RADHAZ warning signs should be posted at eye level on doors or between handrails of inclined ladders.

When used as a temporary barrier, Type 2 signs should be posted at waist level on a non-metallic rope.

4.9.7.3.3 Order Information for Type 2 RF RADHAZ Warning Signs

The order information for Type 2 RF RADHAZ warning signs is provided in the table below.

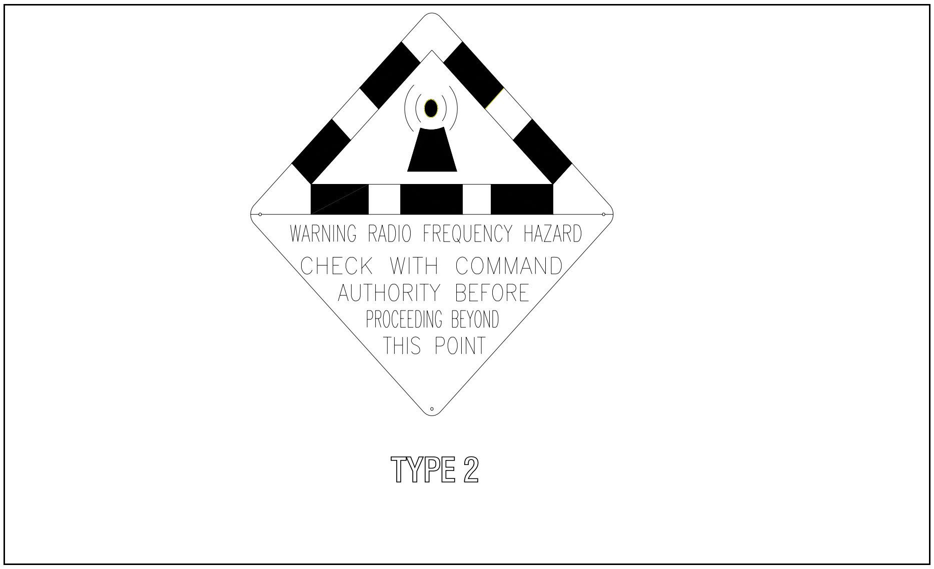
Size	Form Number	NSN
Five inch	102/5	7690-01-377-5895
Twelve inch	102/12	7960-01-377-5082

Continued on next page

4.9.7.3 Type 2 RF RADHAZ Warning Sign, Continued

4.9.7.3.4 Example of Type 2 RF RADHAZ Warning Sign

An example of the Type 2 RF RADHAZ warning sign is provided below.



4.9.7.4 Type 3 RF RADHAZ Warning Sign

Introduction

This topic

- describes the appropriate usage and placement of the Type 3 radio frequency (RF) radiation hazard (RADHAZ) warning sign, and
- provides the order information and an example of the Type 3 sign.

4.9.7.4.1 Use of Type 3 RF RADHAZ Warning Signs

Type 3 RF RADHAZ warning signs are used to advise personnel of an RF burn hazard source and not to touch metal objects or use special handling procedures when touching metal objects.

IMPORTANT: Use only *non-metallic* Type 3 signs within a permissible exposure limit (PEL) boundary or in the near-field of an RF transmitting antenna. Metallic Type 3 signs are a burn hazard when illuminated by energy from a nearby RF transmitting antenna.

4.9.7.4.2 Placement of Type 3 RF RADHAZ Warning Signs

Type 3 RF RADHAZ warning signs should be posted on, or in the vicinity of, an RF burn hazard source where it can be seen easily. If the burn hazard source is large, additional signs should be posted around the source from each direction.

When Type 3 signs are used on cargo railing or running rigging, the signs should be mounted on the hook insulator to warn personnel not to touch the wire or rigging above the insulator.

IMPORTANT: Currently, RF burn measurement standards have not been defined and safe measurement procedures are not available. Placement of signs, therefore, is based on the experience of unit personnel or personnel from other units who have previously sustained burns.

4.9.7.4.3 Order Information for Type 3 RF RADHAZ Warning Signs

The order information for Type 3 RF RADHAZ warning signs is provided in the table below.

Size	Form Number	NSN
Five inch	103/5	7690-01-377-5896
Twelve inch	103/12	7960-01-377-9905

Continued on next page

4.9.7.4 Type 3 RF RADHAZ Warning Sign, Continued

4.9.7.4.4 Example of Type 3 RF RADHAZ Warning Sign

An example of the Type 3 RF RADHAZ warning sign is provided below.

TYPE 3

4.9.7.5 Type 4 RF RADHAZ Warning Sign

Introduction

This topic

- describes the appropriate usage and placement of the Type 4 radio frequency (RF) radiation hazard (RADHAZ) warning sign, and
- provides the order information and an example of the Type 4 sign.

4.9.7.5.1 Use of Type 4 RF RADHAZ Warning Signs

Type 4 RF (RADHAZ warning signs are used to warn personnel of Hazards of Electromagnetic Radiation to Fuel (HERF).

See 4.9.4 HERF and HERO Safety Practices for details on HERF.

4.9.7.5.2 Placement of Type 4 RF RADHAZ Warning Signs

Type 4 RF RADHAZ warning signs should be posted above aviation and automotive gasoline fueling stations.

4.9.7.5.3 Order Information for Type 4 RF RADHAZ Warning Signs

The order information for Type 4 RF RADHAZ warning signs is provided in the table below.

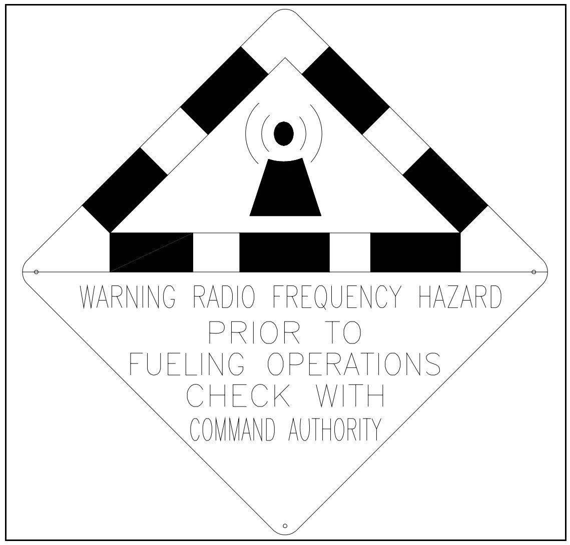
Size	Form Number	NSN
Five inch	104/5	7690-01-377-5899
Twelve inch	104/12	7960-01-377-5900

Continued on next page

4.9.7.5 Type 4 RF RADHAZ Warning Sign, Continued

4.9.7.5.4 Example of Type 4 RF RADHAZ Warning Sign

An example of the Type 4 RF RADHAZ warning sign is provided below.



4.9.7.6 Type 5 RF RADHAZ Warning Sign

Introduction

This topic

- describes the appropriate usage and placement of the Type 5 RF radiation RADHAZ warning sign, and
- provides the order information and an example of the Type 5 sign.

4.9.7.6.1 Use of Type 5 RF RADHAZ Warning Signs

Type 5 RF RADHAZ warning signs are labels that are generally used below deck in a system equipment room to advise system operators of specific safety precautions.

The safety precautions are typed in the blank spaces on the label.

Examples:
- Inform the Officer of the Deck (OOD) before placing system in radiate mode.
- In manual mode, do not depress below horizon between __ and __ degrees relative.
- Ensure that temporary exclusion barriers are in place before radiating.
- Do not stop antenna between __ and __ degrees when radiating.

4.9.7.6.2 Placement of Type 5 RF RADHAZ Warning Signs

Type 5 RF RADHAZ warning signs should be posted near the applicable controls (such as the radiate switch or antenna control switch) where they be seen easily by the system operators during normal operations.

IMPORTANT: Do not cover or obscure switch labels, meters, indicators, or nameplates when posting Type 5 signs on system cabinets or control panels.

4.9.7.6.3 Order Information for Type 5 RF RADHAZ Warning Signs

The order information for Type 5 RF RADHAZ warning signs is provided in the table below.

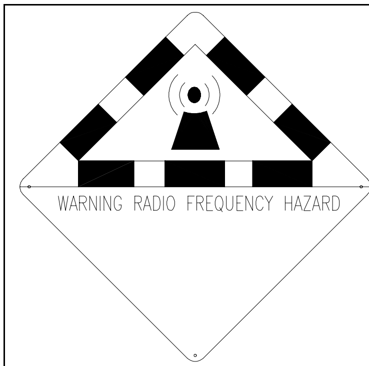
Size	Form Number	NSN
Five inch	105/5	7690-01-377-5374
Twelve inch	105/12	7960-01-377-5375

Continued on next page

4.9.7.6 Type 5 RF RADHAZ Warning Sign, Continued

4.9.7.6.4 Example of Type 5 RF RADHAZ Warning Sign

An example of the Type 5 RF RADHAZ warning sign is provided below.



TYPE 5

4.9.7.7 Type 6 RF RADHAZ Warning Sign

Introduction

This topic

- describes the appropriate usage and placement of the Type 6 radio frequency (RF) radiation hazard (RADHAZ) warning sign, and
- provides the order information and an example of the Type 6 sign.

4.9.7.7.1 Use of Type 6 RF RADHAZ Warning Signs

Type 6 RF RADHAZ warning signs are used to advise personnel not to operate transmitters, cellular telephones, or other wireless communication devices within a designated area.

Note: Personnel who are not familiar with Command requirements for transmitter operation should check with the Officer of the Deck (OOD) before operating transmitters.

4.9.7.7.2 Placement of Type 6 RF RADHAZ Warning Signs

Type 6 RF RADHAZ warning signs should be posted at eye level on the door to a space, and at various places inside the space, where classified information is processed.

4.9.7.7.3 Order Information for Type 6 RF RADHAZ Warning Signs

The order information for Type 6 RF RADHAZ warning signs is provided in the table below.

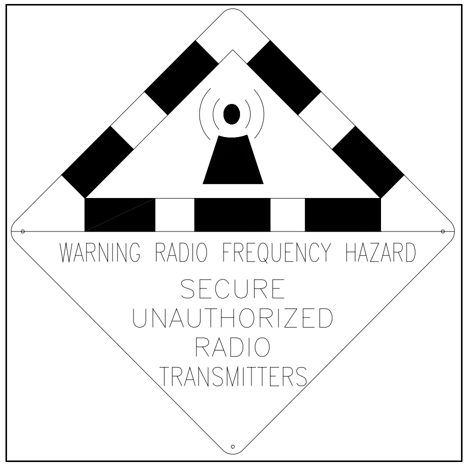
Size	Form Number	NSN
Five inch	106/5	7690-01-377-5444
Twelve inch	106/12	7960-01-377-5447

Continued on next page

4.9.7.7 Type 6 RF RADHAZ Warning Sign, Continued

4.9.7.7.4 Example of Type 6 RF RADHAZ Warning Sign

An example of the Type 6 RF RADHAZ warning sign is provided below.



4.9.7.8 Type 7 RF RADHAZ Warning Sign

Introduction

This topic

- describes the appropriate usage and placement of the Type 7 radio frequency (RF) radiation hazard (RADHAZ) warning sign, and
- provides the order information and an example of the Type 7 sign.

4.9.7.8.1 Use of Type 7 RF RADHAZ Warning Signs

Type 7 RF RADHAZ warning signs are used to ensure that personnel follow the Hazards of Electromagnetic Radiation to Ordnance (HERO) safety practices.

See 4.9.4 HERF and HERO Safety Practices for details on HERO.

4.9.7.8.2 Placement of Type 7 RF RADHAZ Warning Signs

Type 7 RF RADHAZ warning signs should be posted in areas where ordnance is loaded and near unit magazines.

4.9.7.8.3 Order Information for Type 7 RF RADHAZ Warning Signs

The order information for Type 7 RF RADHAZ warning signs is listed below.

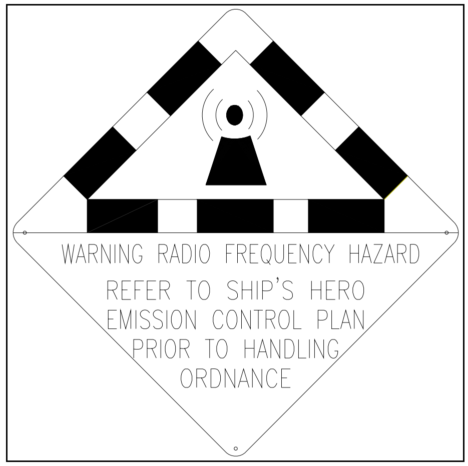
- Size: five inches
- Form Number: 107/5
- NSN: 7690-01-377-5901

Continued on next page

4.9.7.8 Type 7 RF RADHAZ Warning Sign, Continued

4.9.7.8.4 Example of Type 7 RF RADHAZ Warning Sign

An example of the Type 7 RF RADHAZ warning sign is provided below.



4.9.7.9 Type 8 RF RADHAZ Warning Sign

Introduction

This topic

- describes the appropriate usage and placement of the Type 8 radio frequency (RF) radiation hazard (RADHAZ) warning sign, and
- provides the order information and an example of the Type 8 sign.

4.9.7.9.1 Use of Type 8 RF RADHAZ Warning Signs

Type 8 RF RADHAZ warning signs are used to

- advise operators to refer to the unit Hazards of Electromagnetic Radiation to Ordnance (HERO) Emission Control Plan before operating a transmitter, and
- ensure that the procedures for restricting RF emissions are followed.

4.9.7.9.2 Placement of Type 8 RF RADHAZ Warning Signs

Type 8 RF RADHAZ warning signs should be posted at eye level near transmitting equipment in the radio room and combat center.

4.9.7.9.3 Order Information for Type 8 RF RADHAZ Warning Signs

The order information for Type 8 RF RADHAZ warning signs is listed below.

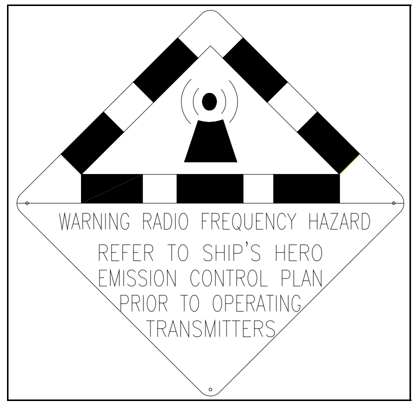
- Size: five inches
- Form Number: 108/5
- NSN: 7690-01-377-5902

Continued on next page

4.9.7.9 Type 8 RF RADHAZ Warning Sign, Continued

4.9.7.9.4 Example of Type 8 RF RADHAZ Warning Sign

An example of the Type 8 RF RADHAZ warning sign is provided below.



5.0 Electronic Equipment Life Cycle

Table of Contents

5.0 Electronic Equipment Life Cycle

Overview

5.0.1 Scope

.
This part describes

- the life cycle of electronic equipment, from acquisition through disposition
- responsibilities for the support of electronic equipment throughout its life cycle, and
- responsibilities of individual units for the management of electronic property and assets.

5.0.2 References

Additional information about the electronic equipment lifecycle may be found in the following resources.

Resource	Description	Location/Link
Supply Policy and Procedures Manual, COMDTINST M4400, 19 (series)	The basic authority on supply for the Coast Guard.	CG Central
Property Management Manual, COMDTINST 4500.5 (series)	Guidance on • Custodial responsibilities • Equipment accountability • Operating Materials and Supplies (OM&S), and • property.	CG Central
Equipment/System Integrated Logistics Support Plan (EILSP) Development Decisions	Guidance on electronic equipment from system acquisition, through life cycle maintenance and system disposition.	CG Central
Equipment/System Integrated Logistics Support Plan (EILSP) and Equipment Support Sheet (ESS) Development and Maintenance Responsibilities, COMDINST 4105.7 (series)	Guidance on electronic equipment, from acquisition through life cycle maintenance and disposition.	CG Central

Continued on next Page

Overview, Continued

5.0.3 Contents

This part covers the following subjects.

5.1 Electronic Equipment Life Cycle Summary

Introduction

This topic describes the stages of the electronic equipment life cycle.

5.1.1 Electronic Equipment Life Cycle

The table below

- provides a brief description of each stage in the life cycle of electronic equipment, and
- identifies where in this manual to find more detailed information.

Note: Electronic equipment is expected to have a service life of 8 years.

Life Cycle Stage	Description	For more information see …
Acquisition and Procurement	• Requirements and specifications are determined for – new electronic equipment, or – configuration changes to existing equipment, and • the appropriate AFC funding to procure the equipment is secured.	5.2 Equipment Acquisition and Procurement
Installation	Electronics equipment • is installed in accordance with the applicable standards and specifications, and • undergoes a certification process in preparation for deployment.	6.0 Equipment Installation 5.3 Equipment Standardization
Equipment Maintenance	Electronics equipment is maintained and repaired in accordance with applicable systems and programs.	• 5.5 Asset Management • 7.0 Equipment Maintenance
Equipment Engineering Changes	When necessary to support operations, the configuration of installed equipment is modified.	8.0 Equipment Engineering Changes
Equipment Disposition	Electronic equipment is removed/uninstalled • when a vessel is decommissioned, or • when a system is upgraded.	5.6 Equipment Disposition

Continued on next page

5.1 Electronic Equipment Life Cycle Summary, Continued

5.1.2 Electronic Equipment Lifecycle Support

Life cycle support of electronic equipment includes

- management of equipment maintenance processes, and
- configuration management, which is the process of managing and controlling changes affecting equipment and its associated documentation.

See 5.4 Equipment Support for more detail.

5.1.3 Equipment / System Integrated Logistics Support Plan (EILSP)

The Equipment/System Integrated Logistics Support Plan (EILSP), COMDTINST M4105.7 (series) provides guidance on electronic equipment from system acquisition, through life cycle maintenance and system disposition.

Equipment/System Integrated Logistics Support Plans for most CG-supported equipment are contained on CG Central.

5.2 Equipment Acquisition and Procurement

Introduction

This chapter contains information on electronic equipment acquisition and procurement, including

- a summary of the acquisition and procurement process
- the three types of equipment acquisitions, and
- categories of funding used for equipment procurement.

5.2.1 Electronic Sensor Equipment and Systems

Sensor equipment and systems include, but are not limited to

- shipboard radar systems
- radio direction finders
- navigation receivers depth finders
- navigation systems, including LORAN-C
- Differential Global Positioning Systems (DGPS)
- marine radio and radio beacons
- electronics short-range Aids to Navigation, and
- systems using
  - voice
  - data
  - radio
  - wire and fiber, and
  - Digital Voice Logging (DVL) equipment.

Continued on next page

5.2 Equipment Acquisition and Procurement, Continued

5.2.2 Acquisition vs. Procurement

Acquisition is the process of acquiring hardware, software, or services. Acquisition should not be considered as merely receiving delivery of equipment.

Procurement is the process of taking a requirement and funds and turning them into a legal contract.

Procurement usually starts once the budget process is complete and funds are available. Depending on the scope of the contract, procurement may cover

- one phase of the acquisition process (for example, the purchase of hardware or testing and installation), or
- most of the acquisition process (for example, designing, building, installing, and maintaining a turn-key operation).

5.2.3 Decision Whether to Acquire Standardized Equipment

The decision whether to acquire standardized equipment is determined by the program manager in the responsible office during the acquisition and recapitalization process.

See 5.3 Equipment Standardization for more detail.

Continued on next page

5.2 Equipment Acquisition and Procurement, Continued

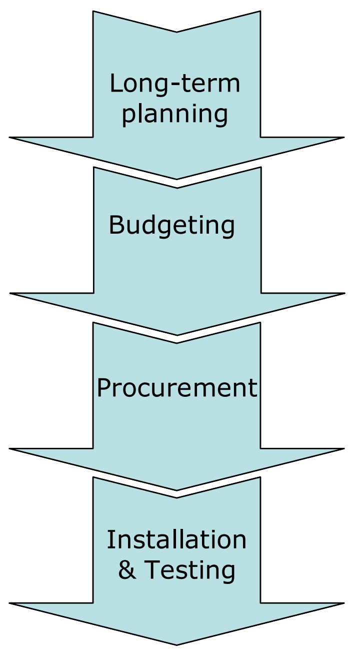
5.2.4 Equipment Acquisition Process

The Acquisition and Procurement processes should follow clear-cut step-by-step procedures.

Problems arise when

- not all steps are completed
- insufficient time is available, or
- personnel are not available.

As shown in the graphic below, the Electronics Equipment Acquisition and Procurement Process includes long-term planning, budgeting, procurement, and installation and testing.



Maintenance and support functions take over once the acquisition phase is completed.

Note: Acquisition planning includes maintenance considerations to ensure a smooth hand-off once operations begin.

Continued on next page

5.2 Equipment Acquisition and Procurement, Continued

5.2.5 Detailed Acquisition Guidance

The table below describes the three types of acquisition process, and identifies where to find step-by-step guidance on each.

The following acquisition process …	Covers acquisitions that …	For step-by-step guidance, refer to …
Major	• are over $50M, or • are under $50M but require management attention (normally between $5M and $50M)	Major Systems Acquisition Manual, COMDTINST M4150.2 (series).
Non-Major	range from $100K to $5M	• the assigned SMEF • the appropriate Center of Excellence, or • HQ.
Simplified	are up to $100K	COMDTINST M4200.13 (series).

5.2.6 Equipment Procurement Funding

Before any procurement can begin, the program manager must ensure that funds are available.

Funds for equipment acquisitions are categorized by Allotment Fund Control (AFC) codes, which

- are flexible obligation ceiling levels, and
- represent a breakdown of Operating Expense (OE) funds.

Each AFC has a specific purpose for which the funds must be used. The two AFC codes most commonly associated with electronics equipment are described in the table below.

Type of Fund	Fund Code	Purpose	Comments
Operating and Maintenance (O&M)	AFC-30	Normal and ordinary operating costs for each OPFAC unit Examples are • office supplies • phone bills, and • office equipment.	AFC-30 (O&M) funds are apportioned

Continued on next page

5.2 Equipment Acquisition and Procurement, Continued

5.2.6
Equipment Procurement Funding (continued)

Type of Fund	Fund Code	Purpose	Comments
Electronics Program (Acquisition, Construction, & Improvements)	AFC-42	Ground and ship-based electronic equipment • acquisition • installation, and • major maintenance. **Note**: This includes electronics equipment and Aids to Navigation (for example, an Instrument Landing System (ILS)) used to support aircraft operations.	AFC-42 funds are apportioned • according to the needs of MLCs and headquarters units by Commandant (CG-64), and • using an allocation formula that considers – the existing plant – new requirements, and – special requests. **Note**: Chargeable items may be provided or performed by • commercial concerns • other Government agencies • CG Integrated Support Command, or • ESU/ESD CG personnel.

5.3. Equipment Standardization

Introduction

This topic describes standardization of electronics equipment, including:

- the importance of standardization
- criteria that contribute to the decision to standardize
- personnel responsible for standardization, and
- standardization policies for vessels and shore units.

5.3.1 Importance of Standardizing Electronic Equipment

Standardization is important because it

- ensures that common equipment and procedures exist in as many places as feasible
- reduces training costs
- allows flexibility in personnel transfers
- improves equipment support, and
- reduces overall life cycle logistics costs.

5.3.2 Scope of Equipment Standardization

The decision of whether to standardize is determined by the program manager in the responsible office during the acquisition and recapitalization process.

Standardization may take into consideration

- the types of equipment installed
- conformance to TEMPEST and other technical performance requirements
- vessel weight and moment status
- antenna configuration, and
- aspects such as the location and arrangement of displays and controls.

Continued on next page

5.3. Equipment Standardization, Continued

5.3.3 Criteria Contributing to the Decision to Standardize

The decision to standardize is based on a number of criteria, including

- equipment life cycle
- retrofit costs, and
- field input (as part of the engineering change request (ECR) process).

Note: Whenever a change extends beyond one platform, standardization must be considered.

5.3.4 Responsibilities for Electronics Equipment Standardization

The responsibilities associated with the standardization of electronic equipment are described in the table below.

Who is Responsible	Description
Commandant (CG-4)	Specifying standardization requirements, including • electronic equipment that may be installed in – vessels, and – shore units, and • computer software or firmware related to electronic equipment or systems directly supported by – Commandant (CG-6), or – a SMEF.
Commandant (CG-45)	Managing typical class arrangement drawings for major cutter classes.
MLCs	Preparing and maintaining engineering drawings—beyond those provided by Commandant or headquarters units—for vessels whose arrangements differ from those typical of the class.
Cognizant MLC Commander	Funding secondary equipment rearrangements required by the later installation of new equipment provided by the Commandant.

Continued on next page

5.3. Equipment Standardization, Continued

5.3.5 Vessel Standardization Policy

The table below specifies standardization polices for various types of equipment installed aboard Coast Guard vessels.

IMPORTANT: Unless otherwise indicated by the installation documentation, deviations are not allowed without prior approval from the alteration approving authority.

The following type of equipment …	Must be installed …
equipment with specified manufacturer and model number	as specified by the Engineering Change.
antennas and transducers	both physically and electrically, as specified by • the Engineering Change, or • drawings or documents referred to by Engineering Changes.
all equipment installed in "Secure Communications Spaces" of ships equipped with on-line cryptographic equipment	both physically and electrically, as specified in the • Engineering Change • associated engineering drawings, and • Computer Operated Engineering Data (COED) lists.
cryptographic equipment installed in other compartments (such as the Combat Information Center)	as specified by the Engineering Change. **Note**: These requirements may include a prohibition against installing other equipment within a specified distance.
all other electronic equipment	as directed by the cognizant MLC, area, or district commander, with the following exceptions: • Equipment must be installed in the compartment specified in the Engineering Change. • Equipment other than antennae installed on weather decks (such as antenna couplers) must be installed on the deck specified (that is, at the same water line), but may be moved horizontally (fore and aft or athwart ships) up to 4 feet without obtaining prior approval. • Equipment must be wired and interconnected as specified by the – Engineering Change, or – COED List.

Continued on next page

5.3. Equipment Standardization, Continued

5.3.6 Standardization Policy for Non-Standard Boats

Non-standard boats—are vessels whose maintenance and configuration control responsibility has been passed to the MLC—must be outfitted with the same make and model equipment installed on similar standard boats, unless otherwise directed by Commandant (CG-64).

The MLC or district is responsible for funding the procurement, replacement, installation, and maintenance of electronic equipment on non-standard boats.

Note: The Commandant will include known requirements for non-standard boat equipment when planning procurement of standard equipment or systems.

5.3.7 Shore Unit Standardization Policy

Commandant (CG-62) requires the installation of standard equipment at shore units when one or more of the following factors apply:

- The equipment is maintained under a service-wide contract.
- Significant economies of training or logistics can be shown.
- Equipment procurement or use is limited by law, regulations, or tariff (for example, telephone, and computer equipment).
- Equipment operational specifications are critical to mission performance.
- Equipment must operate with standard computer software, or software that is under Commandant configuration control.
- Equipment is specified or provided.
- Substitute equipment is not authorized.

IMPORTANT: When the equipment is specified or provided, substitution of other equipment is not allowed without prior approval from the alteration approving authority.

5.3.8 Arrangement of Equipment in Shore Units

Unless otherwise specified in the engineering approval documentation, equipment may be arranged within the room or building at the discretion of the appropriate area, MLC, or district commander.

Note: Equipment arrangements will typically be specified when they affect performance or TEMPEST requirements.

Continued on next page

5.3. Equipment Standardization, Continued

5.3.9 Computer Software or Firmware Modification Policy

The following requirement applies only when computer software or firmware related to electronic equipment or systems is directly supported by Commandant (CG-6) or by a SMEF.

A change of any size (for example, one or more program statements)

- is considered a change to the equipment itself, and
- is forbidden unless the change is
  - approved in accordance with the established change process, and
  - documented.

Exceptions: Specific configuration control policies for an information system supersede this policy.

5.4 Equipment Support

Overview

Scope

This topic contains information on

- configuration management, which is a process for managing and controlling changes to supported equipment and systems, and
- management responsibilities for the support of electronic equipment.

5.4.01 References

Additional information about equipment support may be found in the following resources.

Resource	Description	Location/Link
Coast Guard Engineering Logistics Concept of Operations (ECONOP), COMDTINST M4100.7 (series)	A conceptual view of the optimal state of engineering logistics, which provides a framework for the development of future business practices and information systems.	---
Configuration Management Guidance MIL-STD-188-124B	---	---
EIA649 National Consensus Standard for Configuration Management	---	---

5.4.02 Contents

This chapter covers the following subjects.

5.4.1 Configuration Management

Introduction

This topic contains information on configuration management, including

- objectives, duration, and responsibilities for configuration management
- configuration baselines, and
- SMEF system manager responsibilities for maintaining baselines.

5.4.1.1 Configuration Management Terms and Definitions

Terms associated with configuration management are defined in the table below.

Configuration Term	Definition
Configuration	An item's • functional characteristics, such as – range – speed, or – reliability, and • physical characteristics, such as – form – fit, or – function.
Configuration Item (CI)	An equipment item or system designated for configuration management.
Configuration Management (CM)	A process for • managing technical engineering documentation and the "as-built" product, and • controlling changes affecting equipment and its associated documentation.
Configuration Identification (CID)	The process of defining the hardware, software, and documentation that constitute a configuration baseline.

Continued on next page

5.4.1 Configuration Management, Continued

5.4.1.1
Configuration Management Terms and Definitions (continued)

Configuration Term	Definition
Configuration Baseline (CB)	• The approved configuration at a specified time, and • the set of all approved Configuration Identifications.
Configuration Control	• The systematic evaluation, coordination, approval or disapproval, and implementation of all approved changes to the configuration item. • May be applied during development and after formal establishment of the Configuration Baseline.

5.4.1.2
Objectives of Configuration Management (CM)

The objectives of Configuration Management (CM) are to

- identify and document the characteristics of a CI
- control changes to these characteristics
- provide information on the status of change actions, and
- audit and review the item for compliance with contractual and identification requirements.

5.4.1.3
CM Duration

CM

- is initiated in the engineering phase of the equipment's life cycle, and
- continues throughout the life of the equipment until it is properly disposed of.

Continued on next page

5.4.1 Configuration Management, Continued

5.4.1.4 Configuration Management Responsibilities

The responsibilities associated with configuration management are described in the table below.

Who is Responsible	Description
SMEF	Managing and controlling changes in system configuration by • identifying a process, and • developing procedures. **Note**: The SMEF configuration management procedures reflect the basic functional objectives of more formal configuration management systems found in many Department of Defense (DoD) directives and publications, but are tailored to meet Coast Guard system requirements.
Engineering	Identifying and documenting functional and physical specifications of electronic • systems • equipment, and/or • software.

Continued on next page

5.4.1 Configuration Management, Continued

5.4.1.5 Configuration Baselines (CBs)

Configuration baselines (CBs) provide for the progressive definition and documentation of the requirements and design information describing CIs.

The three types of CBs used by CM are described in the table below.

CB Type	Description	Documentation Where Baseline Typically Defined
Functional Baseline	The approved configuration documentation that describes • the performance characteristics of a system or top level configuration in the following areas: – function – inter-operability, and – interface, and • the verification required to demonstrate achievement of these performance characteristics.	Systems Requirements Specification.
Allocated Baseline	The current approved performance-oriented documentation for a proposed CI that describes • the functional and interface characteristicated that are allocated from those of a *higher-level* CI, and • the verification required to demonstrate achievement of these characteristics.	• Procurement Specification, or • Development Specification.
Product Baseline	Defines the “as-built” and tested configuration.	• Engineering drawings • parts lists • product, material, and process specifications • technical manuals • technical repair standards, and • test requirements for the verification of required performance.

Continued on next page

5.4.1 Configuration Management, Continued

5.4.1.6 SMEF Responsibility for Configuration Baselines

The SMEF is responsible for maintaining the product baseline. The SMEF

- acts as custodian of the engineering technical data which makes up the Configuration Baseline for each system equipment and/or software (**Note**: this does not include the provisioning documentation used to develop a MICA or APL)
- insures the accuracy of the Product Baseline Update as configuration changes are approved and implemented
- maintains the Product Baseline equipment and/or software
- at periodic intervals, ensures the performance meets the technical specifications identified in the Configuration Baseline documentation, and
- maintains a current copy of all provisioning documentation, including master parts lists and APLs. **Reference**: For more information on provisioning policies and procedures, see the Provisioning Manual for Major Systems Acquisitions, COMDINST M4423.1 (series).

See 5.4.3 SMEF Responsibilities for Supporting Equipment for additional responsibilities of the SMEF for supporting electronic equipment.

5.4.1.7 The Software Master Library/ Repository

The SMEF is also responsible for maintaining the Software Master Library/Repository, which

- contains released and pre-released software and documentation
- includes an archive of inactive software and documentation, including updated masters, and
- is used by the SMEF to maintain the Product Baseline for software

Note: Released software is software in the field. Pre-released software is software that is either under evaluation, or has not been delivered to the field.

Only the System Manager, acting as the Configuration Manager, may provide the Inventory Control Point (ICP) with approved changes to the Provisioning Technical Documentation.

5.4.2 Equipment Support Roles and Responsibilities

5.4.2.1 Equipment Support Roles and Responsibilities

The roles and responsibilities associated with electronic equipment support are described in the table below.

Role	Description
Support Manager	All electronic equipment or systems are assigned a support manager within Commandant (CG-64) who • is responsible for life cycle support of the program assigned, and • provides guidance for policy, planning and financial matters, which includes – drafting Resource Proposals (RPs) – reviewing life cycle costs – submitting annual Integrated Budget Development System (IBDS). entries, and – submitting Total Cost of Ownership (TCO) data to the TCO Manager in Commandant (CG-64).
• SMEF Systems Manager, or • Equipment Manager	The SMEF or Equipment Manager indirectly provides vital services to technicians via their appropriate MLC/ESU/ESD, including • identifying repair or replacement options for aging or high failure items • providing technical assistance to the technician's support chain of command • issuing Field Changes, and • providing configuration management (CM) for all supported equipment. See 5.4.3 SMEF Responsibilities for Supporting Equipment for more detail about the function of a SMEF Systems Manager.
Maintenance Support Provider	Maintenance support for equipment or software products can be provided by • the developer • a contractor, or • a dedicated in-house group. Ideally, the developer should maintain a system. Better, more supportable products may be created if developers know that maintenance support will be their responsibility.

Continued on next page

5.4.2 Equipment Support Roles and Responsibilities, Continued

5.4.2.2 SMEF vs. Equipment Manager

The differences between the roles of a SMEF and an equipment manager in supporting electronic equipment are described in the table below.

Role	Description
SMEF	Systems Management and Engineering Facilities (SMEFs) were created to unite systems management functions with the Engineering Facility. A SMEF is usually assigned when the equipment or system • interfaces with a SMEF-supported system • is critical to mission completion • has an operational requirement • has a large number of installations • is highly complex (that is, has a large number of sub-units or requires specialized training), and/or • has an expected life cycle cost greater than $25,000. **Note**: Although the term SMEF is frequently used to indicate the person(s) acting as the System Manager, it is important to note that SMEF is the entire command and not one person.
Equipment Manager	The Commandant (CG-64) may assign an Equipment Manager when a SMEF is not required. An Equipment Manager • has fewer responsibilities than a SMEF, and • is responsible for a particular piece of equipment that – does not have a significant interface with a system, or – is not considered mission critical. In many cases, an Equipment Manager is responsible for providing life cycle support for commercial of the shelf (COTS) material, which requires little or no engineering expertise. **Note**: Occasionally, in the execution of assigned duties, Equipment Managers may be required to contract with an engineering facility to resolve an engineering issue beyond their capabilities – either • a Coast Guard Center of Excellence (a SMEF), or • an outside contractor.

Continued on next page

5.4.2 Equipment Support Roles and Responsibilities, Continued

5.4.2.3 SMEF Responsibilities

The SMEF has broad responsibilities, including the authority to

- issue field changes
- release software, and
- have direct liaison with all levels of the Coast Guard.

The SMEF has at its disposal

- engineers
- systems managers, and
- significant baseline facilities.

See 5.4.3 SMEF Responsibilities for Supporting Equipment for more detail.

5.5.2.4 Assigning the Appropriate SMEF

The table below provides guidance on assigning the appropriate SMEF to a project.

If the equipment or system …	Then …
• functionality or type can be associated with an existing SMEF responsibility, or • interfaces with one or more of the equipment or systems currently assigned to an existing SMEF	Commandant (CG-64) assigns the existing SMEF.
• functionality or type cannot be associated with existing SMEF responsibility, or • does not interface with one or more of the equipment or systems currently assigned to an existing SMEF	Commandant (CG-64) assigns a new SMEF.

Continued on next page

5.4.2 Equipment Support Roles and Responsibilities, Continued

5.4.2.5 Depot Level Support at a SMEF

The prime responsibility of an electronic repair depot is the repair of APA repairable electronic items that are under the control of the ICP at the Engineering Logistics Center (ELC) in Baltimore, MD.

The Commandant (CG-4) is responsible for

- establishing depot facilities, and
- assigning repair responsibilities.

5.4.2.6 Technician Responsibilities for Communicating with Equipment Manager or SMEF

Technicians are responsible for ensuring that the appropriate SMEF or Equipment Manager is an addressee on all communications concerning electronic equipment.

Note: If two or more systems or equipment suites are integrated with different SMEFs or Equipment Managers, all relevant SMEFs and Equipment Managers must be addressees.

5.4.3 SMEF Responsibilities for Supporting Equipment

Introduction

This topic describes the responsibilities of the Systems Management Engineering Facility (SMEF) for equipment support and maintenance.

5.4.3.1 The SMEF Role in the Maintenance Management Process

The SMEF role in the maintenance management process varies depending on

- who provides maintenance
- what maintenance consists of, and
- how maintenance is accomplished.

Note: Maintenance requirements should be stated in
- the Equipment/System Integrated Logistics Support Plan (EILSP), and
- the Systems Requirements Specification.

5.4.3.2 Relationship Between SMEF and ELC

The Engineering Logistics Center (ELC)

- refers the following matters to the System Manager at the appropriate SMEF:
  - – equipment and computer software maintenance, and
  - – configuration management for the selected equipment and software, and
- ensures that SMEF policies and procedures are reflected in
  - – Coast Guard Planned Maintenance System (CGPMS), and
  - – local maintenance doctrines.

5.4.3.3 SMEF Engineering Staff Responsibilities

The engineering staff within a SMEF

- is primarily responsible for executing engineering projects assigned by Commandant (CG-4), and
- works closely with the system management/support staff during the requirements phase of any assigned project.

The SMEF System Manager may draw upon technical expertise of the engineering staff, using guidelines formally established by the Commanding Officer.

Continued on next page

5.4.3 SMEF Responsibilities for Supporting Equipment, Continued

5.4.3.4 SMEF System Manager Responsibilities

The table below describes the System Manager's responsibilities in supporting equipment.

References: For more information, refer to

- Equipment/System Integrated Logistics Support Plan (EILSP) Development Decisions, and
- Equipment/System Integrated Logistics Support Plan (EILSP) and Equipment Support Sheet (ESS) Development and Maintenance Responsibilities, COMDINST 4105.7 (series).

For …	The System Manager …
new equipment	works closely with the Project Manager to develop • the EILSP, and • associated (Equipment Support Sheet) ESS.
existing systems	develops or updates • the EILSP, and • associated ESS.
aging or unsupportable equipment	• identifies the equipment to be submitted to the Electronic System's replacement and replenishment (AFC-42) program, and • maintains liaison with Inventory Control Points (ICPs).
items that are under the control of an inventory control point (ICP)	• maintains liaison with the appropriate stock point ELC, Defense Logistics Agency (DLA) or commercial contractor, and • provides technical advice to the item manager at the ICP as required.

5.5 Asset Management

Overview

Introduction

This chapter contains information on the management of CG electronics assets, including

- Management Information for Configuration and Allowances (MICA)
- Coast Guard-owned assets
- Government-furnished assets
- property management at unsafe sites
- the Mandatory Turn-in (MTI) Program for defective equipment, and
- the procurement of approved hand-held radios.

5.5.0.1 References

Additional information about asset management may be found in the following resources.

Resource	Description	Location/Link
Supply Policies and Procedures Manual (SPPM), COMDTINST M4400.19 (series)	The basic authority on supply for the Coast Guard.	CG Central
Policy and Procedures Manual (PPM)	Guidance on • Custodial responsibilities • Equipment accountability • Operating Materials and Supplies (OM&S), and • property.	CG Central
ELC Support Gram	A listing of all repairable items supported by the ELC.	CG Central

Continued on next page

Overview, Continued

5.5.0.2 Contents

This chapter covers the following subjects.

5.5.1 Management Information for Configuration and Allowances (MICA)

Introduction

This topic describes the Management Information for Configuration Allowances (MICA) document, including

- the purpose and scope of MICA
- information contained within the MICA, and
- information used to produce the MICA.

5.5.1.1 Purpose of MICA

Management Information for Configuration and Allowances (MICA) is an allowance document prepared for, and "tailored" to, a specific individual unit or unit class. MICA

- establishes the unit material support for installed and portable equipment, and
- provides a listing of the equipment, parts, and supplies required for a unit to perform its operational mission.

5.5.1.2 MICA Authority

The MICA is published under the authority specified in the Supply Policy and Procedures Manual, COMDTINST M4400.19 (series).

5.5.1.3 Information Listed in MICA

The MICA lists

- the equipment, components, and equipage verified as being on a unit to perform its operational mission
- the parts, special tools, and supplies required for the operation, maintenance, overhaul, and repair of equipment and components, and
- the miscellaneous portable items, operating space items, and consumables necessary for the safety, care, and upkeep of the unit itself.

Continued on next page

5.5.1 Management Information for Configuration and Allowances (MICA), Continued

5.5.1.4 Scope of Information Contained Within the MICA

The MICA provides technical and supply information for Electronic, Hull, and Mechanical (HM&E) equipment.

Note: The MICA does *not* contain information relative to

- provisions (foodstuffs)
- recreational equipment
- printing equipment
- medical material
- hydrographic charts
- resale clothing
- ship's store merchandise
- bulk fuels and lubricants, and
- ammunition.

Allowance for these items are published in unique lists prepared by the appropriate activities.

5.5.1.5 Sources of MICA Content

The table below describes sources from which the content of the MICA is derived.

Source	Description
• Boat Class Maintenance Plan (BCMP), and • Cutter Class Maintenance Plan (CCMP)	Guidance on maintenance requirements is provided by the Program Manager, based on • the unit's mission • unit design • number of required operational days • number of maintenance days available • watch standing requirements • crew size, and • billet structure.

Continued on next page

5.5.1 Management Information for Configuration and Allowances (MICA), Continued

5.5.1.5
Sources of MICA Content (continued)

Source	Description
Allowable Parts List (APL)	Allowance Parts Lists (APLs) • are developed using information from manufacturers and vendors of applicable equipment or components, and • specify all maintenance-significant parts associated with the equipment in accordance with the unit's MSG or BCMP/CCMP. **Note**: In some cases, parts intended to be kept in the same compartment with the installed equipment are found in AELs rather than in APLs.
Allowance Equipage List (AEL)	Allowance Equipage Lists (AELs) are prepared under the direction of the Program Manager and/or Sponsor and include information obtained from manufacturers and vendors. AELs • describe a component or system (such as damage control) • support the component or system with a range of Operating Space Items (OSIs), and • list the required allowances. AELs fall into the general category of tools and equipage, which are retained in the custody of the user department.
Lead Allowance Parts List (LAPL)	For mechanical, and electrical (HM&E) equipment, the LAPL • reflects requirements of generic unit equipment maintenance plan, and • is used as a guide in preparing APLs. The LAPL lists items determined by the CG to be maintenance significant. **Example**: The LAPL for a centrifugal pump might show that all shims, seats, sleeves, and seals are maintenance-significant.

Continued on next page

5.5.1 Management Information for Configuration and Allowances (MICA), Continued

5.5.1.5
Sources of MICA Content (continued)

Source	Description
Provisioning Technical Documentation (PTD)	Provisioning technical documentation (PTD) is developed during the equipment provisioning process, when • parts, supplies, and tools required to support equipment for an initial period of service are determined, and • an APL is developed if necessary. The PTD contains the technical information provided by, or obtained from • contractors • manufacturers, and/or • vendors of the equipment onboard a particular unit. **Note**: Demand and usage throughout the initial support period determines the levels of additional or follow-on support required throughout the equipment's life cycle.
Engineering Data for Provisioning (EDRP)	The Contractor provides an Engineering Data for Provisioning (EDRP) for the equipment being provided to the government under a contract. The depth of information available to the Coast Guard varies depending on such factors as • the contract • the equipment • the manufacturer, and • the vendor. **Note**: In some instances, this information is proprietary, and therefore not available to the government.

Continued on next page

5.5.1 Management Information for Configuration and Allowances (MICA), Continued

5.5.1.6 APL and AEL Technical Characteristics

The technical characteristics provided on the APL and AEL describe equipment form, fit, and function.

Technical characteristics may include:

- drawing number(s)
- operating characteristics (for example, speed and pressure)
- manufacturer's name and part number
- technical manual and plan number, and
- other information needed to identify, maintain, or procure the item.

5.5.1.7 MICA Master File (MMF) Description

The MICA Master File (MMF) is the CG's central electronic (ELEX) for Hull, Mechanical, and Electrical (HM&E) equipment. The MMF

- contains technical characteristics and logistical data on the CG's HM&E and ELEX inventory, as well as maintenance-worthy parts and equipage associated with that equipment, and
- maintains technically oriented configuration and logistics data, as well as supply support information.

5.5.1.8 Information Contained within the MMF

The MMF contains information on all parts needed to maintain the equipment. Typical data found in the MMF includes:

- maintenance philosophy for each equipment and component
- guidance for anticipated failure and replacement
- unit locations
- related APL or AEL numbers
- quantity per application, and
- supply support information, including:
  - stock numbers
  - unit prices
  - unit of issue
  - source of supply, and
  - part number to stock number cross-reference information.

Continued on next page

5.5.1 Management Information for Configuration and Allowances (MICA), Continued

5.5.1.9 MICA User Guide (MUG)

The MICA User Guide (MUG) is a valuable reference for finding information throughout the MICA, as it

- describes the MICA data elements notes, and codes, and
- contains samples of each page type.

The MICA User Guide can be found at CG Central.

5.5.1.10 Importance of the Configuration Database to the MICA

The quality of the MICA is only as good as the equipment configuration data available to the ELC. As a result, it is important to establish and maintain an accurate configuration database.

Configuration data

- is a compilation of specific, detailed information on each component and its function, within a given system or platform (unit/unit class), and
- includes
  - nomenclature
  - manufacturer's name
  - part number
  - model number
  - design and operating characteristics, and
  - a description of the function performed.

5.5.1.11 Unit Feedback on MICA Accuracy

An accurate MICA document helps guarantee successful logistics support for CG units.

To ensure the MICA document is accurate, the unit should promptly report any changes resulting from

- additions
- deletions, or
- equipment modifications.

It is essential that changes be incorporated promptly and properly upon receipt.

Continued on next page

5.5.1 Management Information for Configuration and Allowances (MICA), Continued

5.5.1.12 MICA Distribution

The type of unit determines which MICA sections are received.

The table below lists the distribution of MICA documents.

For …	MICA documentation includes …
major cutters	• one master MICA consisting of ELEX and HM&E for your supply department • ELEX-only MICA for ETs, and • HM&E MICA for MKs and EMs.
• Electronic Support Units (ESU) • Electronic Support Detachments (ESD) • Electronic Support Detachment Details (ESDD) • Loran Stations • Communications Stations	an ELEX-only MICA that is representative of the units under the applicable area of support.
• Sectors • Small Boat Stations	an HM&E-only MICA that is representative of the units under the applicable area of support.
newly constructed cutters	an initial MICA without supply aids (Part V). **Note**: The supply aids are incorporated in follow-on MICAs.

5.5.2 Coast Guard and Navy Type/Navy-Owned Asset Management

Introduction

This topic identifies resources that contain detailed information about the management of various Coast Guard and Navy Type/Navy-Owned (NT/NO) assets.

5.5.2.1 Basic Authority on Coast Guard Supply Policy and Procedures

The Supply Policy & Procedures Manual (SPPM), COMDTINST M4400.19 (series) is the basic authority on supply for the Coast Guard.

5.5.2.2 Supply Publications

The publications listed in the table below provide guidelines and authority for supply.

Note: Units not on the authorized Standard Distribution List (SDL) for these publications should

- initiate requests for addition to the SDL, and
- direct their inquiries to the next senior in the chain of command in the interim.

For information on …	Refer to …	At …
• Custodial Responsibilities • Equipment Accountability • OM&S • Property	Policy and Procedures Manual (PPM)	CG Central

Continued on next page

5.5.2 Coast Guard and Navy Type/Navy-Owned Asset Management, Continued

5.5.2.2
Supply Publications (continued)

For information on …	Refer to …	At …
• Acronyms (for example), CMPlus, DAAS) • General Purpose • OPNAV 4590/CK	Supply Policy & Procedures Manual (SPPM), COMDTINST M4400.19 (series)	CG Central
• DD-1149 • DD-1348 • Equipment Disposition (Install/Deinstall)	• Policy and Procedures Manual (PPM), and • Supply Policies and Procedures Manual (SPPM)	CG Central
Unserviceable (Repairable) Tag – Materiel (DD-1577-2)	• SPPM, and • ELC Support Gram	CG Central
Non-Av DLR (Navy Turn-In)	• SPPM, and • Commandant (CG-64)	CG Central
Mandatory Turn-in (APA/XB) Emergency Requisitions	• SPPM, and • ELC Elex Support Gram	CG Central
Nomenclature	ELC(021)	---
Electronics Equipment Requisition Message	ELC Support Gram	CG Central
COMSEC Equipment	CMS Manual	---
CMPlus Electronic Equipment	CMPlus User's Guide.	CG Central

Continued on next page

5.5.2 Coast Guard and Navy Type/Navy-Owned Asset Management, Continued

5.5.2.3 Other Supply Procedure References

The following references may also be helpful for information on supply policy and procedures.

Reference Title	Reference Title Number
Activity Address Directory (Section IX)	DOD 4000.25-D-DOD
Aeronautical Engineering Maintenance Management Manual	COMDTINST M13020.1 (series)
Aircraft Material Stocking List	CG-298
Defense Logistics Services Center Catalog Management Data	(CMD) (Microfiche)
E/GICP Appropriation Purchase Account (APA) Repairable Electronic Program	E/GICP 4408.1 (series)
E/GICP-Repair Depot Transaction Procedures	E/GICP 4510.1 (series)
ELC Support Gram	ELC-02 Equipment Management Branch
Electronics Material Identification Manual	ELCINST M4410.5 (series)
LORAN-C Frequency Standard Set Operator’s Guide	LSU Publication
Maintenance Logistic Command Pacific Area Command (MLCPAC) Telecommunications Systems Support Instructions	MLCPACINST M.10550.1 (series)
MLCLANT Standard Operating Procedures (SOP)	---
Navy Stock List of Publications and Forms	NAVSUP-2002 (Microfiche)

5.5.3 Government-Furnished Asset Management

Introduction

This topic provides information on government-furnished assets, including property that is

- exclusively under the contractor's control, and
- *not* exclusively under the contractor's control.

5.5.3.1 Issuing Government-Furnished Equipment

The electronics community routinely issues government-furnished equipment (GFE) to contractors for repair or installation.

When issuing GFE, the property may or may not be under the exclusive control of the contractor.

Whether the property is under the exclusive control of the contractor or not, the contract must include provisions for control of government property, including

- **inventory, and**
- **accountability requirements.**

These requirements must follow existing property policy.

Continued on next page

5.5.3 Government-Furnished Asset Management, Continued

5.5.3.2 Management of Property Exclusively Under the Contractor's Control

Coast Guard policies for the management of government-furnished property exclusively under a contractor's control are described in the table below.

Management Aspect	Policy
Contractor Accountability	If the government-furnished equipment (GFE) is exclusively under the contractor's control, the contractor is liable for all equipment and reparable under the terms of the contract. **Exceptions**: Exceptions to contractor liability are • reasonable wear and tear, and • consumption of consumable materials.
Contractor Maintenance System	When creating the Statement of Work (SOW) for property exclusively under the contractor's control, ensure that provisions require the contractor to establish and maintain a system to control, protect, preserve, and maintain all government property. The contractor's system must be approved by the contracting officer.
Removal of Equipment from Unit Inventory	In general, equipment that will not be returned to the original unit will not be removed from the unit's inventory until signed transfer documents are received from the contractor.

Continued on next page

5.5.3 Government-Furnished Asset Management, Continued

5.5.3.3 Management of Property *Not* Exclusively Under the Contractor's Control

Coast Guard policies for the management of government-furnished property *not* exclusively under a contractor's control are described in the table below.

Management Aspect	Policy
Custodial Responsibilities	A government-employed custodian must be designated in writing. The custodian may be • a civilian, or • a uniformed employee. **Note**: The appointed Property Officer may *not* act as custodian. A contractor may assist the custodian by performing duties outlined in Property Management Manual, COMDTINST 4500.5 (series), including sight inventories.
Equipment in Unit Inventory	Property that is not under the exclusive control of the contractor is handled in the same method as any other property on the unit's inventory listing.

5.5.3.4 Equipment On Loan to a Contractor

Equipment on loan to a contractor

- is the responsibility of the loaning Operations Facility (OPFAC), and
- must be entered into the unit's property accountability system (custodian's system).

Note: Any capitalized equipment must also be entered into the unit's Oracle fixed asset module (FAM).

5.5.4 Unstaffed (Remote) Site Management

Introduction

This topic describes the remote site maintenance policy that applies to unstaffed Coast Guard electronics sites.

5.5.4.1 Scope of Remote Site Maintenance Policy

The Remote Site Maintenance Policy applies to Coast Guard unstaffed electronic sites, including

- NDS/VHF-FM
- DGPS
- NDGPS
- VTS
- Microwave communication
- PCMS, and
- any unstaffed Coast Guard electronics facility whose operational and support responsibilities are similarly divided, and
- unstaffed electronic sites co-located with other units having personnel assigned.

Example: Future Automated Loran Station (ALS) sites are within the scope of this policy.

5.5.4.2 Sites Excluded From the Remote Site Maintenance Policy

Sites excluded from the Remote Site Maintenance Policy are

- Coast Guard units with organic support, including:
  - WHEC
  - WMEC
  - Crewed LORSTAs, and
  - Aids to Navigation Sites serviced by an Aids to Navigation team, and
- afloat units assigned to Districts, Sectors, Stations, and MSOs.

Continued on next page

5.5.4 Unstaffed (Remote) Site Management, Continued

5.5.4.3 Unsupported Electronics at Unstaffed Remote Electronic Sites

Examples of unsupported electronic equipments at unstaffed remote electronic sites are Radio Direction Finder (RDF) or Low Level VHF sites that have been purchased and supported with AFC-30 funds.

When unsupported electronic equipment is at unstaffed remote electronic sites:

- it is recorded as General Purpose Property (GPP) when installed, and
- spare parts or equipment are recorded in the Operating Materials and Supplies (OM&S) database.

Note: The ESU may provide property custodial support.

5.5.4.4 Operator vs. Owner of Equipment at Unstaffed Sites

The difference between the terms "owner" and "operator" in reference to unstaffed sites is described in the table below.

Role	Description
Owner	In general, the public owns all government property; the Coast Guard acts as custodians. As a result, when we speak of property "ownership," we really mean custodial responsibilities formally delineated for • commanding officers • property officers, and • property custodians. In common practice, however, the operator of a site is frequently referred to as the "owner" of that site.
Operator	The organization that directly controls, and/or primarily benefits from the services provided by the system or equipment. **Example**: NAVCEN controls Loran monitor sites and uses critical real time data from the sites for its operations. NAVCEN is the operator of the Loran monitor sites.

Continued on next page

5.5.4 Unstaffed (Remote) Site Management, Continued

5.5.4.5 Remote Site Property Officer Responsibilities

The Commanding Officer must designate a Property Officer to administer the unit's property program.

The Property Officer is accountable for all site property, including

- towers
- huts, and
- electronics.

Note: The Property Officer may designate a property custodian to assist with the support of unstaffed remote electronic sites and equipment. See 5.5.4.6 for details.

5.5.4.6 Remote Site Property Custodians

The Property Officer may designate the appropriate MLC units as the custodian of supported unstaffed remote electronic sites and equipment.

Custodianship may be divided between MLC units. For example:

- the custodian of real property may be the CEU, and
- the equipment custodian may be an ESU or ESD.

Contractors performing maintenance services for the government may assist the property custodian in performing custodial duties, including sight inventories. Contractor-performed inventories must meet CG property accounting requirements, whether the property is under the exclusive control of the contractor or not.

Note: The property custodian reports to either the Property Officer, or Commandant, in accordance with the Property Management Manual, COMDINST M4500.5 (series).

Continued on next page

5.5.4 Unstaffed (Remote) Site Management, Continued

5.5.4.7 Summary of Property Custody and Support Assignment Responsibilities

The table below provides an abbreviated summary of property custody and support assignments for unstaffed sites.

Note: This list is not intended to be all-inclusive, but merely a sampling.

Site Type	Property Officer	Property Custodian
Maritime DGPS	NAVCEN	ESU/ESD
Nationwide DGPS	NAVCEN	ESU/ESD
Army Corps of Engineering DGPS	NAVCEN	ESU/ESD
Loran Monitor Site	NAVCEN	ESU/ESD
Unstaffed Loran Transmitting Site	NAVCEN	ESU/ESD
NDS/VHF-FM	Group/AIRSTA (master NDS controller site)	ESU/ESD
VTS	VTC	ESU/ESD
Microwave Comms	Group/District receiving primary service	ESU/ESD

5.5.4.8 Additional Information on Unstaffed Site Maintenance

For more information on unstaffed site maintenance, refer to Property Management Manual, COMDTINST M4500.5 (series).

5.5.5 Mandatory Turn-In (MTI) Program for Defective Equipment

Introduction

This topic contains policies and procedures for the ELC Mandatory Turn-In (MTI) Program.

5.5.5.1 Listing of Repairable Items

All repairable items supported by the ELC are listed in Support Grams published and advertised on the ELC's intranet Web site at CG Central.

The ELC's electronic repairables are identified by the Cognizance (COG) "XB."

In FEDLOG, both electronic and HM&E repairables are identified by

- Repair Code "R", and
- Management Code "A".

5.5.5.2 Replacing Failed Repairable Items

When a repairable item in the field fails, the unit must

- requisition a replacement from the ELC in accordance with Milstrip/Milstrap procedures, and
- upon receipt of a replacement, return the defective item back to the ELC on receipt of the replacement.

The ELC maintains a rotatable pool of Ready for Issue (RFI) repairable items which provide support for failed components on a mandatory turn-in basis.

Reference: For Milstrip/Milstrap procedures, refer to the Supply Policy and Procedure Manual, COMDTINST M4400.19 (series).

5.5.5.3 SWII Equipment Turn-In Exception

Some defective SWII equipment does not need to be returned. Check the ELC Web site at CG Central for a list of SWII equipment and disposal instructions.

[redacted]

It is important to return required defective material promptly to

- **ensure that repairable material is available to maintain the pipeline, and**
- **eliminate the requirement for overdue reporting.**

Continued on next page

5.5.5 Mandatory Turn-In (MTI) Program for Defective Equipment, Continued

5.5.5.4 Equipment Turn-in Documentation

The table below describes the documentation that must be completed when a failed repairable item is turned in to the ELC.

Document	Description	For completion instructions see …
DD-1348-1 (BC1), *Single Line Item Release/Receipt Document*	A preprinted form that was packed with the serviceable item when it was shipped from the ELC. **Note**: A typewritten DD-1348-1 may be prepared if the preprinted DD-1348-1 was not provided or lost. **IMPORTANT**: Do *not* use Form DD-1149 unless directed to do so by the ELC.	• 5.5.5.5 (preprinted), or • 5.5.5.6 (typewritten)
Serviceable/Unserviceable Material Tag (CG-5236)	A tag that is • used to describe the problem with the defective equipment, and • affixed to the equipment before shipment to the ELC.	5.5.5.7

Continued on next page

5.5.5 Mandatory Turn-In (MTI) Program for Defective Equipment, Continued

5.5.5.5 Completing the Preprinted DD-1348-1 for Defective Equipment

Follow the procedures below to complete the preprinted DD-1348-1, *Single Line Item Release/Receipt Document* when turning in defective equipment.

Note: For instructions on completing a manual DD-1348-1, see 5.5.5.6.

Step	Action
1	Ensure that the stock number and quantity of the defective unit match the stock number and quantity shown on the DD-1348-1. **IMPORTANT**: If the stock number does not match the stock number on the item being returned, the ELC will • return the item to the unit, and • give no credit for the item.
2	If you have received substitute equipment, write • **RECEIVED SUBSTITUTE**, and • the stock number of the item you are returning. **Note**: Substitutions apply primarily to SWII equipment.
3	Enter the Julian Date (a 4-digit number consisting of the last digit of the current year and the numerical calendar day) in the DATE SHIPPED block. **Example**: Enter 20 October 2006 as **6293**.
4	Complete the CG-5236 tag, using the procedure described in 5.5.5.7.

Continued on next page

5.5.5 Mandatory Turn-In (MTI) Program for Defective Equipment, Continued

5.5.5.6 Completing a Typewritten DD-1348-1 Turn-In Document

The procedure for completing a typewritten DD-1348-1 is described in the table below.

Notes:
- Complete a typewritten DD-1348-1
  - if the preprinted DD-1348-1 was not provided or lost, or
  - for early turn-in.
- The DD-1348-1 is available in Adobe Forms.

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Enter BC1 in the DOC IDENT (document identifier) block.</td></tr>
<tr><td>2</td><td>Enter the stock number, as described in the table below.

<table>
<tr><th>If the turn-in is …</th><th>Then use the stock number …</th></tr>
<tr><td>routine</td><td>of the serviceable material received.</td></tr>
<tr><td>early</td><td>cited in the ELC letter or message directing the return.</td></tr>
</table>

Note: Unless the ELC has issued a substitute, the stock number of the turn-in should be the same stock number as the material received.</td></tr>
<tr><td>3</td><td>Enter your unit's OPFAC in the SUPPLEMENTARY ADDRESS block.</td></tr>
<tr><td>4</td><td>Enter the Julian Date in the DATE SHIPPED block.</td></tr>
<tr><td>5</td><td>Enter the stock number from the turn-in equipment in the ITEM DESCRIPTION field.

Exception: For NOMEN (nomenclature), enter the description listed.</td></tr>
<tr><td>6</td><td>Complete the CG-5236 tag, using the procedure described in 5.5.5.7.</td></tr>
</table>

Continued on next page

5.5.5 Mandatory Turn-In (MTI) Program for Defective Equipment, Continued

5.5.5.7 Completing the CG-5236 Tag

The procedure for completing the Serviceable/Unserviceable Material Tag (CG-5236) is described in the table below.

Note: Failure to attach a properly completed CG-5236 creates delays in identifying and repairing the item.

Step	Action
1	Enter the date and a brief description of the failure, including symptoms, in TROUBLE INDICATION field. **IMPORTANT**: Be specific in the problem description. "Not working" is not a sufficient description.
2	Enter the complete document number from the DD1348-1, including the Unit OPFAC, in the UNIT OPFAC field.
3	Return the defective item to the ELC using the procedure described in 5.5.5.8.

Continued on next page

5.5.5 Mandatory Turn-In (MTI) Program for Defective Equipment, Continued

5.5.5.8 Returning a Defective Item to the ELC

The procedure for returning a defective item to the ELC is described in the table below.

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Affix the completed CG-5236 tag to the defective item.

See 5.5.5.7 for information on completing the CG-5236 tag.</td></tr>
<tr><td>2</td><td>Package the defective item so it will be protected during shipment to the ELC, using the guidelines in the table below.

<table>
<tr><th>If the defective item …</th><th>Then …</th></tr>
<tr><td>fits within the reusable container provided with the replacement item</td><td>package the defective item in the reusable container.</td></tr>
<tr><td>does not fit within the box provided with the replacement item</td><td>procure packing material locally.</td></tr>
</table></td></tr>
<tr><td>3</td><td>Strike out or peel off any previously applied

• address labels
• carrier shipping labels, or
• carrier barcode labels.</td></tr>
<tr><td>4</td><td>• Place the original and Copies 2 and 3 of the completed DD-1348-1 in the container with the tagged item, and
• retain Copy 4 for the unit’s records.

See 5.5.5.5 for information on completing the DD-1348-1.</td></tr>
<tr><td>5</td><td>Apply the preprinted return address label to the container.

Note: If a preprinted label is not received, prepare a label with a typewriter, or by legibly printing the address on the container. Include the following information:

• the “ship to” address in block 3 of the DD-1348-1 (DOC IDENT (“BC1”)
• the unit’s OPFAC, and
• the DOCUMENT NUMBER of the requisition that the item was ordered under.</td></tr>
<tr><td>6</td><td>Mark the outside of the container CONDITION CODE “F”.</td></tr>
</table>

Continued on next page

5.5.5 Mandatory Turn-In (MTI) Program for Defective Equipment, Continued

5.5.5.8
Returning a Defective Item to the ELC (continued)

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>7</td><td>
• Remove the prepaid return shipping barcode label from the special packing envelope attached to the outside of the reusable shipping container, and
• apply the prepaid return shipping barcode label to the top of the container next to the shipping address label.

IMPORTANT: The barcode label must be applied for the package to be sent and billed to the ELC. If the prepaid return barcode label is not received, contact the ELC MTI Coordinator at 410-562-6800 for assistance.

Exceptions:
<table>
<tr><th>If …</th><th>Then …</th></tr>
<tr><td>your unit is in Alaska or Puerto Rico</td><td>contact the ELC’s MTI Coordinator at 410-562-6800 to receive
• funding, and
• a return authorization control number.

After receiving the return authorization, contact the shipping vendor for package pick-up.</td></tr>
<tr><td>the item is being shipped by government bill of lading (GBL)</td><td>contact the ELC’s MTI Coordinator at 410-562-6800 to receive
• funding, and
• a return authorization control number.

After receiving the return authorization
• properly fill out the return GBL, and
• fax a copy of the GBL to the ELC MTI Coordinator at 410-562-6213.

Note: The ELC will fund GBL shipment returns only if the required return authorization control number is obtained and annotated on the GBL.</td></tr>
</table>
</td></tr>
</table>

Continued on next page

5.5.5 Mandatory Turn-In (MTI) Program for Defective Equipment, Continued

5.5.5.8
Returning a Defective Item to the ELC (continued)

Step	Action
8	Complete the vendor pick-up record for small package return. The following information will be needed for pick-up: • SHIPPER NUMBER • NAME AND ADDRESS: Enter your unit address • DATE: Enter the date your return will be picked up
9	Call the 800 number of the shipping vendor and request a return pick-up at your location. **Exception**: Units in Alaska and Puerto Rico are responsible for calling the shipping vendor receipt of a return authorization control number, as described in Step 7 of this procedure. **Note**: The shipping vendor should pick up the package the next working day after you call in the pick-up request.
10	Upon pick-up, have the contractor sign the Vendor Return Pick-up Record or GBL. **Note**: Only one Vendor Return Pick-up Record is needed per pick-up.
11	Retain a copy of the Vendor Return Pick-up Record or GBL for your records. **Note**: The barcode and/or GBL number recorded will be needed for tracking purposes.

Continued on next page

5.5.5 Mandatory Turn-In (MTI) Program for Defective Equipment, Continued

5.5.5.9 Overdue MTI Items

Mandatory turn-in items are considered overdue if not received at the ELC within 45 days from the date the item was shipped by the ELC.

Units are

- notified via MSG when items are overdue, and
- given 30 days to respond or to return the overdue item.

The return pick-up record and copies of GBL shipping documents enable tracking of overdue defective turn-ins.

IMPORTANT: Units should retain copies of pick-up records and GBL shipping documents, as they will be required to submit documentation as proof of delivery to the ELC.

5.5.5.10 Delinquency in Returning Overdue MTI Items

Failure to respond or return the overdue item within 30 days of receiving notification from the ELC could result in the unit being charged the replacement cost of the item.

Charges are transferred to the unit via an ELC-prepared ITV submitted to the Finance Center.

5.5.6 Procuring Approved Hand-Held Radios

Introduction

This topic contains information on procuring approved hand-held radios, including

- the necessity for handheld radios to be approved for use in hazardous locations
- the classifications, divisions, and groups used to define hazardous conditions, and
- the minimum hazard designation that handheld radios must meet to be approved for use.

5.5.6.1 Handheld Radios Approved for Hazardous Locations

All handheld radios procured by Coast Guard units must be approved intrinsically safe for use in hazardous locations by

- Factory Mutual Research Corporation (FMRC), or
- Underwriters Laboratories, Inc. (UL).

5.5.6.2 Hazardous Location Classifications

The table below describes the three classifications of hazardous locations.

Class	Locations where there is a danger of explosion due to …
I	the presence of a flammable gas or vapor.
II	the presence of a flammable dust.
III	the presence of flammable fibers or flyings.

Continued on next page

5.5.6 Procuring Approved Hand-Held Radios, Continued

5.5.6.3 Divisions Within Hazardous Location Classifications

There are two divisions within each hazardous location class. The table below provides a description of each division.

Division	An explosive mixture of gas, vapor, dust, and/or fibers or flyings and air may exist …
1	under normal operating conditions.
2	under abnormal conditions (for example, accidental rupture of a vessel or container, or failure of a ventilating system).

5.5.6.4 Groups Within Hazardous Location Classifications

Class I and II hazardous locations are also broken down into groups, which are described in the table below.

Group	Hazardous Materials Included Within Group
Class I	
A	Acetylene
B	• Butadene • Hydrogen • Ethylene Oxide • Propylene Oxide

Continued on next page

5.5.6 Procuring Approved Hand-Held Radios, Continued

5.5.6.4
Groups Within Hazardous Location Classifications (continued)

Group	Hazardous Materials Included Within Group
C	• Acetaldehyde • Ethylene • Cyclopropane • Ether Vapors • UDMH • Unsymmetrical
D	• Acetone • Ammonia • Benzene • Butane • Butyl Alcohol • Butyl Acetate • Ethane • Ethyl Acetate • Ethylene Dichloride • Gasoline • Heptane • Hexanes • Isoprene • Methane • Methanol • Ketones • Propanol • Petroleum • Octanes • Pentanes • Propane • Ethanol Propylene • Styrene • Toluene • Vinyl Acetate • Vinyl Chloride • Xylanes
	Class 2
E	Metal dust, including: • aluminum • commercial alloys, and • magnesium
F	• Carbon black • Coal • Charcoal • Coke dust
G	• Flour • Starch • Grain dust

Continued on next page

5.5.6 Procuring Approved Hand-Held Radios, Continued

5.5.6.5 Minimum Hazard Designation Required for Hand-Held Radios

At minimum, hand-held radios must be approved for use in hazardous location

- Classes I, II, and III
- Division 1, and
- Groups D, F, and G.

Hand-held radios must also be approved for non-incendive use in Class I, Division 2, Groups A, B, C, and D.

5.6 Equipment Disposition

Introduction

This topic describes electronic equipment disposition responsibilities of

- offices within HQ
- servicing ESUs, and
- servicing units.

5.6.1 HQ Equipment Disposition Responsibilities

The responsibilities associated with the disposition of electronic equipment are described in the table below.

Responsible Office	Description
Commandant (CG-84)	HQ Property Management Office.
Commandant (G-CI)	Providing funding for the installation of new equipment.
Commandant (CG-64)	• Provides disposition instructions for all electronic equipment associated with vessels being decommissioned, or surveyed. • Contacts all interested parties regarding electronic equipment on board the vessel.
Commandant (G-OCU)	Provides costs associated with removal of equipment, including shipping and handling.

5.6.2 ESU Responsibilities for Equipment Removal and Shipment

The servicing Electronic Support Unit (ESU) is responsible for following the instructions in the memorandum, which includes proper removal and shipping of applicable equipment.

Continued on next page

5.6 Equipment Disposition, Continued

5.6.3 Servicing Unit Responsibilities for Equipment Removal and Replacement

Servicing units are responsible for

- installing replacement-in-kind (RIK) equipment, if provided, and
- properly removing and shipping applicable equipment.

When equipment is obsolete and will not be replaced, the Commandant (G-SCE-2) and/or SMEF sends a disposition message with instructions on the equipment's removal and transfer.

IMPORTANT: Technicians are responsible for
- the proper removal of cables, racks, and other gear to ensure that
  - the decommissioned vessel is safe to sail, and
  - RIK equipment, if provided, can easily be installed, and
- ensuring that the proper transfer paperwork has been sent.

Reference: For information on proper removal of equipment and transfer, refer to the Supply Policy and Procedures Manual, COMDTINST M4400, 19 Series.

6.0 Equipment Installation

Table of Contents

6.0 Equipment Installation

Overview

6.0.1 Scope

This part contains

- resources that provide helpful information on electronic equipment installations, and
- requirements and responsibilities for certifying electronic equipment installations.

6.0.2 Reference

Additional information on electronic equipment installation may be found in the following resource.

Resource	Description	Location/Link
Electronics Installation and Maintenance Book (EIMB), NAVSHIP 0967-000-0000	A 13-volume series of books containing safety information, maintenance policies, installation standards and practices, and basic electronic equipment and material handling procedures.	CG Central

6.0.3 Contents

This part covers the following subjects.

6.1 Electronic Equipment Installation Resources

Introduction

This topic identifies various resources that provide information on electronics equipment installations, including

- installation plans
- standards and specifications, and
- handbooks.

6.1.1 Installation Plans

The Installation Plan describes the procedure for getting the finished "accepted" system installed and operating properly in its intended environment.

Step-by-step instructions are provided, including the approximate time to complete each phase of the installation.

6.1.2 Standards and Specifications

Standards and specifications provide detailed information, installation techniques, or specific application of one particular item or subject.

See 10-B.2.4 Standards and Specifications for more detail.

6.1.3 Handbooks

Handbooks contain guidelines and techniques for installing various types of electronic equipment, including

- communication systems
- radio frequency (RF) lines and fittings
- secure and non-secure information systems, and
- grounding, bonding, and shielding.

See 10-B.2.3 Handbooks for more detail.

6.2 Certification of Electronic Equipment Installations

Overview

Introduction

This chapter describes the certification process that all electronic equipment installations performed by the Coast Guard (CG) must undergo, including

- types of electronic equipment installations and certification requirements
- responsibilities of key personnel in the certification process, and
- a sample of a completed Installation Certification Memorandum.

6.2.01 Contents

This chapter covers the following topics.

6.2.1 Types of Electronic Equipment Installations and Certification Requirements

Introduction

This topic

- explains the certification requirement for all electronic equipment installations performed by the Coast Guard (CG), and
- identifies the three types of electronic equipment installations and certification responsibilities.

6.2.1.1 Certification Requirement for Equipment Installations

All electronic equipment installations performed by the Coast Guard (CG) must undergo a certification process, which

- verifies that equipment arrangement and installation details conform to the class/platform drawings and good installation practices
- controls equipment additions and configuration to ensure that space and weight limitations are used effectively
- promotes standardization to reduce design costs of present and future installations by allowing for development and maintenance of drawings effective for all cutters within a class, and
- simplifies the preparation of specifications for future equipment installations.

Deviations are *not* permitted when Commandant (CG-64) requires that equipment be installed *exactly* according to drawings.

Continued on next page

6.2.1 Types of Electronic Equipment Installations and Certification Requirements, Continued

6.2.1.2 Types of Electronic Equipment Installations and Certification Responsibilities

The table below describes the three types of electronic equipment installations performed by the Coast Guard, as well as the individual responsible for performing the certification.

Note: The engineering approval document indicates the type of installation certification required.

Installation Type	Description	Certification Responsibility	Team Leader Assignment (Not Required for CG Yard Installations)
A	An equipment installation that is directed by or reported to another agency	Commandant (CG-64) performs either • the entire certification, or • a commandant-specified activity, such as Space and Naval Systems Command (SPAWAR) See 6.2.5 Commandant (CG-64) Certification Responsibilities for details.	Officer or senior enlisted Electronics Specialist assigned by Commandant (CG-64) See 6.2.6 Team Leader Certification Responsibilities for details.
B	An equipment installation under an Acquisition, Construction, and Improvement (AC&I) or Operating Expense (OE) contract that requires Coast Guard certification as part of the contract	**Initial installation**: Commandant (CG-64) See 6.2.5 Commandant (CG-64) Certification Responsibilities for details. **Subsequent installations**: The Maintenance and Logistics Command (MLC)	**Initial Installation**: Officer or senior enlisted Electronics Specialist assigned by Commandant (CG-64) **Subsequent Installations**: The senior MLC or district Electronics Specialist See 6.2.6 Team Leader Certification Responsibilities for details.

Continued on next page

6.2.1 Types of Electronic Equipment Installations and Certification Requirements, Continued

6.2.1.2
Types of Electronic Equipment Installations and Certification Responsibilities (continued)

Installation Type	Description	Certification Responsibility	Team Leader Assignment (Not Required for CG Yard Installations)
C	An equipment installation for which specific operating parameters must be confirmed or tested to ensure compliance with regulations or law	The MLC	The senior MLC or district Electronics Specialist See 6.2.6 Team Leader Certification Responsibilities for details.

6.2.1.3 Unit Personnel with Responsibilities in the Certification Process

The table below identifies where in this chapter to find information on the responsibilities of unit personnel in the certification process.

For information on the responsibilities of …	See …
Commanding Officer, CG Yard	6.2.2 Commanding Officer, CG Yard Certification Responsibilities
Cognizant Area or MLC Commander	6.2.3 MLC, Area, or District Commander Certification Responsibilities
Commanding Officer at the unit being certified	6.2.4 Commanding Officer, Unit Certification Responsibilities

6.2.2 Commanding Officer, CG Yard Certification Responsibilities

Introduction

This topic describes the responsibilities of the Commanding Officer, Coast Guard (CG) Yard in the certification process for an installation at or by the CG Yard.

6.2.2.1 Commanding Officer Responsibilities for CG Yard Installations

The certification responsibilities of the Commanding Officer for installations performed at or by the Coast Guard (CG) Yard are described in the table below.

Step	Action
	Prior to Certification
1	*Upon receipt of a statement of work*: Furnish the Project Coordinator with cost estimates on material and man-hours for each electronic installation.
2	Coordinate with the Project Coordinator to ensure all materials necessary for electronic installations are made available for retrofit.
3	*For Class A and initial Class B installations, at least ten working days prior to scheduled certification*: Notify • Commandant (CG-64) • The Maintenance and Logistics Command (MLC) commander • Area or district commander, and • Cutter commanding officer. **Note**: These notifications are *not* necessary for Class C or subsequent Class B installations.
4	Provide the commanding officer of the ship with necessary security clearances for Yard personnel participating in the certification.
5	Ensure that two sets of applicable current drawings are on board.
6	Ensure that other shipboard or Yard activities that would interfere with the certification effort are not scheduled concurrent with the certification.

Continued on next page

6.2.2 Commanding Officer, CG Yard Certification Responsibilities, Continued

6.2.2.1
Commanding Officer Responsibilities for CG Yard Installations (continued)

Step	Action
7	Provide the certification team with one Electronics Specialist for the duration of the certification. **Note**: An Engineering Logistics Center (ELC) Chief Warrant Officer is preferred, but a Chief Electronics Technician may be assigned if a Chief Warrant Officer is not available.
8	Arrange for a meeting room for team use before and during the certification.
After Certification is Completed	
9	Provide training to ship's technicians on affected electronics equipment.
10	Provide the ship with a set of electronics drawings.
11	*Upon receipt of the certification report*: • Correct all discrepancies identified as Yard responsibility. • Furnish the Commandant (CG-64) with the completion date for the corrections.

6.2.3 MLC, Area, or District Commander Certification Responsibilities

Introduction

This topic describes the responsibilities of the Maintenance and Logistics Command (MLC), area, or district commander in the certification process for

- Coast Guard (CG) Yard installations, and
- Installations accomplished by activities other than the CG Yard.

6.2.3.1 Cognizant Area or MLC Commander Responsibilities for CG Yard Installations

The certification responsibilities of the cognizant area or Maintenance and Logistics Command (MLC) commander for installations by the Coast Guard (CG) Yard are described in the table below.

Step	Action
	Prior to Certification
1	Provide the commanding officer of the ship with necessary security clearances for all personnel participating in the certification, if required.
2	• Identify and provide any calibrated test equipment required by the certification team. • Ensure that calibrated test equipment is on board the unit.
3	Provide the certification team with a Chief Warrant Officer, Engineering Logistics Command (ELC), for the duration of the certification. **Note**: If a Chief Warrant Officer (ELC) is not available, a Chief Electronics Technician may be assigned.
	After Certification is Completed
4	*After receiving the certification report:* • Correct all discrepancies identified as MLC or area responsibility. • Provide the Commandant (CG-64) with completion dates for the corrections.

Continued on next page

6.2.3 MLC, Area, or District Commander Certification Responsibilities, Continued

6.2.3.2 Cognizant Area or MLC Commander Responsibilities for Installations Other than CG Yard

The certification responsibilities of the MLC, area, or district commander for electronics installations accomplished at activities other than the CG Yard are described in the table below.

Step	Action
	Prior to Certification
1	*At least ten days prior to the scheduled certification*: Notify the Commandant (CG-64).
2	Provide the commanding officer of the ship with necessary security clearances for all personnel participating in the certification.
3	• Identify and provide any test equipment required by the certification team. • Ensure that the test equipment is on board the unit.
4	Provide the certification team with a Chief Warrant Officer, ELC, for the duration of the certification. **Notes**: • The Chief Warrant Officer has authority to sign documentation and address questions from the commanding officer. • If a Chief Warrant Officer (ELC) is not available, a Chief Electronics Technician may be assigned.
	During Certification
5	Ensure that other shipboard activities will not interfere with the certification team.
6	Ensure that systems complementary to the systems being certified are operating properly.

Continued on next page

6.2.3 MLC, Area, or District Commander Certification Responsibilities, Continued

6.2.3.2
Cognizant Area or MLC Commander Responsibilities for Installations Other than CG Yard (continued)

Step	Action
	After Certification is Completed
7	Provide the ship with two sets of electronic drawings.
8	*After receiving the certification report*: • Correct all discrepancies identified as MLC or area responsibility. • Provide the Commandant (CG-64) with completion dates for the corrections.

6.2.4 Commanding Officer, Unit Certification Responsibilities

Introduction

This topic describes the responsibilities of the Commanding Officer, Unit in the certification process for

- Coast Guard (CG) Yard installations, and
- installations accomplished by activities other than CG Yard.

6.2.4.1 Commanding Officer, Unit Certification Responsibilities for CG Yard Installations

The responsibilities of the Commanding Officer of the unit being certified during installations by the Coast Guard (CG) Yard are described in the table below.

Step	Action
	Prior to Certification
1	• Identify and provide calibrated test equipment with all required adapters not acquired by the certification team. • Ensure that test equipment and adapters are on board the unit.
2	Ensure that electronic systems complementary to the systems being certified are operating properly.
3	• Obtain quotas for training of appropriate cutter personnel. • Ensure that Electronics Technicians are available for training on electronic installations. **Note**: Training includes requisition of necessary school quotas for new equipment installation and maintenance training.
4	Provide one Electronics Specialist for the certification team for the duration of the certification. **Note**: The Electronics Specialist assists or ensures that certification is performed correctly.

Continued on next page

6.2.4 Commanding Officer, Unit Certification Responsibilities, Continued

6.2.4.1
Commanding Officer, Unit Certification Responsibilities for CG Yard Installations (continued)

Step	Action
5	When circumstances warrant, provide additional members to the certification team, including specialists with ratings of: • Electrician's Mate (EM) • Electronics Technician (ET), and • Information Systems Technician (IT).

6.2.4.2 Commanding Officer, Unit Certification Responsibilities for Installations Other Than CG Yard

The responsibilities of the Commanding Officer of the unit being certified for electronics installations at activities other than the CG Yard are described in the table below.

Step	Action
	Prior to Certification
1	Provide at least one member to the certification team. **Note**: When circumstances warrant, provide additional members to the certification team, including specialists with ratings of • Electrician's Mate (EM) • Electronics Technician (ET), and • Information Systems Technician (IT).

Continued on next page

6.2.4 Commanding Officer, Unit Certification Responsibilities, Continued

6.2.4.2
Commanding Officer, Unit Certification Responsibilities for Installations Other Than CG Yard (continued)

Step	Action
	During Certification
2	Ensure that other unit activities will not interfere with the certification team.
3	Ensure that electronic systems complementary to the systems being certified are operating properly.
4	• Obtain quotas for training of appropriate cutter personnel. • Ensure that Electronics Technicians are available for training on electronic installations. **Note**: Training includes requisition of necessary school quotas for new equipment installation and maintenance training.
	After Certification is Completed
5	• Retain a copy of certification reports. • Review discrepancy lists to plan for future availabilities, such as – revisits to ensure that discrepancies have been corrected, or – new equipment certifications not yet approved.

6.2.5 Commandant (CG-64) Certification Responsibilities

Introduction

This topic describes Commandant (CG-64) certification responsibilities for Type A and initial Type B installations for

- Coast Guard (CG) Yard installations, and
- installations accomplished by activities other than CG Yard.

6.2.5.1 Commandant (CG-64) Responsibilities for CG Yard Installations

The responsibilities of the Commandant (CG-64) for the certification of Type A and initial Type B installations by the Coast Guard (CG) Yard are described in the table below.

Step	Action
	Prior to Certification
1	Assign one Electronics Specialist (officer or senior enlisted) as the certification team leader. **Note**: The senior Commandant (CG-64) team member will be the team leader, regardless of the rank of the other team members. For all other installations, the senior Maintenance and Logistics Command (MLC) or district Electronics Specialist will be the team leader.
2	Coordinate administrative arrangements for the certification team.
3	Outline responsibilities for the certification team.
4	Meet with CG Yard team members to coordinate team efforts.
	After Certification is Completed
5	*Within 30 days after completion of certification*: Provide a certification report or memorandum to • the appropriate MLC, area, or district commander • the Unit Commanding Officer, and • the CG Yard.

Continued on next page

6.2.5 Commandant (CG-64) Certification Responsibilities, Continued

6.2.5.2 Commandant (CG-64) Responsibility for Installations Other Than CG Yard

The certification responsibility of the Commandant (CG-64) for Type A and initial Type B installations accomplished at activities other than the CG Yard is described below.

Prior to certification, assign one Electronics Specialist (officer or senior enlisted) as the certification team leader.

Note: The senior Commandant (CG-64) team member will be the team leader, regardless of the rank of the other team members. For all other installations, the senior MLC or district Electronics Specialist will be the team leader.

6.2.6 Team Leader Certification Responsibilities

Introduction

This topic describes team leader certification responsibilities

- prior to electronic installations
- during electronic installations, and
- after the electronic installation is completed.

6.2.6.1 Team Leader Responsibilities Prior to Certification

The responsibilities of the Certification Team Leader *prior to* certification are described in the table below.

Note: A Certification Team Leader is *not* assigned for CG Yard installations.

Step	Action
1	Verify that appropriate team members have been designated.
2	Verify that a meeting room has been obtained.
3	Coordinate certification meetings.
4	Outline responsibilities of the certification team.
5	Meet with key personnel to coordinate team efforts.
6	Ensure that the cutter holds all applicable drawings.

Continued on next page

6.2.6 Team Leader Certification Responsibilities, Continued

6.2.6.2 Team Leader Responsibilities During Certification

The responsibilities of the Certification Team Leader *during* certification are described in the table below.

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Assemble the certification team to

• review tasks outlined, and
• discuss any pertinent changes to drawings or project requirements.</td></tr>
<tr><td>2</td><td>Verify that shipboard configurations are in agreement with arrangement drawings.</td></tr>
<tr><td>3</td><td>Inspect the following items to ensure acceptable levels of workmanship.

Note: Installation standards and standards of workmanship should be specified in documents such as general specifications or installation drawings.

<table>
<tr><th>Item</th><th>Inspect For</th></tr>
<tr><td>Equipment foundations</td><td>Adequacy against foundation drawings.</td></tr>
<tr><td>Cable runs, connections, and labels</td><td>• Are cables properly terminated, secured, bonded, and tagged?
• Are cables sized properly for intended functions?</td></tr>
<tr><td>Grounding and bonding</td><td>• Is the ship/facility adequately grounded and bonded?
• Is equipment adequately grounded and bonded?</td></tr>
<tr><td>Power panels and connecting boxes</td><td>Accuracy against power distribution drawings.

• Is equipment connected to the correct breakers?
• Are breakers the proper size and adequately labeled?</td></tr>
</table>
</td></tr>
</table>

Continued on next page

6.2.6 Team Leader Certification Responsibilities, Continued

6.2.6.2
Team Leader Responsibilities During Certification (continued)

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>4</td><td>Check the following items to ensure acceptable levels of workmanship.

<table>
<tr><th>Item</th><th>Check For</th></tr>
<tr><td>Equipment positioning</td><td>• Is equipment positioned for easy maintenance?
• Will the equipment open and extend fully?</td></tr>
<tr><td>Wave guide/Antenna feeds</td><td>• Is the wave guide/antenna feed running properly and free of bends and dents?
• Are appropriate accessories (for example, bends, twists, adapters, and flanges) used?</td></tr>
<tr><td>Penetrations</td><td>Are penetrations of watertight boundaries properly made and sealed?</td></tr>
<tr><td>Housekeeping</td><td>• Have the equipment and areas surrounding the equipment been cleared and debris removed?
• Have nicks and scratches been touched up?</td></tr>
<tr><td>Adjacent equipment and spaces</td><td>Have nearby equipment or spaces been damaged by the installing activity?</td></tr>
</table>

Note: In a situation where workmanship is poor but no standards have been established, the role of the certification team is limited to observing and reporting discrepancies.</td></tr>
</table>

Continued on next page

6.2.6 Team Leader Certification Responsibilities, Continued

6.2.6.2
Team Leader Responsibilities During Certification (continued)

Step	Action
5	To ensure that unit personnel demonstrate sufficient knowledge of equipment operation and maintenance • request that ship personnel operate each piece of equipment while certification team member(s) watch, and • question personnel concerning operation and maintenance of equipment.
6	Verify that necessary equipment school training has been completed or is scheduled.
7	Verify that all applicable field changes are installed.
8	*At the end of each certification work day:* Meet with the certification team to • review discrepancies, and • compile a discrepancy listing for the installing activity or contract supervisor for correct action.

Continued on next page

6.2.6 Team Leader Certification Responsibilities, Continued

6.2.6.3 Team Leader Responsibilities After Certification is Completed

The responsibilities of the Certification Team Leader *after* certification is completed are described in the table below.

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Arrange to meet with all team members, including the cutter commanding officer if available.

Note: If the commanding officer is not available, request to meet with the executive officer.</td></tr>
<tr><td>2</td><td>Provide a rough draft of discrepancies to the unit and installing activity.

Note: Responsibility for correcting deficiencies will vary with the situation.</td></tr>
<tr><td>3</td><td>No more than 30 days after certification completion:

Submit an Installation Certification Memorandum documenting the results of the certification to the appropriate individuals, as described in the table below.

<table>
<tr><th>If the team leader was assigned by the …</th><th>Then the memorandum should be addressed to the …</th></tr>
<tr><td>Commandant (CG-64)</td><td>appropriate operational commander, with a copy to the unit.</td></tr>
<tr><td>Maintenance and Logistics Command (MLC)</td><td>Commandant (CG-64), with a copy to the unit.</td></tr>
</table>

See 6.2.6.4 for a description of the contents of an Installation Certification Memorandum.

Note: Upon receipt of the Installation Certification Memorandum, the MLC, area, or district commander initiates appropriate corrective action.</td></tr>
</table>

Continued on next page

6.2.6 Team Leader Certification Responsibilities, Continued

6.2.6.4 Contents of the Installation Certification Memorandum

The table below describes the contents of the Installation Certification Memorandum prepared by the Certification Team Leader.

See 6.2.7 Sample Installation Certification Memorandum for an example.

Memorandum Contents	Description
References	Lists all • applicable references • approved engineering changes • projects, and • tables of electronic drawings (TEDs).
Tests	Lists any tests performed other than equipment operation.
Installations	• Lists all installations, and • indicates whether the installations were satisfactory or unsatisfactory.
Discrepancies	• Lists all discrepancies found during the certification, and • indicates the recommended party responsible for correcting the discrepancy.
Training	Lists all training performed by the installing activity or contractor.
Recommendations	Provides any recommendations concerning • changes to unit, system, or equipment configurations, and • unsatisfactory installations.
Commendatory remarks	If appropriate, includes any commendatory remarks concerning the quality of the work performed.

6.2.7 Sample Installation Certification Memorandum

6.2.7.1 Certification Memorandum for Type A Installation

A sample Certification Memorandum for a Type A electronic equipment installation is shown below.

U.S. Department of Transportation
United States Coast Guard

Commandant
United States Coast Guard

2100 Second Street, S.W.
Washington, DC 20593-0001
Staff Symbol: G-SCE
Phone: (202) 267-XXXX
Fax: (202) 267-4617
Email:

10550
20 Jun 2002

MEMORANDUM

From: John Doe, Rank

Reply to
Attn of:

To: Commandant (G-SCE)

Subj: TYPE A ELECTRONICS INSTALLATION CERTIFICATION OF USCGC CERT (WHEC 174)

Ref: (a) Electronics Manual, COMDTINST M10550.25A
(b) SHIPALT 378-B-204
(c) CG Yard Project 17214

1. As outlined in reference (a), a Type A certification of electronic equipment installed on CGC CERT was performed by the following personnel from 1 to 4 September 1998:

LT SMITH COMDT (G-SCE)
CWO SMITH CG YARD
CWO SMITH MLCLANT (te)
CWO SMITH CGC CERT
ETC SMITH CGC CERT

2. All installations authorized by references (b) and (c) were done satisfactorily with only minor discrepancies. The installations certified were the following:

AIMS-MK-XII-IFF System
TDL-708 LORAN-C Receivers
SR-216 MF Transmitters
Constant Level Amplifiers
Rewiring of CIC Evaluator

3. Enclosure (1) is a list of minor discrepancies. Parties responsible for correcting discrepancies are also listed.
4. Installations made by CG Yard personnel were done in a professional manner. Cooperation of shipboard personnel was excellent.

#

SAMPLE CERTIFICATION MEMO

Continued on next page

6.2.7 Sample Installation Certification Memorandum, Continued

6.2.7.1 Certification Memorandum for Type A Installation (continued)

Subj: TYPE A ELECTRONICS INSTALLATION CERTIFICATION OF USCGC CERT (WHEC 714) 10550
20 Jun 2002

Enclosures:	(1) List of Discrepancies
Copy:	MLC(t) (as appropriate)
	COMDT (G-SCE) (if applicable)
	CGC CERT(WHEC-174)
	CG Yard
	G-S Centers of Excellence as Appropriate

SAMPLE CERTIFICATION MEMO

Continued on next page

6.2.7 Sample Installation Certification Memorandum, Continued

6.2.7.1 Certification Memorandum for Type A Installation (continued)

LIST OF DISCREPANCIES

1. Power feed cable to panel (01-156-2) in STTY not labeled. (CG Yard correct.)

2. Power feed cable to panel (01-158-1) in the Air Search Radar Room not labeled. (CG Yard correct).

3. Power panel (01-156-2) in STTY:
   a. Feeder cable tag information incorrect. (CG Yard correct).
   b. Feeder cable information not contained on power panel label. (CG Yard correct).

4. Power Panel (01-155-1):
   a. Label plate missing. (CG Yard correct).
   b. Incorrect label on feeder cable. (CG Yard correct).

5. Feeder cable to power panel (01-155-0) incorrect. (CG Yard correct).

6. No label on power panel (01-146-22). (CG Yard correct).

7. The AN/UNQ-7D Tape Recorder used with the ESM system was inoperative. (Ship's force correct).

8. The modifications to the towed body storage rack in the Sonar Equipment Room were not accomplished due to delay in parts delivery. (District correct.)

9. The VHF-FM antenna (Type 925) should be replaced with a Columbia Products Mode 420 (District correct).

(TYPED OR STAMPED LOWER RIGHT CORNER OF THE PAGE) "ENCL (1)"

SAMPLE LIST OF DISCREPANCIES

7.0 Equipment Maintenance

Table of Contents

Continued on next page

Table of Contents, Continued

7.0 Equipment Maintenance

Overview

7.01 Scope

This part describes

- the three levels of maintenance for electronic equipment
- guidelines for implementing the planned maintenance systems (PMSs), as well as descriptions of the supporting documentation for the PMS
- tools and processes of the progressive maintenance program that enable local repair of electronic assemblies
- routine maintenance activity guidelines to promote equipment efficiency
- the process and guidelines for performing corrective maintenance actions used to restore inoperative equipment to a fully operative condition, and
- guidelines for implementing, documenting, and reporting Coast Guard field changes.

7.02 References

Additional information on electronic equipment maintenance may be found in the following resources.

Resource	Description	Location/Link
Maintenance Procedure Card (MPC) in the Coast Guard Planned Maintenance System (CGPMS) Work Schedule Books (WSB)	Step-by-step maintenance actions to be performed on electronic equipment or system, and documentation needed to complete CGPMS.	Unit technical libraries
Equipment Technical Manuals	Specific manuals associated with each type and piece of equipment, which may contain • drawings • theory of operation, and • parts lists.	Unit technical libraries

7.03 Contents

This part contains the following subjects.

7.1 Maintenance Levels

Introduction

This topic describes the three levels at which electronic equipment maintenance is accomplished:

- organizational
- intermediate, and
- depot.

7.1. 1 Organizational Level Maintenance

Organizational Level Maintenance is on-site maintenance performed on a unit's equipment by personnel assigned to that unit.

The scope of maintenance performed at the organizational level depends on the capabilities of the unit's personnel. Examples of responsibilities are provided in the table below.

If a unit …	Then organizational level maintenance is performed by …	And typically includes …
has a large, well equipped maintenance force with Electronic Technicians (ETs)	ETs	• inspection • cleaning • lubrication • adjustment • troubleshooting • fault isolating, and • replacement of failed components.
does not have ETs	• Officer of the Day (OOD), or • watch supervisor	• noting that a failure has occurred • recording the symptoms, and • notifying the responsible intermediate level facility that maintenance is required. See 7.1.2 for information on intermediate level maintenance.

Continued on next page

7.1 Maintenance Levels, Continued

7.1.2 Intermediate Level Maintenance

Intermediate Level Maintenance is maintenance or technical assistance provided by designated field maintenance activities in direct support of organizational level units.

Examples of activities that provide intermediate level maintenance are

- electronic support units (ESU)
- electronic support detachments (ESD)
- district or sector maintenance personnel, or
- commercial repair activities.

See 2.3 Maintenance and Logistics Commands (MLCs), Districts, and Subordinate Units for more detail.

The scope of maintenance performed at the intermediate level includes

- routine (scheduled) maintenance for units that do not have ETs, such as
  - inspections
  - cleaning
  - alignment
  - corrosion control
  - equipment testing, and
  - tower inspections
- unscheduled (corrective) maintenance that is beyond a unit's capacity, such as
  - fault verification/isolation, and
  - repair to board or component level
- equipment removal/replacement of equipment, and
- installation of new systems that do not require major structural changes.

Continued on next page

7.1 Maintenance Levels, Continued

7.1.3 Depot Level Maintenance

Depot level maintenance is maintenance performed at centralized repair facilities by the Coast Guard, commercial, or other government agencies (OGAs).

The scope of maintenance performed at the depot level is to support the logistics “pipeline” through an inventory control point (ICP), which is responsible for directing failed items to the appropriate depot level facility for repair.

The depot level maintenance facility

- repairs and returns items to a ready-for-issue (RFI) status, and
- sends the RFI items to the ICP.

Note: Depot level maintenance facilities normally do *not* provide direct support to other levels of maintenance.

7.2 Maintenance Programs and Systems

Overview

7.2.01 Scope

This chapter describes the programs and systems in place to provide electronic equipment maintenance, including

- planned maintenance, which is a schedule of activities designed to maintain equipment performance at design standards, including
  – tests
  – adjustments
  – alignments
  – inspections
  – cleaning
  – lubrication, and
  – preservation, and
- progressive maintenance, which utilizes dedicated, structured work centers to screen and repair electronic assemblies (EAs) at the organizational and intermediate maintenance levels.

7.2.02 Reference

Additional information on maintenance programs and systems may be found in the following resource.

Resource	Description	Location/Link
CGPMS User Guide	A detailed explanation of the various components of the Coast Guard (CG) Planned Maintenance System (PMS) and how they are used.	The Engineering Logistics Center (ELC) Web site

7.2.03 Contents

This chapter contains the following topics.

7.2.1 Coast Guard Planned Maintenance System (CGPMS): Policies, Roles and Responsibilities

Introduction

This topic contains information on Coast Guard Planned Maintenance System (CGPMS) policies, roles and responsibilities, including

- CGPMS policy
- CGPMS objectives
- CGPMS sponsor
- CGPMS waiver requests
- an exception to PMS policy (Standard Workstation III)
- unit CGPMS roles and responsibilities, and
- other CGPMS roles and responsibilities.

7.2.1.1 CGPMS Policies

Significant reductions in corrective maintenance have been obtained at units using the Coast Guard Planned Maintenance System (CGPMS) policies listed below.

- CGPMS procedures and materials are mandatory at all Coast Guard units.
- All other forms of planned maintenance systems (PMS) are not authorized when CGPMS is available.
- When CGPMS is not available, Navy Planned Maintenance Systems (NPMS) are performed, if applicable.
- Units will develop and use Locally Planned Maintenance Systems (LPMS) only if CGPMS and NPMS are not available.
- Local recording of CGPMS actions is required, either by entering the information in CMPlus (when installed) or by using the CGPMS forms when CMPlus is not available.

Reference: For more information about the requirements of using CGPMS materials, refer to the CGPMS User Guide, which is available through the ELC Web site.

Continued on next page

7.2.1 Coast Guard Planned Maintenance System (CGPMS): Policies, Roles and Responsibilities, Continued

7.2.1.2 CGPMS Objectives

The objectives of using CGPMS are listed below.

- Provide a standardized planned maintenance program for electronic equipment within the Coast Guard.
- Provide the necessary and required tools to plan, schedule, and perform effective planned/preventive maintenance.
- Serve as a training tool for inexperienced technicians to familiarize them with new equipment.
- Provide maintenance hours data that is used to model staffing standards for Coast Guard units.

7.2.1.3 CGPMS Sponsor

Under the guidance and direction of the Director, Command, Control, Communications, Computers, and Information Technology (C4IT) Directorate, the Office of Command, Control (C2), and Navigation Systems (CG-64) is the authority and sponsoring activity for the CGPMS for electronic systems.

7.2.1.4 Exception to PMS Requirement for CGSWIII

The Coast Guard Standard Workstation III (CGSWIII) does not have PMS requirements. Use CGSWIII equipment until failure and then submit for warranty repair.

Continued on next page

7.2.1 Coast Guard Planned Maintenance System (CGPMS): Policies, Roles and Responsibilities, Continued

7.2.1.5 Unit Responsibilities for CGPMS Implementation

The responsibilities of unit personnel for implementing the CGPMS are described in the table below.

See 7.2.2 Coast Guard Planned Maintenance Systems (CGPMS): Documents and Forms for complete details on documentation associated with the CGPMS.

Who is Responsible	Description
Unit Commanding Officer (CO) or Officer in Charge (OinC)	• Integrates CGPMS procedures into the unit's regular work schedule and ensure compliance. When necessary, modifies CGPMS scheduling to best fit operational commitments. • Requests required waivers of compliance from Commandant (CG-64) via the appropriate Maintenance and Logistics Command (MLC) and the ELC. • Provides qualified personnel to perform CGPMS and forwards Feedback Reports (FBR) to the CGPMS Manager when the indicated labor hours for an assigned maintenance procedure are not accurate. • If no Electronic Technician (ET) is assigned to the unit, ensures that the appropriate support facility maintains the unit's CGPMS.
Senior Technician (the senior technical supervisor, military or civilian, at the electronics facility)	• Schedules and performs planned maintenance. • Incorporates CGPMS into the unit's training schedule. • Initiates requests for CGPMS revisions using FBRs. • Maintains a current CGPMS Library. • Ensures Equipment History Forms are complete and current. • If the unit does not have Electronics Material Officer (EMO), assumes the appropriate duties of the EMO.
EMO	• Ensures compliance with the CGPMS requirements in the division by – maintaining the CGPMS Work Schedule Books (WSBs) – reviewing and inspecting CGPMS work schedules to ensure they are current and complete – reviewing FBRs, and – ensuring CGPMS is in the unit's training schedule. • Briefs the CO or OinC on the status of the unit's CGPMS.

Continued on next page

7.2.1 Coast Guard Planned Maintenance System (CGPMS): Policies, Roles and Responsibilities, Continued

7.2.1.6 Responsibilities for CGPMS Program Administration

Responsibilities associated with the administration of the CGPMS program are described in the table below.

See 7.2.2 Coast Guard Planned Maintenance Systems (CGPMS): Documents and Forms for complete details on documentation associated with the CGPMS.

Who is Responsible	Description
CGPMS Sponsor Commandant (CG-64) and Program Manager	• Establishes, develops, and promulgates the overall policy and direction for the CGPMS program. • Reviews the total resources requested for the operation, support, and improvement of the CGPMS program. • Approves management applications of CGPMS data and documentation. • Provides instructions and technical direction for the CGPMS program. • Provides final approval authority for all maintenance procedures.
CGPMS Sponsor ELC	• Places requests for equipment maintenance evaluation on the Candidate Equipment List. • Monitors CGPMS Feedback Reports (FBRs), including coordinating timely resolution of technical and safety issues with the appropriate SMEF. • Provides a single point of contact for the Navy concerning electronic NPMS. • Disseminates Naval Sea Systems Command Center (NAVSEACEN) advisories regarding urgent safety-related issues on electronics equipment common to both CGPMS and NPMS.

Continued on next page

7.2.1 Coast Guard Planned Maintenance System (CGPMS): Policies, Roles and Responsibilities, Continued

7.2.1.6
Responsibilities for CGPMS Program Administration (continued)

Who is Responsible	Description
CGPMS Sponsor MLC	• Ensures the prescribed test equipment or its equivalent is available for each unit to perform CGPMS and NPMS maintenance procedures. • Reviews FBRs (CG-5451) and Navy Feedback Reports (OPNAV 4790/7B) from units under their cognizance and provides comments to the CGPMS Manager, as appropriate. • Monitors CGPMS performance at units under their cognizance. • Reports safety, technical, logistics, and scheduling discrepancies, pertinent to CGPMS, to the CGPMS Manager. • Assists the CGPMS Manager in coordinating CGPMS field unit visits. • Provides the CGPMS Manager advance notice of all additions or deletions of test equipment supplied or supported by MLC.
CGPMS Sponsor Systems Management and Engineering Facility (SMEF)	• Assists the MLC in – determining test equipment inventories and CGPMS requirements for units within their area of responsibility, and – monitoring CGPMS performance within their area of responsibility. • Advises the appropriate MLC of problems relative to the operation, safety, logistics, scheduling, and management of the CGPMS program.
Training Centers	Coast Guard Training Center, Petaluma includes CGPMS training in Class “A” curricula for ETs and Information Systems Technicians (ITs). Coast Guard Reserve Training Center, Yorktown includes CGPMS training in the Aid to Navigation (AToN) and Operations Specialist (OS) curricular.

Continued on next page

7.2.1 Coast Guard Planned Maintenance System (CGPMS): Policies, Roles and Responsibilities, Continued

7.2.1.7 CGMS Contractor Contact Information

The CGPMS contractor is responsible for the overall CGPMS.

For questions concerning any aspect of the overall CGPMS, you can contact the CGPMS contractor by telephone or e-mail:

Office Telephone: 703-273-4775
Office Fax: 703-691-8105
CGPMS Toll Free: 1-888-872-4767
E-Mail Address: mail@cgpms.com

7.2.2 Coast Guard Planned Maintenance System (CGPMS): Documents and Forms

Introduction

This topic contains information on CGPMS documents and forms, including

- CGPMS documents in the Work Schedule Books (WSBs)
- types of Feedback Reports (FBRs)
- the process for submitting an FBR, and
- CGPMS material updates.

7.2.2.1 CGPMS Documents in the WSB

The unit's Work Schedule Books (WSB) contains all the CGPMS documents. Each document is described in the table below.

Document	Description
User's Guide	A detailed explanation of the various components of CGPMS, and how they are used. **Note**: The User Guide is updated on an as needed basis and can be ordered from the ELC by Feedback Report (FBR), or memo.
Maintenance Procedure Card (MPC)	Step-by-step maintenance actions to be performed on an electronic equipment or system.
Index of Maintenance Procedures (IMP)	An index of all applicable MPCs for a given piece of equipment or system.
List of Effective IMPs	• A list of all CGPMS materials for electronic equipment installed at or supported by the unit, and • Total annual maintenance hours for all the listed equipment.

Continued on next page

7.2.2 Coast Guard Planned Maintenance System (CGPMS): Documents and Forms, Continued

7.2.2.1
CGPMS Documents in the WSB (continued)

Document	Description
Master Index	Complete listings of • all available CGPMS procedures, and • Navy Maintenance Index of Procedures (MIP) for Navy equipment used by the Coast Guard. See 7.2.3 Navy Planned Maintenance System (NPMS) for more detail on ordering NPMS materials.

7.2.2.2
CGPMS Forms

The CGPMS forms described in the table below are available on the intranet from

- Adobe Forms, and
- the CGPMS Manager at the ELC Web site.

Form	Description
Feedback Report (FBR) Form (CG-5451)	A three part form used to ensure continuous improvement to the CGPMS. See 7.2.2.3 for more detail on FBRs.
• Monthly PMS Maintenance Schedule (CG-5452), and • Annual PMS Maintenance Schedule (CG-5453)	Forms that technicians use to plan, schedule and display planned maintenance for a specific unit monthly and/or annually. **Note**: Scheduling activities at a unit help distribute CGPMS workload and maintain equipment reliability. Local conditions may require adjustment to the maintenance schedule (underway, special projects, travel restrictions).
CG-5454 Equipment History	A form used to record equipment maintenance history and comments when • no TDR is provided for equipment, or • it is necessary to record information in addition to that required by the TDR.

Continued on next page

7.2.2 Coast Guard Planned Maintenance System (CGPMS): Documents and Forms, Continued

7.2.2.3
Types of FBRs

The FBR is a three-part form for

- recording CGPMS actions
- reporting deficiencies or recommendations for changes in CGPMS, and
- submitting administrative and miscellaneous CGPMS requests or comments (for example, requesting updated CGPMS materials).

The three types of FBRs are described in the table below.

See 7.2.2.4 for details on the FBR submission process.

Type	Description
Technical FBRs	Technical FBRs are used to describe technical discrepancies or technical problem areas encountered with CGPMS. Each technical FBR should address only one subject or technical problem that affects equipment performance, which may include: • equipment design and configuration reporting problems, or • procedure discrepancies.

Continued on next page

7.2.2 Coast Guard Planned Maintenance System (CGPMS): Documents and Forms, Continued

7.2.2.3
Types of FBRs (continued)

Type	Description
Administrative FBRs	Administrative FBRs are used to provide administrative feedback. Each administrative FBR may address several problems or requests, such as: • missing or mutilated pages • modification or update of a unit's CGPMS package • general comments concerning CGPMS, or • ordering CGPMS forms or additional procedures.
Safety Related FBRs	Safety Related FBRs are treated very seriously. An FBR involving safety of personnel or damage to equipment is considered URGENT. The Commanding Officer (CO) or Officer in Charge (OinC) • sends urgent FBRs by PRIORITY message to the CGPMS Manager at the ELC, with the cognizant MLC (t) (Maintenance and Logistics Command, Electronics Division) and Systems Management and Engineering Facility (SMEF) as "info addressees," and • submits a follow-up FBR to amplify information reported in the message. **Note**: An FBR regarding Navy-owned or Navy-type CG-owned equipment must be forwarded to NAVSEACEN and NAVSAFECEN with Commandant (CG-64) as an "info addressee. See 7.2.3 Navy Planned Maintenance System (NPS) for information on NPS procedures.

Continued on next page

7.2.2 Coast Guard Planned Maintenance System (CGPMS): Documents and Forms, Continued

7.2.2.4 FBR Submission Process

The process for submitting an FBR is described in the table below.

Note: FBR forms are available as a three part carbonless form, or can be completed online in Adobe Forms and printed.

<table>
<tr><th>Stage</th><th>Who is Responsible</th><th>Description</th></tr>
<tr><td>1</td><td>Senior ET</td><td>Completes the FBR.</td></tr>
<tr><td>2</td><td>Electronics Material Officer (EMO)</td><td>Reviews the FBR.</td></tr>
<tr><td>3</td><td>CO or OinC</td><td>• Forwards copies of the FBR as follows:
– Original/Headquarters (white) copy to the CGPMS Manager
– MLC (yellow) copy to the cognizant MLC (t), and
• retains the Originator copy (pink).</td></tr>
<tr><td>4</td><td>CGPMS Manager</td><td>Sends a letter of acknowledgement to the reporting activity and to the appropriate MLC.

The table below describes circumstances that require additional actions by the CGPMS manager.

<table>
<tr><th>When an FBR …</th><th>Then the CGPMS Manager …</th></tr>
<tr><td>requires additional review prior to action</td><td>• notes the need for additional review in the acknowledgement letter, and
• coordinates technical reviews by other activities.</td></tr>
<tr><td>is Technical</td><td>sends a copy of the Technical FBR and associated documents to the appropriate Systems Management and Engineering Facility or Equipment Manager.</td></tr>
</table></td></tr>
</table>

Continued on next page

7.2.2 Coast Guard Planned Maintenance System (CGPMS): Documents and Forms, Continued

7.2.2.5 Receiving CGPMS Documentation and Forms

The table below describes when and how units receive CGPMS documentation and forms.

Type of Update	Description
Initial Issue	Units that support electronic equipment and are not currently participating in CGPMS must submit the following information to the CGPMS Manager by Rapid draft letter, fax, or e-mail: • a request for initial issue, and • a copy of the unit's latest configuration.
Automatic Updates	Units receive automatic shipments of updated CGPMS documentation and forms as changes occur or new equipment or systems are added to CGPMS. Automatic updates are based on current CGPMS records and the data entered in the Fleet Logistics System (FLS) central database.
Annual Updates	Annual updates ensure the unit has the most current CGPMS documentation and forms. Detailed instructions for completing the update (that is, ensuring that all equipment and repairable items at a station are in the CGPMS system) are contained in the Annual Update package. Each unit receives CGPMS documentation and forms based on previous requests submitted by FBRs, current CGPMS records, and data contained in AIM.

Continued on next page

7.2.2 Coast Guard Planned Maintenance System (CGPMS): Documents and Forms, Continued

7.2.2.5
Receiving CGPMS Documentation and Forms (continued)

Type of Update	Description
Requested Updates	Units may request revisions to its CGPMS documentation and forms due to equipment changes by submitting an FBR to the CGPMS Manager.
Special Requests	Units may request CGPMS documentation and forms for equipment not actually installed at their unit or supported by their unit for training or other reasons. The unit must submit an FBR • stating their reason for requesting the additional material, and • indicating whether they want to receive automatic updates for the new material. **Note**: The special request will not be reflected in the unit's List of Equipment Index of Maintenance Procedures (LOEIMP) total maintenance hours.

7.2.3 Navy Planned Maintenance System (NPMS)

Introduction

This topic contains information on Navy Planned Maintenance System (NPMS), including

- when to use NPMS
- ordering NPMS procedures
- requesting to be on the NPMS distribution list, and
- providing NPMS feedback.

7.2.3.1 When to use NPMS

The Navy develops and provides Planned Maintenance System (PMS) procedures for Navy electronic equipment. Coast Guard units are expected to use the Navy Planned Maintenance System (NPMS) for Navy-owned or Navy-type Coast Guard-owned equipment, for which CGPMS procedures do not exist.

7.2.3.2 Required Planned Maintenance Reporting

Units are responsible for tracking, updating, and maintaining planned maintenance in CMPlus.

7.2.3.3 Requesting inclusion on NPMS Distribution List

The procedure used by the unit's PMS coordinator to request inclusion on the Navy PMS Distribution List is described in the table below.

Step	Action
1	Either • complete a letter requesting to be placed on the distribution list, and include – a listing of Navy-owned or Navy-type Coast Guard-owned electronic equipment at the unit, and – all required Maintenance Index Procedure (MIP) numbers, or • complete OPNAV 4790/7B (found in USCGForms on the CG Standard Workstation).

Continued on next page

7.2.3 Navy Planned Maintenance System (NPMS), Continued

7.2.3.3
Requesting inclusion on NPMS Distribution List (continued)

Step	Action
2	Send the request letter to: Commanding Officer Naval Sea Support Center, Pacific P.O. Box 85548 San Diego, CA 92138 Attn. Code 914.
3	Forward copies of Navy PMS correspondence, letters, or Navy Feedback Report (FBR) Form OPNAV 4790/7B to the • Coast Guard Planned Maintenance System (CGPMS) Manager, and • appropriate MLC(t) (Maintenance and Logistics Command, Electronics Division).

7.2.3.4 Ordering NPMS Procedures

NPMS procedures may be ordered, at no cost. The procedure for ordering the necessary NPMS procedures is described in the table below.

Step	Action
1	Is the unit on the Navy PMS Distribution List? • If *yes*, go to Step 2. • If *no*, request to be placed on the NPMS Distribution List before completing this procedure. (See 7.2.3.03 for details.)
2	Complete a FBR Form OPNAV 4790/7B. **Note**: This form is available on Adobe Forms.
3	Forward the completed FBR to Naval Sea Support Center, Pacific (NAVSEASUPCENPEC).
4	Forward copies of Navy PMS correspondence, letters, or OPNAV 4790/7B to the CGPMS Manager and the appropriate MLC(t).

Continued on next page

7.2.3 Navy Planned Maintenance System (NPMS), Continued

7.2.3.5 Providing NPMS Feedback

Use the Navy Feedback Report (ONAV 4790/7B) to provide feedback on NPMS.

Forward completed copies of ONAV 4790/7B to

- NAVSEASUPCENPAC, and
- the appropriate MLC (t).

7.2.4 Locally Planned Maintenance System (LPMS)

Introduction

This topic contains information on Locally Planned Maintenance Systems (LPMS), including

- when to use LPMS
- guidelines for creating LPMS materials, and
- reporting LPMS to the Coast Guard Planned Maintenance System (CGPMS) Manager.

7.2.4.1 When to Use an LPMS

A unit may develop and use a Locally Planned Maintenance System (LPMS) whenever the Coast Guard Planned Maintenance Systems (CGPMS) or Navy Planned Maintenance Systems (NPMS) are *not* available for an equipment or system they support.

The equipment's SMEF has the authority to approve an LPMS.

7.2.4.2 Guidelines for Creating LPMS Documentation

The SMEF must use the guidelines below to create LPMS documentation when needed.

- Format an LPMS as a CGPMS using a standard CGPMS Maintenance Procedure Card (MPC).
- Use the following forms for LPMS documentation:
  - Monthly and Annual Schedules, CG-5452/CG-5453, and
  - Equipment History Forms, CG-5454.

See 7.2.2 Coast Guard Planned Maintenance Systems (CGPMS): Documents and Forms for more detail about obtaining and using the CGPMS documentation identified above.

7.2.4.3 Reporting LPMS to the CGPMS Manager

The unit's PMS manager or designee must send a notification letter with all LPMS documentation to the CGPMS Manager for review and possible inclusion in CGPMS.

7.2.4.4 Required LPMS Maintenance Reporting

Planned maintenance must be tracked, updated and maintained using CMPlus.

7.2.5 Progressive Maintenance Program

Overview

7.2.5.01 Scope

This section describes the progressive maintenance program for electronic assemblies (EAs), including

- the work centers used for local screening and repair of EAs,
- roles and responsibilities for progressive maintenance program compliance, administration, and support, and
- how to report progressive maintenance activities.

See 7.3.4 Progressive Maintenance Activities for detail on completing progressive maintenance activities.

7.2.5.02 References

Additional information about the progressive maintenance program may be found in the following resources.

Resource	Description	Location/Link
• Supply Policy and Procedures Manual (SPPM), COMDTINST M4400.19 (series) • Management Information for Combined Allowance/Coordinated Shipboard Allowance List (MICA/COSAL) Manual	Provide detail on Source, Maintenance, and Recoverability (SM&R) codes, which indicate • the military source of supply, and • the organization that repairs specific equipment or a modular component.	SPPM: CG Central
Naval Supply Publication 485, NAVSUP P-485	Provides guidelines for when to send a faulty EA to the depot for repair, instead of using the Miniature/ Microminiature (2M) repair process.	---

Continued on next page

Overview, Continued

7.2.5.02
References (continued)

Resource	Description	Location/Link
Certification Manual for 2M/Module Test and Repair (MTR) Program, NAVSEA TE000-AA-MAN-010/NAVAIR SE-004-PQS-000	Provides certification standards and requirements for the 2M/MTR Program.	---
Ordnance Manual, COMDTINST M8000.2 (series)	---	---
Naval Engineering Manual, COMDTINST M9000.6 (series)	---	---
Maintenance Policy for Naval Ships, OPNAVISNT 4700.7 (series)	Provides policies for 2M repairs of electronic equipment.	---
Naval Aviation Maintenance Program, OPNAVINSTs 4790.2 (series)	Provides policies for 2M repairs of electronic equipment.	---
Maintenance of Surface Ship Electronic Equipment, OPNAVINST 4790.13 (series)	Provides policies for 2M repairs of electronic equipment.	---

Continued on next page

Overview, Continued

7.2.5.03 Contents

This section contains the following topics.

7.2.5.1 Progressive Maintenance Program Overview

Introduction

This topic contains an overview of the progressive maintenance program, including

- purpose of progressive maintenance program
- progressive maintenance program objectives
- progressive maintenance program scope
- progressive maintenance program components
- 2M/MTR certification process, and
- 2M/MTR work center locations.

7.2.5.1.1 Purpose of Progressive Maintenance Program

The progressive maintenance program establishes dedicated, structured work centers to screen and repair Electronic Assemblies (EAs), which include both electronic modules (EMs) and circuit card assemblies (CCAs), at a significant cost reduction and increase in equipment up time.

Note: Historically, even though there were highly trained personnel aboard most surface ships and many shore facilities, the failed EAs were returned to depot sites for repair. The progressive maintenance program gives units the tools and training needed to screen and repair most EAs locally.

7.2.5.1.2 Progressive Maintenance Program Objectives

The progressive maintenance program is designed to meet the objectives described below.

- Improve equipment Operational Availability (A_O) by providing technicians at the operational and intermediate levels
  - an additional tool to troubleshoot complex systems that do not have adequate maintenance assist modules (MAMs) onboard, and
  - the ability to screen and repair faulty EAs if appropriate.
- Eliminate the turn-in of no failure evident (NFE) of certain EMs and CCAs to the depot.

Note: Doing test and repair at the lowest level enhances ship sustainability and helps to ensure optimum economic use of resources in achieving maximum operational readiness.

Continued on next page

7.2.5.1 Progressive Maintenance Program Overview, Continued

7.2.5.1.3 Progressive Maintenance Program Scope

The progressive maintenance program applies to Coast Guard (CG) activities involved in the maintenance and material support of EAs in the following equipment:

- Hull, Mechanical, and Electrical (HM&E)
- Navy-Type Navy-Owned (NTNO), and
- Navy-Type Coast-Guard Owned (NTCGO).

Exceptions: This program is not designed nor intended to replace any existing Coast Guard or Navy Depot Repair programs (such as ELCs) which continue to operate under separate charters and policy directives.

7.2.5.1.4 Progressive Maintenance Program Components

The progressive maintenance program components are described in the table below.

Component	Description	See
Module Test/Repair (MTR) Program	Electrical/electronic module test and repair capabilities developed and provided to organizational- and intermediate-level maintenance facilities.	7.2.5.3 Module Test/Repair (MTR) Program
Miniature/Microminiature (2M) Program	• Rework and repair work on damaged electronic assemblies (EAs), and • replacement of discrete components and integrated circuits (ICs).	7.2.5.4 Miniature/Microminiature (2M) Program

Continued on next page

7.2.5.1 Progressive Maintenance Program Overview, Continued

7.2.5.1.5 2M/MTR Certification Process

A 2M/MTR Field Service Engineer certifies units to receive 2M/MTR stations, using the certification process described in the table below.

Reference: For more detail on the 2M/MTR work center certification standards and requirements, refer to Certification Manual for 2M/MTR Program Miniature/Microminiature (2M)/Module Test and Repair (MTR), NAVSEA TE000-AA-MAN-010/NAVAIR SE-004-PQS-000.

Stage	Description
Training	
1	Existing billeted personal are trained to become certified Electronics Technicians (ETs) for MTR Screening, and/or 2M Repair.
Requesting Initial Certification	
2	2M/MTR Field Services is notified that the 2M/MTR work center meets the minimum requirements specified in the Certification Manual.
Certification	
3	A 2M/MTR Field Service Engineer visits the work center to evaluate the site's MTR program by determining if the site has met minimum levels of • certified personnel • equipment outfitting, and • facility requirements.
4	Did the2M/MTR Field Service Engineer identify the site as capable of performing high quality diagnostic testing and repairs? • If *yes*, the site receives initial certification. Go to Stage 5. • If *no*, the site is de-certified, and scheduled for re-inspection with an 8 month timeframe. Repeat Stages 1-3 for re-inspection.

Continued on next page

7.2.5.1 Progressive Maintenance Program Overview, Continued

7.2.5.1.5
2M/MTR Certification Process (continued)

Stage	Description
	Follow-on Review
5	Site certification must be renewed, by repeating Stages 3-4: • every 18 months (**Note**: The 2M/MTR Field Service Engineer may extend this to 24 months to facilitate scheduling), and • when a 2M/MTR site is relocated. **Note**: Each In-Service Engineering Agent (ISEA) liaison must establish procedures for scheduling and monitoring certification.

7.2.5.1.6
2M/MTR Work Center Locations

The units listed below maintain a fully outfitted and certified 2M/MTR work center.

- Shore units designated to provide intermediate level maintenance
- Selected Naval Engineering Support Units (NESU)
- Selected Electronics Support Units (ESU)
- Selected Electronics Support Detachments (ESD)
- 378' high endurance cutter (WHEC)
- 270' medium endurance cutter (WMEC), and
- 420' ice breaker (WABG).

Note: 2M/MTR workstations may be installed or certified at other units with the approval of Commandant (CG-64) and the appropriate chain-of-command. As funding is allocated, the program office provides required equipment to outfit approved units designated to maintain a 2M/MTR work center.

7.2.5.2 Progressive Maintenance Program: Roles and Responsibilities

Introduction

This topic contains information on the progressive maintenance program's roles and responsibilities, including

- personnel responsible for ensuring progressive maintenance program compliance
- responsibilities for progressive maintenance program administration, and
- Navy responsibilities for progressive maintenance program support.

7.2.5.2.1 Personnel Responsible for Ensuring Progressive Maintenance Program Compliance

The following personnel are responsible for ensuring compliance with the provisions of the progressive maintenance program:

- area and district commanders
- commanders of Maintenance and Logistics Commands (MLCs)
- commanding officers of headquarters units
- assistant commandants for directorates
- Chief Counsel, and
- special staff offices at Headquarters.

Continued on next page

7.2.5.2 Progressive Maintenance Program: Roles and Responsibilities, Continued

7.2.5.2.2 Responsibilities for Progressive Maintenance Program Administration

Responsibilities associated with the administration of the progressive maintenance program are described in the table below.

Who is Responsible	Description
Commandant (CG-64)	• Serves as Program Manager, implementing and requiring adherence to program policy, procedures, and technical direction. • Establishes Memorandums of Agreement (MOAs) with appropriate – Navy activities to maintain life cycle support of existing and future Miniature/Microminiature (2M)/Module Test and Repair (MTR) facilities, and – Coast Guard activities to provide funding for support of Coast Guard electronics and Hull, Mechanical, and Electrical (HM&E) equipment. • Provides funding from the annual Navy-Type/Navy-Owned (NTNO) program budget to maintain 2M/MTR program capabilities for NTNO equipment. • Partners with In-Service Engineering Agent (ISEA) liaisons to monitor the effectiveness of the program and adapt to changes in the program and technology to maximize utilization and unit support throughout the Coast Guard. • Provides life cycle management of 2M/MTR equipment.
MLC (t)	Tracks Module Test/Repair (MTR) component as Coast Guard General Purpose Electronic Test Equipment (GPETE).
ISEA Liaison	• Identifies training shortfalls, works with the program manager to ensure training reflects program changes, and provides follow-on training for the operation and maintenance of the 2M/MTR equipment. • Monitors the effectiveness of the 2M/MTR program, analyzes data collected via the program's database to identify weaknesses, and identifies and assists in the development of new diagnostic data for use in screening and troubleshooting EAs. • Provides logistics, maintenance, and management support to 2M/MTR facilities, including assisting units in maintaining site certification.

Continued on next page

7.2.5.2 Progressive Maintenance Program: Roles and Responsibilities, Continued

7.2.5.2.2
Responsibilities for Progressive Maintenance Program Administration (continued)

Who is Responsible	Description
Commanding Officer	• Ensures that all suspected faulty Electronic Assemblies (EAs) are screened prior to returning them to the repair depot. • Ensures that MTR stations and at least one technician are certified. • Ensures that 2M stations and at least one technician are certified. • Maintains piece parts allowances, consumable materials, and miscellaneous support items. • Ensures compliance with reporting requirements for all screening and repair actions using the Module Test and Repair Tracking System (MTRTS).
TRACEN Yorktown	Provides MTR program training and 2M training as directed by headquarters training managers. **Note**: Training may also be available at various Navy, Marine Corps, or Air Force training sites.

Continued on next page

7.2.5.2 Progressive Maintenance Program: Roles and Responsibilities, Continued

7.2.5.2.3 Navy Responsibilities for Progressive Maintenance Program Support

Responsibilities of Navy activities for support of the progressive maintenance program are described in the table below.

Responsible Activity	Description
Naval Undersea Warfare Center (NUWC)	The NUWC, Field Engineering Office, Norfolk Detachment is the Navy's In-Service Engineering Agent (ISEA) for the diagnostic portion of the program. A Coast Guard liaison at NUWC provides various services to ensure maximum effectiveness and utilization of the diagnostic capabilities of the program are realized.
Naval Surface Warfare Center (NSWC)	NSWC, Crane Division is the Navy's ISEA for the repair portion of the program. A Coast Guard liaison at NSWC provides various services to ensure maximum effectiveness and utilization of the repair capabilities of the program.
Navy Regional Maintenance Centers (RMCs)	General program assistance may be available through various Navy RMCs.

7.2.5.3 Module Test/Repair (MTR) Program

Introduction

This topic contains information on the Module Test/Repair (MTR) program, including

- MTR program description
- MTR work center components
- MTR screening options
- gold disk test routine
- silver disk testing routines, and
- screening without a test routine.

7.2.5.3.1 MTR Program Description

The Module Test/Repair (MTR) Program is the local screening aspect of the progressive maintenance program. It establishes dedicated, structured MTR work centers for use by certified personnel aboard most surface ships and many shore facilities.

The MTR technician can screen suspected faulty electronic assemblies (EAs) to confirm the presence of a fault and then identify the failed component(s). This involves

- interpreting both the visual condition and electrical characteristics of EAs and individual components, and
- comparing the characteristics of suspected faulty EAs with baseline characteristics stored in a locally accessible database.

See 7.3.4 Progressive Maintenance Activities for more detail on performing MTR screening.

Continued on next page

7.2.5.3 Module Test/Repair (MTR) Program, Continued

7.2.5.3.2 MTR Work Center Components

The MTR Program accomplishes diagnostic screening/testing of suspected faulty EAs using the General Purpose Electronic Test Equipment (GPETE) in the MTR Workstation. The MTR configuration is not static. As new techniques for repair are available, they are evaluated and institutionalized into the MTR.

A fully equipped MTR work center consists of the equipment described in the table below.

Note: The GPETE test station uses an IBM compatible personnel computer (PC), which is not counted as part of the microcomputer allowance.

Component	Description
Electrical/ Electronic Equipment AN/USM-674(V) Test Station	• Works by applying a current-limited AC signal across two points of an electronic component to provide a unique analog signature that displays the relationship between voltage and current across and through the component. • Graphically displays the analog signature, which represents the overall health of the device under test.
Test station software	• Guides the technician through the diagnostic testing process. • Displays a known good analog signature (when available in the database) that the technician can use to evaluate the analogue signature of the suspected faulty EA. • Digitizes the analog signatures for storage by the PC, enabling a technician to – learn and save the signatures of a good EA, and – utilize the stored information to fault isolate defective EAs.
Documentation	Maintenance policies and procedures for testing and repairing EAs.

Continued on next page

7.2.5.3 Module Test/Repair (MTR) Program, Continued

7.2.5.3.3 MTR Screening Options

Technicians should always use the most complete screening option available. The three MTR screening options are

- Gold Disk test routine
- Silver Disk test routine, and
- screening without a test routine.

7.2.5.3.4 Gold Disk Test Routine

The Gold Disk test routine is the first choice for screening, when available. It is a diagnostic troubleshooting routine used to isolate faulty components on an EA, or to determine whether an EA is no failure evident (NFE) to be returned to equipment.

The Gold Disk test routine database is not static, and is updated regularly. As new routines are verified to be complete, they are added to the Gold Disk database.

The Gold Test Routine is comprised of the four logistic tools described in the table below.

Logistic Tool	Description
Assembly Drawing	The assembly drawing is • a graphical representation of the EA under test that can be displayed in the graphics viewer mode of the MTR software, and • developed in scale to the original EA, including comparison against the manufacturer's drawing to ensure accurate development.

Continued on next page

7.2.5.3 Module Test/Repair (MTR) Program, Continued

7.2.5.3.4
Gold Disk Test Routine (continued)

Logistic Tool	Description
Schematics	The schematic is included in a format easily accessible for the technician to reference during fault isolation.
Gold Disk MDB	The Gold Disk MDB is a database that contains logistics data for the EA under test, including • each component • the manufacturer's code (CAGE) • part number, and • National Stock Number (NSN). **Note**: The database provides a cross-reference tool by comparing the component logistic data to the • manufacturers data, and • military provisioning data, including the Allowance Parts List (APL), and Illustrated Parts Breakdown (IPB).
Analog Diagnostic Signature Database (D/D)	The analog diagnostic signature database (D/D) is the heart of the MTR system. The D/D is broken down into different sections, which correlate to the specific groups of electrical components on the EA. The D/D contains: • parent system nomenclature, EA part number, and revision level of the specific EA used during the signature mapping • the individual component, with prompts that encourage the technician to use component instructions during testing (that is, the exact procedures needed to complete the required test), and • the "stored signature characteristics" of each component of the EA, which are – digitized signatures of a known good ready for issue (RFI) EA – developed using a minimum of three RFI EAs, and – used by the technician for signature comparison against the suspected faulty EA.

Continued on next page

7.2.5.3 Module Test/Repair (MTR) Program, Continued

7.2.5.3.5 Silver Disk Testing Routines

Silver Disk test routines are routines that are typically developed by MTR work centers that

- may not contain all the logistics information, schematic diagrams, or graphic assembly drawing of a "Gold Disk" test routine, and
- contain un-validated signatures.

Note: Silver Disk test routines may be submitted to the Naval Undersea Warfare Center (NUWC) for verification and inclusion in the Gold Disk test routine database.

7.2.5.3.6 Screening Without a Test Routine

MTR screenings should include any additional resources that the technician can use to screen and EA, even if the suspect EA does not have a test routine developed for it.

646/674 MTR work centers operate in two modes, Local and Remote. The technician can complete a screening in Local mode at the equipment independent of the controller. If a known good board is available, the MTR technician can complete the screening of the suspect board by comparing the component signatures of the suspected faulty board to the signatures of the good board.

Note: The Huntron 2000 is used in the same manner.

7.2.5.4 Miniature/Microminiature (2M) Program

Introduction

This topic contains information on the Miniature/Microminiature (2M) Program, including

- 2M program description
- 2M program advantages
- 2M program scope
- 2M work centers
- miniature electronic repair, and
- microminiature electronic repair.

7.2.5.4.1 2M Program Description

The 2M Program

- is the local repair component of the progressive maintenance program at the organization and intermediate maintenance levels
- supports miniature and microminiature electronic repair
- provides 2M repair stations, which includes the repair equipment, tools, software, techniques, and training required for certified technicians to perform
  - highly reliable, high quality repairs on complex electronic assemblies (EAs), including damaged EAs, and
  - replacement of discrete components and integrated circuits (ICs).

See 7.3.4 Progressive Maintenance Activities for more detail on performing 2M repair.

7.2.5.4.2 2M Program Advantages

2M electronic repair saves time and money by

- reducing potential maintenance costs associated with turning in no failure evident (NFE) EAs to the depots
- repairing EAs at the lowest possible maintenance level, and
- improving overall fleet readiness through increased self-sustainability of the repair site itself.

Note: Repaired EAs are considered a condition “A” asset.

Continued on next page

7.2.5.4 Miniature/Microminiature (2M) Program, Continued

7.2.5.4.3 2M Program Scope

The 2M Program applies to all electronic equipment following the direction of

- Maintenance Policy for Naval Ships, OPNAVISNT 4700.7 (series)
- Naval Aviation Maintenance Program, OPNAVINSTs 4790.2 (series), and
- Maintenance of Surface Ship Electronic Equipment, OPNAVINST 4790.13 (series).

7.2.5.4.4 2M Work Center Components

The 2M work center components are described in the table below.

Component	Description
Tools and materials	The 2M Electronic Repair Station consists of the tools and materials required for EA repairs, including: • various power and hand tools • a microscope • miscellaneous supplies, and • consumable materials.
A "Piece Parts" Allowance Parts List (APL)	APL contains the frequently used repair components.
Electrostatic Discharge (ESD) Control	ESD Control consists of safety equipment designed to protect EAs under test or repair by discharging electrical potentials residing on work surfaces and technician's skin.
Documentation	Maintenance policies and procedures for and repairing EAs.

Continued on next page

7.2.5.4 Miniature/Microminiature (2M) Program, Continued

7.2.5.4.5 Scope of Miniature Electronic Repair

Miniature Electronic Repair covers the safety and repairs described below.

- Familiarization with electrostatic discharge (ESD) and related handling procedures to minimize ESD risks to the EA.
- Repair of single-sided and double-sided EAs, focusing on discrete and multilead through-hole components.
- Removal and replacement of these components.
- Removal and re-application of conformal coatings.
- Wiring and soldering of various terminals and connectors.
- Removal and replacement of damaged conductors and printed circuit board laminate.

See 4.5 Working with Energized Electrical Equipment for more detail on EDS safety guidelines.

7.2.5.4.6 Scope of Microminiature Electronic Repair

Microminiature Electronic Repair is more technically demanding than the miniature level repair, therefore miniature repair training is a prerequisite for microminiature training. Microminiature repair involves:

- high-density component packaging
- multilayer conductor and laminate repair
- flex-print repair
- edge-lighted panel repair
- welded lead repair, and
- surface mounted technology (SMT) repair.

7.2.5.5 Module Test and Repair Tracking System (MTRTS) Reporting

Introduction

This topic contains information on module test and repair tracking system (MTRTS) reporting, including

- MTRTS purpose
- MTRTS life cycle support
- reporting guidelines for Miniature/Microminiature (2M) and Module Test/Repair (MTR) maintenance, and
- non-2M/MTR related maintenance reporting.

7.2.5.5.1 MTRTS Purpose

The Module Test and Repair Tracking System (MTRTS) is software and procedures for reporting all Miniature/Microminiature (2M) and Module Test/Repair (MTR) maintenance activities. It provides the ability to document, track, and generate reports of 2M/MTR maintenance actions related to the screening, fault isolation, and repair of electronic assemblies (EAs). Program managers use this maintenance action data to

- monitor component failure
- adjust piece parts Allowance parts List (APL) provisions, and
- measure the effectiveness of the MTR maintenance program.

7.2.5.5.2 MTRTS Lifecycle Support

Naval Undersea Warfare Center (NUWC) provides the life cycle support for the MTRTS. This includes software deliveries and upgrades, and collection and compilation of data.

Continued on next page

7.2.5.5 Module Test and Repair Tracking System (MTRTS) Reporting, Continued

7.2.5.5.3 Reporting Guidelines for 2M and MTR Maintenance

Guidelines for reporting 2M/MTR maintenance with the MTRTS are described in the table below.

Note: Reporting instructions are issued with the MTRTS software.

Unit Capability	Guidelines
Units with a 2M/MTR work center and related 2M/MTR maintenance activities	The MTRTS software must be used to document, track, and generate reports of MTR maintenance actions as described below. • Report all 2M/MTR work center maintenance actions, including screening, fault isolation, and repairs of EAs. • Send valid MTRTS Quarterly submissions no later than ten (10) days following the end of each quarter, as follows: – perform an MTRTS backup, and, – e-mail the file to uscgdata@nor.nuwc.navy.mil **IMPORTANT**: Do not report any *non* 2M/MTR-related maintenance in MTRTS. See 7.2.5.5.4 for details.
Units without a 2M/MTR work center	Units that do not have a certified 2M/MTR work center are not required to perform any 2M/MTR reporting. The 2M/MTR technicians that perform the 2M/MTR maintenance at their local NESU, ESU, or ESD are responsible for reporting the maintenance through MTRTS.

Continued on next page

7.2.5.5 Module Test and Repair Tracking System (MTRTS) Reporting, Continued

7.2.5.5.4 Non-2M/MTR Related Maintenance Reporting

Non-2M/MTR related maintenance should *not* be reported in MTRTS.

Note: All other non-2M/MTR related maintenance actions should be reported in accordance with this manual and the following references:

- Ordnance Manual, COMDTINST M8000.2 (series), and
- Naval Engineering Manual, COMDTINST M9000.6 (series) at CG Central.

7.3 Maintenance Activities

Overview

7.3.01 Scope

This chapter describes the general activities that must be performed to maintain electronic equipment, including routine, corrective, and progressive maintenance.

7.3.02 References

Additional information on maintenance activities may be found in the following resources.

Resource	Description	Location/Link
Maintenance Procedure Card (MPC) in the Coast Guard Planned Maintenance System (CGPMS) Work Schedule Books (WSB)	• Step-by-step maintenance actions to be performed on an electronic equipment or system, and • documentation needed to complete CGPMS.	Unit technical libraries
Equipment Technical Manuals	Specific manuals associated with each type and piece of equipment, which may contain • drawings • theory of operation, and • parts lists.	Unit technical libraries

7.3.03 Contents

This chapter contains the following topics.

7.3.1 Maintaining the Proper Environment for Electronic Equipment

Introduction

This topic contains information on maintaining the proper environment for electronic equipment, including

- scope of environmental maintenance guidelines covered in this topic
- temperature, humidity, and corrosive-atmosphere control guidelines for electronic equipment
- storage guidelines for electronic equipment
- guidelines for standby electronic equipment, and
- guidelines for minimizing vibration and shock to electronic equipment.

7.3.1.1 Scope of Environmental Maintenance Guidelines Covered in this Topic

It is beyond the scope of this topic to present all the problems encountered from environmental conditions because methods of installation and stowage of electronic equipment differ from ship to ship and from one shore station to another. However, this topic does provide some of the common preventive and corrective measures.

For more detailed equipment-specific guidelines, refer to

- Coast Guard Planned Maintenance System (CGPMS) documentation
- manufacturers' technical manuals
- equipment EILSPs, and
- local Coast Guard directives.

7.3.1.2 Temperature Control for Electronic Equipment

The cooling and heating of air spaces surrounding the components of electronic equipment is usually controlled by blowers, fans, hot oil and water coolers, and so on, either to dissipate the heat generated by the equipment components or to heat or cool the surrounding air.

To avoid adverse effects of temperature extremes of electronic equipment, follow the guidelines below.

- Keep the equipment free of foreign matter. Foreign matter can greatly affect the heating or cooling which may result in equipment damage or malfunction caused by improper temperature control.
- Control minimum and maximum temperature extremes.

See 7.3.5 Cold Weather Operations: Special Maintenance Considerations for guidelines on maintaining electronic equipment in cold weather.

Continued on next page

7.3.1 Maintaining the Proper Environment for Electronic Equipment, Continued

7.3.1.3 Ventilation for Electronic Equipment

It is important to provide adequate ventilation of the equipment to control humidity and protect equipment from trapped moisture and/or high operating temperatures. Excess humidity may result in damage to equipment from condensation and fungus growth, under conditions of both salt-laden moist air and high temperatures.

7.3.1.4 Corrosion Prevention for Electronic Equipment

To prevent corrosion, a regular periodic cleaning schedule should be established. This schedule should include the following activities, as specified on the maintenance procedure card (MPC):

- cleaning
- surface protection
- lubricating moving parts, and
- applying approved solvents or wetting agents to remove any accumulated foreign matter, such as
  - soil
  - dust
  - oil film
  - salt-impregnation, and
  - corrosion.

IMPORTANT: All access doors and panels should be fastened securely and in place when no maintenance work is being performed on the equipment.

7.3.1.5 Storage of Electronic Equipment

When electronic equipment and component parts must be stored or remain in an inoperative condition for a considerable length of time, the additional preventive measures described below must be taken.

New or repaired modular assemblies and parts are packaged in accordance with the applicable packaging specifications. All units are packaged in a waterproof bag inside an outer bulky casing (crate or carton). Leave the waterproof bag intact for storage until the part is drawn for use. The outer casing may be removed.

See 7.3.1.6 for details on environmental controls for standby electronic equipment.

Continued on next page

7.3.1 Maintaining the Proper Environment for Electronic Equipment, Continued

7.3.1.6 Environmental Controls for Standby Electronic Equipment

Equipment that will remain idle and de-energized for a considerable length of time should have its space heaters turned ON to keep the insulation and equipment dry.

If space heaters are not provided for the equipment, appropriate measures should be taken to ensure that proper climatic conditions are maintained. For example:

- keep the temperature in a moderate range, and
- avoid extreme swings in temperature that could cause condensation.

7.3.1.7 Minimizing Vibration and Shock to Electronic Equipment

Mechanical shock can result in damage to, or de-tuning of, electronic equipment. Vibration effects are directly related to the resonant mechanical frequency of the equipment concerned.

To minimize the detrimental effects of shock or vibration, shock-mounts and anti-vibration devices are employed in equipment installations to isolate the equipment. Shock-mount and anti-vibration devises are relatively simple in their design and construction and require little maintenance. It is impractical to provide a rigid schedule of inspections and tests.

The rules for minimizing vibration and shock to electronic equipment are described in the table below.

Rule	Rationale
Ensure that the following equipment parts are secure and in place: • mounting clips • shock-mounts • ground straps • associated hardware, and • all fastening devices, such as threaded bolts, nuts, screws, studs, and thread-locking devices.	Vibration caused by loose parts or relative motion between parts can produce objectionable operating conditions such as • noise • intermittent circuit malfunctions • short circuits • component electrical overload, or burnout, and • equipment failure.

Continued on next page

7.3.1 Maintaining the Proper Environment for Electronic Equipment, Continued

7.3.1.7
Minimizing Vibration and Shock to Electronic Equipment (continued)

Rule	Rationale
Ensure that paint, oil, solvents, and other types of organic material are not applied to or allowed to come in contact with the resilient surface of a shock-mount.	Contact with these materials will result in loss of resiliency, deterioration, and premature failure of the resilient member of the shock-mount.
Do not install a rigid connection between the foundation and the framework of equipment that is supported by a shock-mount.	Such a connection destroys the effectiveness of the mount and may result in serious damage to the equipment mounted on it.

7.3.2 Routine Maintenance Activities

Overview

7.3.2.01 Scope

This section provides general guidelines for performing routine maintenance activities that are required as part of the planned maintenance systems.

7.3.2.02 References

Additional information about routine maintenance may be found in the following resources.

Resources	Description	Location/Link
EIMB, General Maintenance Book, NAVSEA SE000-00-EIM-160	Provides tables of standard Navy lubricants and their uses.	---
MIL-STD-1310 (Shipboard Bonding, Grounding, and Other Techniques for Electromagnetic Compatibility and Safety)	Guidelines for grounding and bonding electrical equipment on Coast Guard cutters.	---
MIL-P-22241A	Specifications for Teflon film.F.4.a.	---
Maintenance Procedure Card (MPC) in the Coast Guard Planned Maintenance System (CGPMS) Work Schedule Books (WSB)	Step-by-step maintenance actions to be performed on an electronic equipment or system, and documentation needed to complete CGPMS.	---
Equipment Technical Manuals	Specific manuals associated with each type and piece of equipment, which may contain • drawings • theory of operation, and • parts lists.	Unit technical libraries
Maintenance Procedure Cards (MPCs)	Step-by-step maintenance actions to be performed on an electronic equipment or system.	Unit technical libraries

Continued on next page

Overview, Continued

7.3.2.03 Contents

This section contains the following topics.

7.3.2.1 Cleaning Electronic Equipment

Introduction

This topic contains information on cleaning electronic equipment, including

- cleaning materials
- damage caused by dust
- air filter cleaning guidelines, and
- heat sink cleaning guidelines.

7.3.2.1.1 Cleaning Materials

Cleaning is an important part of equipment maintenance and should be performed at regular intervals. Exercise care when cleaning to prevent damage to components. Guidelines for materials to use when cleaning electronic equipment are provided below.

- Use a soft, clean, lint-free cloth.
- Never use steel wool or emery cloth on electronic equipment.
- Sandpaper and files should be used only as directed by competent authority.
- Do *not* use blowers or compressed air.
- A vacuum cleaner with a nonmetallic nozzle may be used to remove dust and foreign matter.
- Approved cleaning solvents should be used to remove dirt film.

IMPORTANT: Always observe proper safety precautions when using solvents.

7.3.2.1.2 Damage Caused by Dust

Dust accumulates in any piece of electronic equipment, particularly in high voltage circuits. Failure to keep equipment free of dust and foreign matter can seriously affect performance and lead to an increased failure rate.

Issues and the potential damage caused by dust are described below.

- If dust remains on electric equipment, it may combine with moisture in the air to form paths for arcs and short circuits.
- Dust forms a thermal insulation and can prevent heat from dissipating to the surrounding air. The component may overheat which may alter the characteristics of and/or shorten the component's lifetime.
- Dust can combine with lubricants, forming an abrasive, which will damage moving parts.

Continued on next page

7.3.2.1 Cleaning Electronic Equipment, Continued

7.3.2.1.3 Air Filter Cleaning Guidelines

Air filters are placed in equipment to remove dust from the air used for cooling the equipment. These filters should be cleaned or replaced regularly. As dust accumulates, airflow is reduced causing equipment to overheat, and larger particles of dust are forced through the filter.

Cleaning guidelines for each type of filter are provided in the table below.

Filter Type	Cleaning Guidelines
• Paper filters • Fiberglass filters	Replace when they become dirty.
Metal screen filters	In the absence of alternate cleaning instructions: • clean in warm soapy water • dry thoroughly before replacing, and • if the equipment requires it, apply a light film of oil to the filter element. **Reference**: For more detail on cleaning filters, refer to the equipment technical manuals and the Electronic Installation and Maintenance Book (EIMB), General Maintenance, NAVSEA SE000-000-EIM-160.

7.3.2.1.4 Heat Sink Cleaning Guidelines

Ensure that heat sinks remain free of dust and other foreign matter.

Rationale: Electronic component heat sinks are designed to utilize conduction, convection, and radiation to transfer the component's heat to the surrounding air.

7.3.2.2 Lubricating Electronic Equipment

Introduction

This topic

- describes the importance of lubricating electronic equipment, and
- identifies resources that contain more detailed information on electronic equipment lubrication.

7.3.2.2.1 Importance of Electronic Equipment Lubrication

Electronic equipment, which has moving mechanical parts, may require periodic lubrication. Failure to lubricate shortens the life of the mechanical parts, and causes breakdown of electronic equipment.

7.3.2.2.2 Lubrication Requirement Rules and Resources

Electronic equipment lubrication rules and resources for implementing the rules are provided in the table below.

Rule	Resource
Maintenance personnel must be thoroughly familiar with the lubrication requirements of the equipment for which they are responsible.	Proper lubrication of mechanical components in electronic equipment is emphasized in • technical manuals, and • reference standards books.
Be sure to use the correct lubricant. It is important, especially if the equipment is being operated under adverse conditions.	Use the tables of standard Navy lubricants and their uses to assist in selecting the correct lubricant. **Reference**: For more detail on the tables of standard Navy lubricants and their uses refer to EIMB, General Maintenance Book, NAVSEA SE000-00-EIM-160.

7.3.2.3 Maintaining Antennae and Transmission Lines

Introduction

This topic contains information on maintaining antennae and transmission lines, including

- safety references for antenna and transmission line maintenance
- grounding and bonding
- wire antenna maintenance
- whip antenna maintenance
- VHF/UHF antenna maintenance
- pressure type coaxial cable maintenance
- radar antenna removal guidelines
- radar antenna painting
- wave-guide problems
- wave-guide maintenance
- manufactured glass wave-guide window guidelines
- locally fabricating a Teflon moisture barrier, and
- wave-guides reassembly guidelines.

Observe great care in performing antenna maintenance.

Aside from actual damage, the most common fault in antenna systems is low resistance to ground.

7.3.2.3.1 Importance of Antenna Maintenance

The antenna is a major element of transmitting/receiving systems. The degree to which the input power is converted to useful radiated energy is the figure of merit or efficiency of the antenna. Maintenance improves efficiency, and must not be overlooked.

Continued on next page

7.3.2.3 Maintaining Antennae and Transmission Lines, Continued

7.3.2.3.2 Safety References for Antenna and Transmission Line Maintenance

Before beginning maintenance on antennae and transmission lines, review the safety guidelines referenced below.

For information on …	See …
working aloft	4.3 Working Aloft
• radiation hazards, and • minimum safe distances from antennae	4.9 Radio Frequency (RF) Radiation Hazards

7.3.2.3.3 Grounding and Bonding

Perform grounding and bonding of Coast Guard cutters as outlined in the latest revision of MIL-STD-1310. Top side bonding on metallic hull surface ships is required when

- there are six or more high frequency (HF) transmitters, and/or
- bonding is specifically required for personnel safety.

Reference: For more information on performing ground and bonding, refer to MIL-STD-1310 (Shipboard Bonding, Grounding, and Other Techniques for Electromagnetic Compatibility and Safety).

Continued on next page

7.3.2.3 Maintaining Antennae and Transmission Lines, Continued

7.3.2.3.4 Wire Antenna Maintenance

Wire antenna construction generally involves the use of bronze clamps and lugs.

- Wire transmitting antennae are generally made with
  - phosphor-bronze tiller rope, or
  - 7 or 9 strand phosphor-bronze antenna wire.
- Receiving antennae are generally made with 7-16 or 7-18 phosphor-bronze antenna wire.

As part of routine maintenance, the following components of antennae must be thoroughly cleaned:

- large antenna insulators
- mechanical contact points
- washers
- feed through bolts
- bonding straps
- lugs, and so on.

At the end of each extended period at sea, maintenance personnel must complete the wire antenna maintenance procedure described in the table below.

Step	Action
	General Inspection
1	Inspect all antennae for signs of • corrosion • fraying, or • other damage.
	Lugs and Clamps
2	Disassemble lugs and clamps.
3	Clean lugs and clamps with sandpaper.
4	Carefully reassemble.

Continued on next page

7.3.2.3 Maintaining Antennae and Transmission Lines, Continued

7.3.2.3.4
Wire Antenna Maintenance (continued)

Step	Action
5	Just prior to hoisting the antenna back into place, apply a very thin coating of high-dielectric insulation compound (Dow-Corning Compound) to the lugs and clamps, except for on the "contact surfaces" of lugs and other points where electrical continuity is necessary. **IMPORTANT**: The compound coating should not be excessive, as salt and soot will stick to it creating a path for radio frequency (RF) arcs.
	Large Antenna Insulators
6	Does the antenna have a polyethylene or other protective coating? • If *yes* – clean with a non-abrasive cloth, and – inspect for tears and scratches. **Note**: If there is evidence of corrosion, follow Coast Guard Planned Maintenance System (CGPMS) procedures. • If *no*, wire brush the bronze ends of the antenna.
7	Remove all foreign material from the insulating portion.
8	To make removal of salt and soot deposits relatively easy, apply a light coating of dielectric insulating compound (Dow-Corning Compound) to the entire insulator, as follows: • squeeze a small amount in the palm • use both hands to spread the compound evenly over the entire insulator surface, and • use a soft cloth to wipe off as much compound as possible.

Continued on next page

7.3.2.3 Maintaining Antennae and Transmission Lines, Continued

7.3.2.3.5 Whip Antenna Maintenance

Remove whip antennae and clean all parts to remove all foreign material and corrosion, including the

- base insulator
- mounting, and
- connections, including the associated lead-in insulator.

Note: A thick coating of dielectric sealing compound on the insulator and around the antenna to lead-in connections (after they are connected) is a great aid in future servicing.

Reference: For complete step-by-step procedures for inspecting, cleaning, and preserving whip antennae, refer to the CGPMS MPC.

7.3.2.3.6 VHF/UHF Antenna Maintenance

Due to their high operating frequency, VHF/UHF antennae are small with fragile construction.

To ensure maximum VHF/UHF system efficiency, guard against the following conditions, which all cause varying degrees of shunting resistance:

- moisture in trunks or coax
- dirty insulators, and
- coaxial cable dielectric breakdown.

Reference: For complete step-by-step procedures for inspecting, cleaning, and preserving VHF/UHF antennae, refer to the MPC.

Continued on next page

7.3.2.3 Maintaining Antennae and Transmission Lines,
Continued

7.3.2.3.7 Pressure Type Coaxial Cable Maintenance

A dehydrator is usually installed to maintain a constant pressure of dry air on a hollow pressure type coaxial cable line to keep moisture out. If there are leaks or the air is not properly dried, moisture forms in the line, which is difficult to correct.

Guidelines for regular monitoring, troubleshooting, and maintenance of pressure-type coaxial cables are described in the table below.

Situation	Maintenance Guidelines
Regular monitoring	• Check the line to be sure it is tight and tighten as necessary. • Check the dehydrator to be sure it is functioning properly.
A line will not hold pressure. **Note**: Typically, line pressure should be from 3-5 pounds.	• Check all joints with soap solution. The presence of bubbles indicates a leak at this point. • Repair the leak immediately.
The indicator warns of the presence of moisture.	Refer to the CGPMS MPC.

7.3.2.3.8 Radar Antenna Removal Guidelines

Ship's personnel, except under very unusual and urgent circumstances, should not attempt to remove large, heavy radar antennae from a vessel. When the Commanding Officer deems it necessary to remove a radar antenna, follow the guidelines below.

- Take every safety precaution to prevent serious accidents. (See 4.3 Working Aloft and 4.9 Radio Frequency (RF) Radiation Hazards for details).
- Only remove the antenna while a vessel is moored.
- Disconnect all wave-guides and cables prior to antenna removal.
- Cover the open ends of any wave-guide with plastic or similar material to prevent the entrance of contaminants.
- After the antenna is removed, place it either on
  - a vehicle to move it to its planned destination, or
  - suitable clean material, such as a canvas, to prevent structural damage and internal contamination.

Note: The servicing ESU/ESD usually provides assistance with crane services.

Continued on next page

7.3.2.3 Maintaining Antennae and Transmission Lines,
Continued

7.3.2.3.9 Radar Antenna Painting

When painting a radar antenna, follow the guidelines below.

- Avoid getting paint on the radar antenna transparent windows.
- Do not paint the line scribed (etched) into the metal enclosure on the top of most radar antenna arrays.

Note: The scribed line provides "squint angle" considerations when aligning the radar servo system, and is the actual angle at which the main power lobe of the antenna is found.

7.3.2.3.10 Wave-guide Trouble Shooting

Wave-guide is the type of transmission line normally used with radar. It is a type of tuned transmission line and resembles a hollow rectangular or circular pipe. The dimensions of the wave-guide are determined by the operating frequency. For example the higher the frequency, the smaller the dimensions (approximately 1/14 wavelength thick by 2/14 wavelength wide).

Typical wave-guide problems and the possible causes are described in the table below.

Problem	Possible Cause
Mismatched line constant	Dirt or foreign matter in the wave-guide, which upsets the line constant.
Scale deposits form within the wave-guide.	Wave-guide is not properly sealed from the weather.
Hot spots along a wave-guide run	Foreign material in the wave-guide is causing excessive loss of power, which shows up in the form of heat.

Continued on next page

7.3.2.3 Maintaining Antennae and Transmission Lines,
Continued

7.3.2.3.11 Wave-guide Maintenance

The procedure for performing routine maintenance on wave-guides is described in the table below.

Step	Action
	Check Dehydrator Plugs
1	Check all wave-guide and associated antenna installations for the presence of dehydrator plugs.
2	Inspect the dehydrator plugs. Has the silica gel in the dehydrator plugs turned pink? • If *yes*, replace the dehydrator plug assembly immediately because it has absorbed too much moisture. • If *no*, the dehydrator plug assembly does not need to be replaced. **Note**: Functioning dehydrator plugs are normally a bluish color.

Continued on next page

7.3.2.3 Maintaining Antennae and Transmission Lines,
Continued

7.3.2.3.11
Wave-guide Maintenance (continued)

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td colspan="2">Inspect Wave-guide Moisture Barriers</td></tr>
<tr><td>3</td><td>Inspect the moisture barrier in the wave-guide near the radar receiver/transmitter (R/T) unit.

Use the information in the table below to determine the maintenance that is needed.

Note: The R/T unit is usually located at the output load side of the bi-directional coupler.

<table>
<tr><th>If the moisture barrier is …</th><th>Then …</th></tr>
<tr><td>intact</td><td>inspect for

• the growth of fungus, and
• green discoloration of the wave-guide.</td></tr>
<tr><td>missing or broken</td><td>install a moisture barrier, which may be a

• manufactured glass wave-guide window, or
• locally-fabricated Teflon moisture barrier.

See
• 7.3.2.3.12 for guidelines on ordering a manufactured glass wave guide window.
• 7.3.2.3.13 for instructions on fabricating a Teflon moisture barrier.</td></tr>
</table>
</td></tr>
</table>

Continued on next page

7.3.2.3 Maintaining Antennae and Transmission Lines, Continued

7.3.2.3.11
Wave-guide Maintenance (continued)

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td colspan="2">Inspect Wave-guide Hangars</td></tr>
<tr><td>4</td><td>Use the information in the table below to ensure that the correct material is placed between the wave-guide and its hangar.
<table><tr><th>Type of Hangar</th><th>Type of Sheath to be Placed Between the Wave-guide and Hangar</th></tr><tr><td>Brass</td><td>Lead</td></tr><tr><td>Aluminum</td><td>• Felt, or
• Neoprene rubber</td></tr></table></td></tr>
<tr><td>5</td><td>Re-assemble the wave-guide as described in 7.3.2.3.14.</td></tr>
</table>

7.3.2.3.12 Ordering a Manufactured Glass Wave-Guide Window for a Wave-guide

To ensure an almost loss-less transition (insertion loss is nil) of radio frequency (RF) energy transferred from the transmitter to the wave-guide, it is critical to obtain the correct moisture barrier.

When ordering a manufactured glass wave-guide window, take into account the following physical requirements:

- outside and inside dimensions
- thickness
- mating flange requirements, and
- type of metal used.

Note: Various manufacturers' catalogs usually index wave-guide windows under wave-guide accessories, wave-guide seals, wave-guide windows, or gas barriers.

Continued on next page

7.3.2.3 Maintaining Antennae and Transmission Lines, Continued

7.3.2.3.13 Locally Fabricating a Teflon Moisture Barrier for a Wave-guide

The procedure for locally fabricating a barrier cut from a sheet of Teflon film.F.4.a is described in the table below.

Step	Action
1	Obtain the required amount of Teflon film.F.4.a. by either • asking a local base activity or the Coast Guard (CG) Yard (one X-band barrier is only about two square inches and is usually readily available), or • purchasing it from a commercial source. **IMPORTANT**: The Teflon film.F.4.a. must be 10 mils thick and meet specification MIL-P-22241A. If you need assistance, contact the ESU or ELC.
2	Fabricate the moisture barrier by • cutting the Teflon film to fit the wave-guide flange where the barrier is to be inserted, and • punching four holes at the corners to accommodate the flange screws.
3	• Install the fabricated barrier in the wave-guide, and • razor trim any excess Teflon to be flush with the flange lips.
4	Conduct a Voltage Standing-Wave Ratio (VSWR) test to determine if there are reflection losses.
5	Is the reflection loss less than or equal to 0.1. dB? • If *yes*, take the course of action prescribed on the MPS. • If *no*, troubleshoot to determine the actual cause of the loss. **Note**: If doubt exists, compare forward and reflected power readings taken before and after installation of the Teflon barrier.

Continued on next page

7.3.2.3 Maintaining Antennae and Transmission Lines,
Continued

7.3.2.3.14 Wave-guides Reassembly Guidelines

Use the guidelines below when reassembling wave-guide sections.

- Be sure that all flanges are clean, properly mated, and that all gaskets are in place.
- All bolts must be drawn up snugly and evenly.
- Wave-guide hangers should exert a firm even pressure on the wave-guide without distorting it and should be padded with
  – a lead sheath where the wave-guide is brass, or
  – felt or neoprene rubber where the wave guide is aluminum.

7.3.2.4 Testing Antennae and Transmission Lines

Introduction

This topic contains information on testing antennae and transmission lines, including

- test intervals for antennae and transmission lines
- determining which type of test to use
- megger testing
- megger test record card, Form NAVSHIP 531, and
- Voltage Standing-Wave Ratio (VSWR) testing.

7.3.2.4.1 Safety References for Antennae and Transmission Lines Testing

Before beginning maintenance on antennae, review the safety guidelines referenced below.

- 4.3 Working Aloft, and
- 4.9 Radio Frequency (RF) Radiation Hazards.

7.3.2.4.2 How an Antenna Works

The radio frequency that is generated by the transmitter serves a useful purpose only when it is radiated into space in the form of electromagnetic energy. The antenna, as the interface between the transmitter and free space, is required to convert the power from the transmitter into electromagnetic energy as efficiently as possible and to direct this energy where it will be useful. The degree to which the input power is converted to useful radiated energy is the figure of merit or efficiency of the antenna.

7.3.2.4.3 Test Intervals for Antennae and Transmission Lines

Coast Guard equipment should be inspected and tested on a regular basis.

The table below contains basic guidelines for determining the maximum interval for testing your equipment.

If the equipment is …	Then test the equipment at least …
on a shore unit	• quarterly, or • more often as local environment dictates.
on a floating unit	• monthly, and • at the end of each extended period at sea.
a submarine cable	annually.

Continued on next page

7.3.2.4 Testing Antennae and Transmission Lines, Continued

7.3.2.4.4 Antenna and Transmission Line Testing Methods

Megger – High-voltage, high-resistance ohmmeter testing

- is the most convenient test of an antenna system, and
- due to the high voltage, which is sufficient in many cases to break down faults in the insulation, exposes any weak spots.

See 7.3.2.4.6 for the megger test procedure.

Exceptions: For some types of antennae and transmission lines, an alternative testing method should be used, as described in the table below.

If the equipment is …	Then …
VHF/UHF antennae	refer to technical manuals or contact the Maintenance and Logistics Command (MLC)/district or equipment manufacturer for information and assistance. **Rationale**: Due to their high operating frequency, the D.C. resistance of VHF/UHF antennae is near zero, therefore megger testing is impractical and inconclusive.
wave-guide line	use VSWR testing. See 7.3.2.4.7 for the VSWR testing procedure.
whip antennae	refer to technical manuals for additional information. **Rationale**: Some whip antennae may contain discrete components or exhibit the characteristics of an electrical short and should not be tested with the megger test.
wire antennae	use Time Domain Reflectometer (TDR) testing.

Continued on next page

7.3.2.4 Testing Antennae and Transmission Lines, Continued

7.3.2.4.5 NAVSHIP 531: Resistance Test Record Card

Use the NAVSHIP-531: Resistance Test Record Card to record the results of megger testing on transmitting and receiving antenna systems and submarine cables. This includes antennae, insulators, and transmission lines.

See 7.3.2.4.6 for the megger testing procedure, along with guidelines for completing NAVSHIP 531.

7.3.2.4.6 Megger Testing Procedure

The megger generates high voltage (approximately 500 volts D.C.), which is usually sufficient to break down faults in the insulation (causing conduction), thereby exposing any weak spots in the insulation of antenna systems and transmission lines.

Electronics Technicians (ETs) perform megger testing by completing the procedure below.

Note: Testing should be performed by the responsible ESU or ESD on shore and floating units that do not have an ET assigned.

See 4.5 Working with Energized Electrical Equipment for safety guidelines.

Step	Action
1	Disconnect all equipment, including the coupler, from the antenna and transmission line. **IMPORTANT**: Test antennae and transmission lines separately, because • the voltage developed by the megger can cause circuit damage in equipment left connected, and • a true reading of the antenna/transmission line cannot be obtained when equipment is left connected due to the circuits providing a path to ground.
2	Connect the megger ground lead to ground or the shield of the transmission line.
3	Connect the hot lead to the antenna connection or the transmission line center conductor.

Continued on next page

7.3.2.4 Testing Antennae and Transmission Lines, Continued

7.3.2.4.6
Megger Testing Procedure (continued)

Step	Action
4	Perform the megger test.
5	Record the megger reading on Form NAVSHIP 531, Resistance Test Record. **Notes**: • Use a separate Resistance Test Record to record the measurements of each segment of the transmission line and antenna network. • Note the following information in the "Remarks" section of the card: – any conditions or situations peculiar to a test on any line or antenna, and – after doing work to correct a low reading, what caused and corrected the problem.
6	Evaluate the reading and result patterns on the Resistance Test Record. Maintenance is needed under the circumstances described below. • The Resistance Test Record indicates a pattern of slowly deteriorating readings and/or sudden changes. • The reading shows a resistance of 200 megohms or less. **IMPORTANT**: A resistance of 5 megohms or less indicates an immediate and urgent need to find and correct the cause of the problem. **Notes**: • The resistance readings above are given for information only. Maintenance technicians should familiarize themselves with the expected readings for their individual antenna and/or transmission line systems. • Make a note in the "Remarks" section of the Resistance Test Record each time work is done to correct a low reading by indicating what caused and corrected the problem.
7	Repeat Steps 1-6 for each antenna and transmission line.

Continued on next page

7.3.2.4 Testing Antennae and Transmission Lines, Continued

7.3.2.4.7 VSWR Test Procedure for Wave Guides

Measuring the VSWR of a wave-guide line is an excellent means of determining the wave-guide efficiency.

ETs perform VSWR testing by completing the procedure below.

Step	Action
1	Refer to the appropriate radar equipment technical manual for • optimum standing-wave ratio for each installation, and • the method of making the VSWR test.
2	Make the VSWR test.
3	Compare the VSWR measurement with the optimum standing-wave ratio.
4	Immediately investigate any marked deviation from the optimum. **Note**: If many cases, simply listening along the wave-guide run while the associated equipment is operating will reveal arcing caused by foreign material at that point. If arcing is discovered, the appropriate section(s) of the wave-guide should be disassembled and the foreign material cleaned using appropriate procedures. See 7.3.2.3 Maintaining Antennae and Transmission Lines for more detail on wave-guide maintenance.
5	Record the results of the VSWR test on Form NAVSHIP-531, Resistance Test Record.

7.3.2.5 Maintaining Motors and Generators

Introduction

This topic contains information on maintaining motors and generators, including

- scope of motor and generator maintenance
- general motor and generator maintenance precautions
- bearing maintenance
- commutator and slip ring maintenance
- brush maintenance
- winding maintenance, and
- battery maintenance.

7.3.2.5.1 Scope of Motor and Generator Maintenance in This Topic

The maintenance of most motors and generators is similar, regardless of size. Use the general maintenance guidelines in this topic in conjunction with the motor or generator's technical manual.

7.3.2.5.2 General Motor and Generator Maintenance Precautions

Take precautions against moisture, dirt, and overloading by following the guidelines in the table below.

Issue	Guidelines
Moisture	Keep moisture away to avoid shorting out the motor.
Dirt and carbon dust	• If possible, use a vacuum cleaner to remove dirt and carbon dust. • Pay particular attention to removing carbon dust. • Take precautions to prevent blowing carbon dust into the windings. **Reference**: For more detail on cleaning frequency and Coast Guard Planned Maintenance System (CGPMS) requirements, refer to the Work Schedule Books.
Overloading	Avoid connecting loads that are in excess of the rated generator output.

Continued on next page

7.3.2.5 Maintaining Motors and Generators, Continued

7.3.2.5.3 Bearing Maintenance Guidelines

Bearings are a source of trouble. Most bearing failures are due to the lack of lubrication or foreign material in the bearings. Use the guidelines in the table below to maintain bearings.

Maintenance Practice	Guidelines/Description
Bearing Quick Check	To perform a quick check of the mechanical condition of a motor or generator bearing • place the blade end of a long screwdriver against the bearing housing, and • place your ear against the end of the handle. A good bearing should have a medium-pitched, singing sound. Grinding or thumping noise indicates trouble with the bearing.
Disassembling a motor or generator	• Take care not to damage the rotor or bearings. • Mark all components to assure proper reassembly. • For motor-generator sets, carefully assemble all couplings so that all units are rotating as if on a single shaft. • Avoid misalignment, which causes coupling and bearing failure.
Replacing a bearing	• If you are in doubt about a bearing's condition, replace it. • When removing a bearing, always use a bearing puller of the proper size. • Never attempt to pry the bearing off or drive it off with a hammer.
Selecting a lubricant	• Check technical manuals for the proper method and grade of lubricant. • Do not mix dissimilar oils.
Lubricating pressure fittings	• Remove the bottom drain plug in the base of the bearing housing. • Never force grease into the bearing unless the plug is removed. • Apply lubricant through fitting or grease cup. • Do not over lubricate. • When fresh grease flows out the drain hole, replace the plug.
Checking sealed bearings	• Check sealed-type bearings periodically. • If doubt exists, replace the bearing. **Note**: Re-lubricating sealed bearings is not recommended.

Continued on next page

7.3.2.5 Maintaining Motors and Generators, Continued

7.3.2.5.3
Bearing Maintenance Guidelines (continued)

Maintenance Practice	Guidelines/Description
Lubricating sleeve-type bearings	• Place a drop of light machine oil in the oil holes periodically. • Do not over lubricate.

7.3.2.5.4
Commutator and Slip Ring Maintenance

Maintenance guidelines for the commutator and slip ring are listed below.

- Keep free of dirt and grease.
- A smooth, shiny, chocolate-colored coating on the surface is normal and should not be disturbed.
- The mica, between segments of the commutator, should be properly undercut.

7.3.2.5.5
Brush Maintenance Guidelines

Maintenance guidelines for brushes are listed below.

- Inspect brushes and brush holders frequently. Brushes should move freely in their holders yet make firm, even contact with commutators or slip ring surface.
- Check spring tension on brushes frequently.
- Do not allow brushes to wear down to less than half of their normal length, or to where brush followers or springs can no longer exert normal pressure.

7.3.2.5.6
Installing Brushes

The procedure for installing new brushes in motors and generators is described in the table below.

Step	Action
1	Disconnect power to the generator by securing and tagging out the main circuit breaker.
2	Is a brush seater available? • If *yes*, place new brushes in holders. Procedure is complete. • If *no*, go to next step.
3	Wrap a single layer of crocus cloth (or fine grit sandpaper) around commutator or slip ring. **IMPORTANT**: Never use emery cloth.

Continued on next page

7.3.2.5 Maintaining Motors and Generators, Continued

7.3.2.5.6
Installing Brushes (continued)

Step	Action
4	Fit the brush in the holder with normal pressure, holding it against the crocus cloth.
5	Rotate the armature by hand in the opposite direction to normal rotation until the face of brush conforms to the contour of the commutator or slip ring.
6	Remove crocus cloth and clean away all traces of carbon dust.
7	Reset the brushes and operate the machine under light load to fully seat the brushes.

7.3.2.5.7 Winding Maintenance

Check the insulation resistance of the various windings periodically to prolong trouble-free operation, as specified on CGPMS Maintenance Procedure Card (MPS).

7.3.2.5.8 Battery Maintenance

The engineering department usually maintains batteries. However, in some instances, the electronics technician may be called upon to maintain them.

See 4.6 Safe Handling of Batteries for more detail on safety guidelines and maintenance for batteries.

7.3.2.6 Soldering

Introduction

This topic contains information on soldering, including

- safety practices
- soldering tip selection guidelines
- solder melting point range and guidelines
- techniques
- solder quality inspection, and
- solder tip care.

7.3.2.6.1 Soldering Safety Practices

Be aware of the hazards associated with soldering, and observe normal safety precautions to ensure that soldering is a safe process. To prevent injuries to personnel, or damage to equipment, observe the precautions listed below.

Safety Practice	Rationale
Always assume that a plugged-in soldering iron is hot.	A hot soldering iron causes burns.
Rest a heated iron only on a metal surface, or a rack provided for this purpose.	Carelessness with a hot soldering iron could cause fire, extensive equipment damage, and serious injuries.
De-energize electronic equipment energized before soldering.	Soldering around energized electronic equipment is an electrical hazard.
Never use an excessive amount of solder.	Drippings may cause serious skin or eye burns.
Do not sling an iron to remove excess solder.	Bits of hot solder that are removed in this manner can cause personal injuries, or may ignite combustible materials in the work area.
Always place the cloth on a suitable surface and wipe the iron across it.	Holding the cleaning cloth in your hand when cleaning a soldering iron presents a burn hazard.
Do not use an iron with a frayed cord or damaged plug.	A frayed cord or damaged plug presents an electrical hazard.

Continued on next page

7.3.2.6 Soldering, Continued

7.3.2.6.1
Soldering Safety Practices (continued)

Safety Practice	Rationale
After completing a task • disconnect the iron, and • allow it to cool.	A soldering iron is a fire hazard when it is • left plugged in for an extended period of time, or • not allowed to cool completely before storage.
Before stowing the soldering iron in its assigned storage area, preserve the soldering tip by • removing any residual solder or flux, and • placing the iron in the protective wire holster to prevent damage.	Protecting the soldering tip prolongs its life. See 7.3.2.6.6 for more information on caring for solder tips.

7.3.2.6.2 Soldering Iron and Tip Selection Guidelines

Use the guidelines below when selecting a soldering tip.

- Carefully select a soldering iron that is the correct size, shape and wattage to ensure reliable soldering.
- The size and shape of the iron and tip should permit soldering with
  - – maximum ease, and
  - – minimum danger of damaging surrounding areas.

Note: The unplated copper tip produces the best overall results.

Continued on next page

7.3.2.6 Soldering, Continued

7.3.2.6.3 Solder Melting Point Range and Guidelines

Solder melts at temperatures lower than the melting point of either of the base metals. Normally the base metals (pure metals) are tin and lead, which when combined, form the alloy (mixture of metals) solder. Tin melts at 1450° F and lead at 621° F. Solder melts between 361° F and 576° F, depending on the lead content.

Guidelines for melted solder are described in the table below.

Guideline	Rationale
Always use solder at the molten (liquid) stage	Solder does not melt sharply. It first becomes plastic, then mushy, and finally molten (liquid).
Avoid excessive temperatures and do not keep solder molten any longer than necessary.	Molten solder absorbs atmospheric gases, which could result in a high resistance connection.
Do not move the soldered joint until the solder is solid.	As solder cools, first it gets mushy, then plastic, and finally solid. If the joint is moved before it is solid, a poor (cold) connection results.

7.3.2.6.4 Soldering Techniques

An appreciable portion of equipment failure(s) can be traced directly to poorly soldered joints. Since equipment aboard ship is subject to an unusual amount of vibration and shock, it is imperative that all soldering be done with the utmost care.

For maximum proficiency at soldering, use the guidelines below.

IMPORTANT: Never use acid core solder in electronic equipment.

Technique	Rationale/Description
Take extra precautions when soldering in delicate circuits such as transistors or print circuits.	Place a heat sink between the point being soldered and the heat sensitive part.
Apply flux to the surface *before* it becomes hot enough to melt solder.	Flux will carbonize if excessive temperatures are used and be a hindrance to soldering. **Note**: With rosin core solder, flux occurs automatically if the solder is held perpendicular to, and above, the joint.

Continued on next page

7.3.2.6 Soldering, Continued

7.3.2.6.4
Soldering Techniques (continued)

Technique	Rationale/Description
Ensure that the surface being soldered is hot enough before the solder is applied.	The surface temperature of parts being soldered must be equal to or above the melting point of the solder.
Apply the solder carefully.	• Always apply the soldering iron tip to the terminal in order to – transfer the maximum heat to the part being soldered, and – provide maximum protection to wire insulation or parts adversely affected by excessive heat. • Tilt the iron sufficiently to permit application of the solder to the joint. • Apply only a sufficient amount of solder to form a slight fillet between wire and terminal. **IMPORTANT**: Do not allow the solder to melt against the soldering iron tip and then flow over the joint.

7.3.2.6.5
Solder Joint Quality Inspection

Visually inspect a solder connection to determine the quality of the solder. A good solder joint has the following characteristics:

- bright appearance
- no porosity
- good fillet between conductors
- strong adherence, and
- no excess flux or solder.

IMPORTANT: Do not use soldering aids or similar tools to exert force on wires for security testing. Bending or pulling wires to determine the security of the connect can present a serious reliability hazard.

Continued on next page

7.3.2.6 Soldering, Continued

7.3.2.6.6 Solder Tip Care

To care for a solder tip, use the guidelines below.

- To prevent oxidation, unplug the iron and allow it to cool before filing.
- Dress copper tips smooth with a suitable file.
- After filing, apply solder to the dressed tip as soon as it reaches the minimum temperature required to melt solder.
- Clean the tip by wiping it on a damp sponge or on other suitable material before each connection is made.

IMPORTANT: Do *not* hold the cleaning cloth in your hand when cleaning a soldering iron. Always place the cloth on a suitable surface and wipe the iron across it.

7.3.3 Corrective Maintenance Activities

Overview

7.3.3.01 Scope

This section provides

- an overview of the corrective actions used to restore inoperative equipment to a fully operative condition, and
- guidelines for treating equipment that has been immersed in salt water.

7.3.3.02 Reference

Additional information about corrective maintenance may be found in the following resources.

Resource	Description	Location/Link
Electronics Installation and Maintenance Book (EIMB), NAVSEA SE000-00-EIM-160, General Maintenance	Detail and complete explanation of corrective maintenance actions.	---

7.3.3.03 Contents

This section contains the following topics.

7.3.3.1 Corrective Maintenance Actions and Operations

Introduction

This topic describes corrective maintenance actions and operations for electronic equipment, including

- corrective maintenance description and examples
- required corrective maintenance reporting, and
- the sequence of corrective maintenance actions, which include
  - failure identification
  - failure correction
  - failure reporting, and
  - parts replenishment.

7.3.3.1.1 Corrective Maintenance Description and Examples

Corrective maintenance of electronic equipment consists of the actions and operations needed to restore inoperative equipment, or equipment operating at a reduced capability, to a fully operative condition. Examples of corrective maintenance actions are

- repair of equipment after a fire
- location and subsequent replacement of a defective component, or
- location of a faulty function and subsequent adjustment of its circuit for an output which is within its specification.

7.3.3.1.2 Required Corrective Maintenance Reporting

Corrective maintenance must be tracked, updated, and maintained using CMPlus.

Corrective maintenance actions (CMAs) in CMPlus

- record and update unscheduled maintenance repairs and casualties
- link to configuration items and parts, and
- are included on the maintenance scheduler.

Reference: An online tutorial and job aids are available at CG Central.

Continued on next page

7.3.3.1 Corrective Maintenance Actions and Operations, Continued

7.3.3.1.3 Corrective Maintenance Task 1: Failure Identification

The operations that the technician completes to identify the need for corrective maintenance are described in the table below.

References:
- For more detail on specific corrective maintenance procedures, refer to the equipment's technical manual.
- For a complete explanation of problem identification, refer to the Electronics Installation and Maintenance Book (EIMB), NAVSEA SE000-00-EIM-160, General Maintenance.

Operation	Description
1	System Recognition
2	Symptom Elaboration
3	Listing Probable Faulty Functions
4	Localizing the Faulty Function
5	Localizing Trouble to the Circuit/Module
6	Failure Analysis

7.3.3.1.4 Corrective Maintenance Task 2: Failure Correction

Failure correction involves restoring equipment to operational condition, which includes

- operational testing
- alignment, and
- adjustment and/or calibration.

7.3.3.1.5 Corrective Maintenance Task 3: Failure Reporting

Failure reporting involves updating the Coast Guard's current Configuration Data Management database.

It is important to create, update, and review CMAs to record maintenance history.

7.3.3.1.6 Corrective Maintenance Task 4: Parts Replenishment

Parts replenishment involves reordering consumables and parts to restore the Management Information for Configuration and Allowances (MICA).

See 5.5.1 Management Information for Configuration and Allowances (MICA) for details on MICA.

7.3.3.2 Rescuing Equipment from Saltwater Immersion

Introduction

This topic contains information on rescuing equipment from saltwater immersion, including

- guidelines for treating equipment that has been immersed in salt water, and
- guidelines for salvaging equipment that has been immersed.

7.3.3.2.1 Treating Equipment That Has Been Immersed in Saltwater

The procedure for rescuing equipment from saltwater immersion is described in the table below.

Step	Action
1	• Disconnect and remove all meters from equipment and cases. • Dismount the equipment and remove all – covers – access and mounting plates – vacuum tubes – fuse cover and fuses, and – armatures from dynamotors or motor-generator sets.
2	Flush all parts of the equipment thoroughly, using warm fresh-water under slight pressure. **IMPORTANT**: If there is no saltwater present inside a pressure-sealed portion, wash the outside of the equipment only. Do not subject the internal parts of pressure-sealed units to the water treatment.
3	Place the equipment in a tank of warm fresh-water and potassium dichromate solution (1/2 ounce potassium dichromate to every 10 gallons of water). Soak the equipment for a minimum of four hours in circulating warm water. **Note**: If non-circulating, change the water solution at intervals of one hour.
4	Remove the equipment from the water and drain it.
5	Blow out all moisture with low-pressure air, and dry it thoroughly for 24 hours at a temperature of approximately 150° F.
6	If storage is required prior to overhaul, spray all exposed metal parts slightly with a light, clear oil.

Continued on next page

7.3.3.2 Rescuing Equipment from Saltwater Immersion, Continued

7.3.3.2.2 Guidelines for Salvaging Equipment That Has Been Immersed in Salt Water

If treated immediately after immersion using the procedure described in 7.3.3.2.1, most equipment will require a minimum of replacement parts and overhaul work.

If the immersion was for a prolonged period or if the equipment has not been properly washed and preserved, cases and mechanical parts are usually so corroded that the equipment cannot be overhauled. Some equipment is impractical to attempt to salvage.

The table below provides guidelines for salvaging and treating certain types of equipment.

Type of Equipment	Guidelines
• Vacuum tubes • meters • externally shielded cables (except plugs)	• It is impractical to attempt to salvage these types of equipment. • Remove and preserve plugs.
Power transformers in transmitters	Must normally be replaced, even though megger tests after baking may show normally high insulation resistance to ground.
• Sockets • Relay contacts, and so on	Replacement may be required, particularly if immersion took place before power voltages were removed from the equipment.
Glass tubes that have their leads coming directly out of the glass envelope with a tube socket	• Replacement is not required unless it is proven defective. • For all tubes of this type, it is necessary to remove all corrosion from the tube leads.
Cathode-ray tubes	It is possible to salvage cathode-ray tubes by • removing the plastic base from the tube • removing all corrosion and saltwater, and • replacing the plastic base.

7.3.4 Progressive Maintenance Activities

Introduction

This topic contains information on progressive maintenance activities, including

- Miniature/Microminiature (2M)/Module Test Repair (MTR) work center equipment maintenance
- MTR screening
- normal 2M progressive maintenance repair process, and
- emergency 2M progressive maintenance repair process.

7.3.4.1 2M/MTR Work Center Equipment Maintenance

The Miniature/Microminiature (2M)/Module Test Repair (MTR) work center equipment must be maintained in accordance with the applicable planned maintenance schedules and controlling documents.

7.3.4.2 Units Without 2M/MTR Work Centers

Activities that do not have 2M/MTR capabilities must send suspect Electronic Assemblies (EAs) for equipment listed in enclosure(1) directly to the Naval Engineering Support Unit (NESU), Electronic Support Unit (ESU), or Electronic Support Detachment (ESD) for screening and repair when feasible.

Continued on next page

7.3.4 Progressive Maintenance Activities, Continued

7.3.4.3 MTR Screening of Suspected Faulty EAs

Follow the steps in the table below to screen a suspected faulty EA using the MTR work center.

Step	Action
1	Screen the suspected faulty EA using one of the following options: • Gold Disk test routine • Silver Disk test routine • Screen without a test routine See 7.2.5.3 Module Test/Repair (MTR) Program for more detail on each test option.
2	Is the EA faulty? • If *yes*, go to the next step. • If *no*, return the EA to the originating work center and continue troubleshooting.
3	Determine the appropriate facility to send the EA for repair, using the guidelines in 7.3.4.4.

Continued on next page

7.3.4 Progressive Maintenance Activities, Continued

7.3.4.4 Determining the Appropriate 2M Repair Facility

After using MTR screening to confirm that an EA is faulty, use table below to determine if the EA can be repaired at the 2M work center or must be sent to the depot for repair.

See
- 7.3.4.6 for the normal progressive maintenance process flow, and
- 7.3.4.7 for the emergency maintenance process flow.

If …	Then …
replacement parts that are needed to repair the defective EA are not available within 72 hours	send the faulty EA to the depot without repair. **Note**: When circumstances permit, wait an additional 60 days for requisitioning components that are not available on the ship.
the defective equipment is Navy-Type/Navy-Owned (NTNO) with the Material Control Codes (MCC) D/E to 1,7, and 9 COG EAs	send the EA to 2M repair station for repair. See 7.3.4.5 for an example of the Federal Logistics (FEDLOG) Material Condition Code screen, where the MCC is listed as the Reparability/Recoverability Code (RC). **Reference**: For more information on when to send faulty EAs to the depot, refer to Naval Supply Publication 485, NAVSUP P-485.
the defective equipment is Hull, Mechanical, and Electrical (HM&E) or Navy-Type/Coast Guard-Owned (NTCGO) that is *not* Source, Material and Repair (SM&R) coded for depot repair	send the EA to 2M repair station for repair. **References**: For more detail on SM&R codes, refer to • Supply Policy and Procedures Manual (SPPM), COMDTINST M 4400.19 (series), and • each unit's Management Information for Combined Allowance/Coordinated Shipboard Allowance List (MICA/COSAL) Manual.
the defective equipment is SM&R coded for depot level repair	• either – forward the EA to the depot for repair, or – if SM&R code indicates, discard the EA, and • submit requisition for a replacement. **Note**: When the situation warrants, Commanding Officers may authorize organizational level repair of EAs coded as depot level repair.

Continued on next page

7.3.4 Progressive Maintenance Activities, Continued

7.3.4.5 Example Material Condition Code (MCC) in FEDLOG

In FEDLOG, the MCC is listed as the Reparability/ Recovery Code (RC). An example of the MCC code displayed in the Material Condition Code screen is shown below.

MCC

```
Management Data Response for NSN 5998-01-198-0127
Item Name: CIRCUIT CARD ASSEMBLY
PMI: A  ADP: 9  CC: X  DML: D  DI:   ESDC: B  HMIC: N
ENAC:

  S/A  SOS  AAC  QUP  UI    Unit Price  E/A MMYY  SLC  CIIC  RC  MGMT CTL  USC
    PC Phrase Statement               UI Conv Factor     OOU JTC
-----------------------------------------------------------------------------
  DS   S9E   Z    1   EA        420.42   A  0503   0    7       -------    I
     X FORMERLY 5999
  DA   S9E   Z    1   EA        420.42             0    7    Z  Q2200X-    A

  GP   S9E   Z    1   EA        420.42             0    7       -------    C
     X FORMERLY 5999
  DN   S9E   Z    1   EA        420.42             0    7    D  3N-----    N
     X FORMERLY 5999Management Data Response for NSN  5998-01-198-0127
Item Name: CIRCUIT CARD ASSEMBLY
PMI: A  ADP: 9  CC: X  DML: D  DI:   ESDC: B  HMIC: N
ENAC:
```

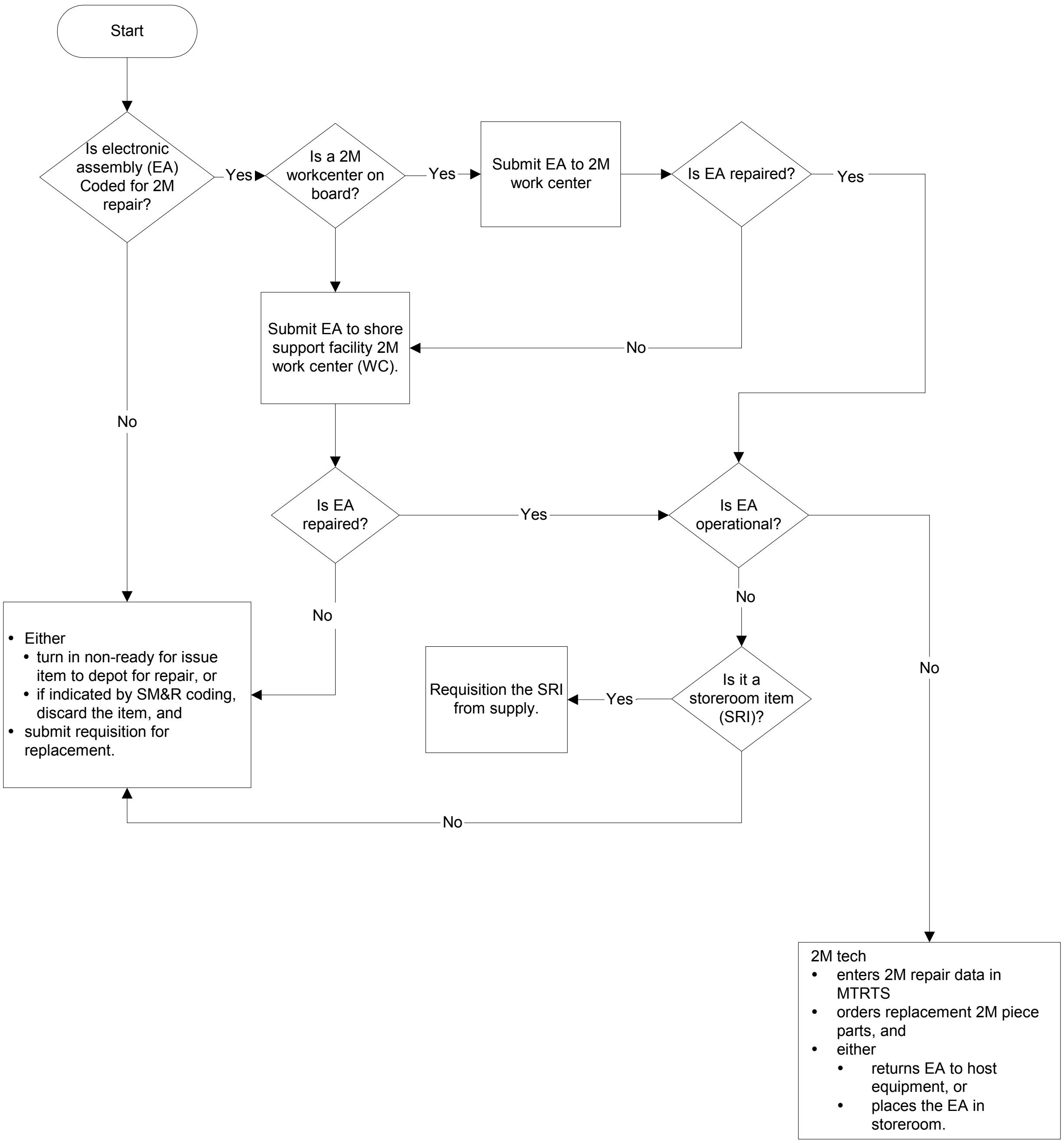
Continued on next page

7.3.4 Progressive Maintenance Activities, Continued

7.3.4.6 Normal 2M Repair Progressive Maintenance Process

The flowchart below shows the normal 2M repair progressive maintenance process.

See 4.5 Working with Energized Electrical Equipment for safety guidelines.

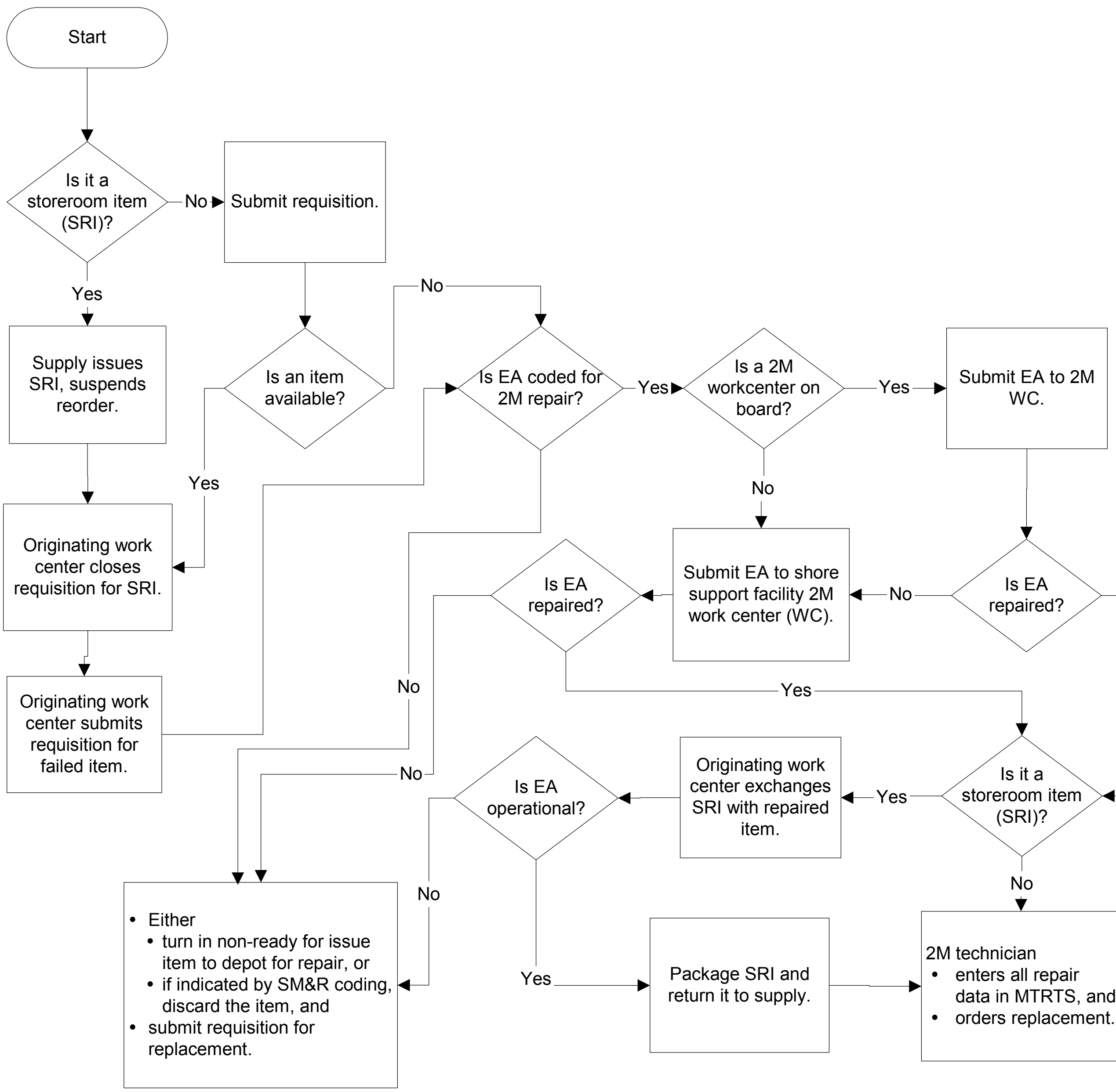


Continued on next page

7.3.4 Progressive Maintenance Activities, Continued

7.3.4.7 Emergency 2M Repair Progressive Maintenance Process

The flowchart below shows the emergency 2M repair progressive maintenance process.



7.3.5 Cold Weather Operations: Special Maintenance Considerations

Introduction

This topic contains information on special maintenance considerations for cold weather operations, including

- personal safety precautions
- advance preparations for cold weather
- cold weather accessories and equipment list
- preparing equipment for cold weather
- maintaining equipment in cold weather
- inspection of equipment in cold weather
- antennae and wave-guides de-icing, and
- cold weather battery maintenance.

7.3.5.1 Personal Safety Precautions Reference for Cold Weather Operations

Observe personal safety precautions at all times.

See 4.4.2 Working in Cold Weather for more detail on cold weather personal safety precautions.

7.3.5.2 Advance Preparations for Cold Weather

Use the guidelines below to prepare for cold weather operations.

- Check the operation and quantity of equipment on board.
- Inventory spare parts, bring up to allowances, and procure additional stocks of high failure rate items.
- Prior to operating in cold weather, check adequacy of cold weather accessories and equipment, and procure items deemed necessary from the Cold Weather Accessories and Equipment List described in 7.3.5.3.

Continued on next page

7.3.5 Cold Weather Operations: Special Maintenance Considerations, Continued

7.3.5.3 Cold Weather Accessories and Equipment List

Recommended accessories and equipment for cold weather operations are listed below.

- cold weather clothing
- canopies for protecting personnel working in exposed areas
- space heaters
- canvas covers for exposed equipment
- microphone covers
- whisk brooms
- wooden mallets
- non-metallic scrapers
- spare antenna insulators
- spare antennae (whip and wire), as required for unit
- special cold weather lubricants, as required for equipment, and
- spare batteries

Note: Contact the MLC/district for assistance in obtaining the items deemed necessary.

7.3.5.4 Preparing Equipment for Cold Weather

Follow the guidelines below to prepare all equipment for cold weather.

Maintenance Practice	Guidelines
Winterize all equipment	Ensure that all available winterizing procedures have been accomplished. For example: • replace normal lubricants with cold weather substitutes, and • install or check operation of space heaters and heating tape.

Continued on next page

7.3.5 Cold Weather Operations: Special Maintenance Considerations, Continued

7.3.5.4
Preparing Equipment for Cold Weather (continued)

Maintenance Practice	Guidelines
Ensure whip antennae have drainage holes installed	Accumulated moisture in whip antennae will cause damage to the antenna when freezing occurs. To avoid this problem • drill a 1/8" hole in the base of each antenna, and • be sure the hole penetrates the adapter base at the lowest point. **Reference**: For more detail on drilling drainage holes on whip antennae, refer to EIMB, General Maintenance, NAVSEA SE-000-00-EIM-160.
Protect exposed equipment	• Cover microphones and headsets used in exposed areas with nylon or polyethylene covers to prevent the diaphragm from collecting moisture. • Protect exposed equipment with snow proof covers when not in use. Brush snow from the covers with a whisk broom before removing the snow covers from the equipment.

7.3.5.5 Maintaining Equipment in Cold Weather

Cold weather is no barrier to operations. For operations in moderately cold weather (down to minus 35° F), special problems must be solved. These problems are complicated to an even greater extent when operating in extremely cold weather (temperatures below minus 35° F).

Equipment Type/Operation	Guidelines
Protecting Equipment from Moisture	• Check equipment that is moved from cold to warm spaces for condensation. • If moisture has not been removed from equipment that is needed for immediate service, bake out the equipment to ensure that ice will not form when the equipment is moved back to a cold space or area. • Keep all moving parts dry to prevent freezing and jamming.

Continued on next page

7.3.5 Cold Weather Operations: Special Maintenance Considerations, Continued

7.3.5.5
Maintaining Equipment in Cold Weather (continued)

Equipment Type/Operation	Guidelines
Equipment not in use	• Protect exposed equipment with snow proof covers. • Keep tube filaments and space heaters energized to combat condensation and freezing during periods when equipment is not being used. • Use pre-heaters, when available, before lighting off cold equipment.
Cables and cords	• Handle cables and cords carefully when cold to prevent cracking or breaking of the insulation. • Place cables in warm areas for some time prior to use to restore their flexibility.
Antennae	• Where high winds prevail, stow antennae to present the least frontal surface to the wind, when not in use. **Exception**: Rotating antennae are designed to rotate freely in the wind and seek the position with the least wind resistance. • Secured rotating antennae should be rotated slowly in one direction only for a short period to ensure that the mechanical system is operating freely. Sudden speed or direction changes may injure the mechanical system.

Continued on next page

7.3.5 Cold Weather Operations: Special Maintenance Considerations, Continued

7.3.5.6 Inspecting Equipment in Cold Weather

While operating in cold weather areas, use the guidelines below to frequently inspect all exposed equipment to minimize ice buildup or other hazards.

Type of Equipment	Guidelines
Rotating Equipment	• Operate and check all exposed rotating equipment *at least once each day*, more frequently under extreme conditions. (**Note**: In some cases it will be necessary to have equipment such as radar antennae rotating continuously.) • Perform the following daily checks on antennae: – monitor ice build-up and remove ice as needed, and – check space heaters to be sure they are operating efficiently. • Check all rotating machinery and gear trains *at least once each week* for proper lubrication.
Whip antennae and wave guides	• Inspect whip antenna base and wave-guide drainage holes *daily* to ensure that they have not become clogged. • Check wave-guides *regularly* to ensure that no moisture has entered or accumulated.
Blowers	Check blowers *daily* to ensure proper operation. Inspect intakes to ensure that snow and/or ice have not clogged them, restricting the airflow.

7.3.5.7 De-icing Antennae and Wave-guides

The formation of ice on wire antennae can cause them to break. Be careful when using the guidelines below to remove ice.

- To remove light ice accumulation on
  - wire antennae, knock the ice off with bamboo poles, or
  - radar, DF, and similar antennae, scrape the ice off with non-metallic scrapers.
- To remove heavy ice accumulation, use
  - steam
  - salt water, or
  - hot air jet, and so on.

Note: After removing ice accumulation, coat the surfaces from which the ice was removed with light oil or suitable silicone compound to inhibit further ice formation.

Continued on next page

7.3.5 Cold Weather Operations: Special Maintenance Considerations, Continued

7.3.5.8 Cold Weather Battery Maintenance Guidelines

Use the guidelines below to maintain batteries in cold weather.

- In cold weather (down to minus 35° F), keep exposed batteries charged.
- In extremely cold weather (temperatures below minus 35° F), remove exposed batteries to a warm room, if possible.

Depending on the battery type, the following additional precautions apply:

- When a wet cell battery will be operating at conditions below 0° F, increase the specific gravity of the electrolyte to 1260.
  Rationale: Batteries with a specific gravity of 1140 freeze at 10° F, and a gravity of 1300 will not freeze until minus 90° F.
- Wet storage batteries must have a gradual warm-up period. Take care to ensure that the electrolyte does not freeze by increasing specific gravity to manufacturer's specifications.
- Thaw dry batteries for one hour at about 27° F, then for a second hour at 70° F.

7.4 Field Changes

Overview

7.4.01 Scope

This chapter

- provides guidelines for implementing, documenting, and reporting field changes issued by the Coast Guard and other sources, and
- describes the types of the field change bulletins, supporting documentation, and parts kits.

7.4.02 Reference

Additional information about field changes may be found in the following resource.

Resource	Description	Link
Headquarters Materiel Management Projects at the Engineering Logistics Center, COMDTINST M4000.13 (series)	Direction for establishing, maintaining, and closing an HQO/HQU Materiel Management Project	---

7.4.03 Contents

This chapter contains the following topics.

7.4.1 Coast Guard-Initiated Field Changes

Introduction

This topic contains information on Coast Guard-initiated field changes, including

- a description of what qualifies as a field change
- the processes for approving, distributing, and installing field changes
- field change requirements and exceptions
- emergency and urgent alterations to electronic equipment
- maintenance hints
- the difference between a field change and a
  - – maintenance hint, or
  - – depot change
- a description of the field change package
- types of field changes
- field change parts kit
- distributing field change packages through the Engineering Logistics Center (ELC)
- guidelines for field change trial installations, and
- an example of a Field Change Bulletin, with enclosures.

7.4.1.1 Field Change Purpose

The Systems Management and Engineering Facility (SMEF), Maintenance and Logistics Command (MLC), or Engineering Logistics Center (ELC) issues field changes to

- modify electronic equipment to meet a change in operational requirements
- remove hazards
- correct design deficiencies
- improve reliability and maintainability, and
- correct technical documentation.

Field change modifications may include changes to

- components
- physical alteration of cabinets or housing
- operational tolerances or capabilities, and/or
- technical manuals.

Continued on next page

7.4.1 Coast Guard-Initiated Field Changes, Continued

7.4.1.2 Types of Field Changes

Field changes to modify electronic equipment are issued to

- meet a change in operational requirements
- remove safety hazards
- correct design deficiencies
- improve reliability and maintainability, or
- correct technical documentation.

The types of field change modifications, issued in the Coast Guard field change bulletin, are described in the table below.

Note: For field change purposes, technical manuals and formal operating and maintenance instructions are treated as an inherent part of the equipment.

See 7.4.1.11 for a description of a Field Change Bulletin and 7.4.1.14-7.4.1.20 for an example.

Type	Description
1	Type 1 field change furnishes a field change parts kit (which is assigned an Activity Control number, and includes documentation, parts, and special tools) required to complete a change. It requires the installing unit to • complete alterations to equipment, and • add corresponding changes to the technical documentation.
2	Type 2 field change furnishes documentation only. It requires the installing unit to • procure (and provide the funds for) required parts or special tools from an appropriate supply source • complete alterations to the equipment, and • add corresponding changes to the technical documentation.
3	Type 3 field change furnishes documentation and some of the parts or special tools needed in a field change parts kit. It requires the installing unit to • procure the remainder of the required parts or special tools from a specified source • complete alterations to the equipment, and • add corresponding changes to the technical documentation.
4	Type 4 field change implements changes to technical documentation only. It requires no alterations to the equipment.

Continued on next page

7.4.1 Coast Guard-Initiated Field Changes, Continued

7.4.1.3 Field Change Development and Distribution Process

Field change development and distribution is described in the process below.

Stage	Description
1	SMEF or designated Equipment Manager (EM) • solicits input from all levels of command to gather the information necessary to develop a field change • prepares a field package that includes all of the information and materials needed to complete the field change, and • obtains appropriate approvals from HQ while developing and testing the field change. **Note**: Commandant (CG-64) designates the EM for electronic equipment that is not supported by a SMEF. The designated EM can be the ELC, MLC, Command and Control Engineering Center (C2CEN), Telecommunication and Information Systems Command (TISCOM), or Loran Support Center (LSU).
2	SMEF or designated EM obtains an activity control number for the Field Change Bulletin from the ELC. **Note**: To obtain an activity control number for a trial installation, the SMEF submits a draft of the proposed Field Change Bulletin and, if required, a stock number.
3	SMEF or designated EM works directly with a unit to perform a trial installation to beta test the field change (when possible), and adjust as needed.
4	SMEF or designated EM • approves the field change, and • submits to Headquarters for final approval.

Continued on next page

7.4.1 Coast Guard-Initiated Field Changes, Continued

7.4.1.3
Field Change Development and Distribution Process (continued)

Stage	Description
5	Headquarters approves and funds the field change and related materials.
6	Field Change Bulletins are distributed to all activities that have an interest in equipment modifications to notify them of the pending change. Parts kits are sent to activities that require a field change installation. **Example**: MLC and district commanders receive bulletins but not the parts kit unless the equipment is going to be installed at the MLC or district office.

Continued on next page

7.4.1 Coast Guard-Initiated Field Changes, Continued

7.4.1.4 Field Change Installation and Reporting Process

Field change installation and reporting is described in the process below.

See 7.4.3 Documenting Completed Field Changes for more detail about the
- Field Change Accomplishment plate, and
- OPNAV 4790/CK Configuration Change Form.

Stage	Description
1	The SMEF or ELC • notifies the activity supervisor that a field change package is being delivered via message traffic or e-mail, and • provides a shipping number for tracking purposes. **Note**: The notification includes the target installation date.
2	The personnel assigned to install the field change (as indicated on the Field Change Bulletin) • verifies the applicability of Coast Guard field changes in the Coast Guard Planned Maintenance System (CGPMS) Work Schedule Book • installs all applicable field changes, and • affixes the Field Accomplishment Plate. **Note**: Depending on the field change installation requirements, installations may be completed by • the unit's Electronics Technician (ET) • a supporting unit • a SMEF, or • a contractor.
3	The individual operating the unit confirms that a field change has been installed, by physically checking the equipment using the identification paragraph of the Field Change Bulletin and the Field Change Accomplishment Plate. **Note**: Applicability of Coast Guard field changes may be verified in the CGPMS Work Schedule Book.
4	The activity/unit that receives the installed field change submits the OPNAV 4790/CK Configuration Change form to the ELC to report that the field change has been installed.

Continued on next page

7.4.1 Coast Guard-Initiated Field Changes, Continued

7.4.1.5 Field Change Requirements and Exceptions

When a field change is issued for a specific type of equipment, the modification must be installed in all equipment of that specific type, as identified in the Field Change Bulletin. Any exceptions are specified by equipment serial number, location, or use, in the Field Change Bulletin.

IMPORTANT: Engineering changes to installed electronic Coast Guard equipment can only be made when directed by an authorized field change. Exceptions can be made under emergency or urgent situations.

See
- 7.4.1.6 for information on emergency alterations, and
- 7.4.1.7 for information on urgent alterations.

7.4.1.6 Emergency Alterations to Electronic Equipment

Operational requirements may necessitate emergency alteration of equipment to

- effect a change in operational characteristics, which if not accomplished may seriously compromise national security, or
- correct an extremely hazardous condition, which may result in
  - fatal or serious injury to personnel, or
  - extensive damage or destruction of the equipment.

IMPORTANT: Units are advised to obtain permission *prior* to making any emergency alternations. However, in emergency situations, the Commanding Office has final approving authority for implementing such alterations.

Using the most expeditious method available to the unit, immediately report any emergency alteration. Follow up with a formal report by completing OPNAV 4790 CK, Configuration Change Form, and submitting it to the Configuration Data Manager.

Continued on next page

7.4.1 Coast Guard-Initiated Field Changes, Continued

7.4.1.7 Urgent Alterations to Electronic Equipment

In urgent situations, the equipment alteration may be

- authorized by
  - an Electronics Advisory (ALDIST), or
  - for SMEF equipment, a SMEF advisory, and
- later confirmed with a Field Change Bulletin.

An *urgent* priority is assigned to field changes for one or more of the reasons below.

- To effect a change in operational characteristics, which if not accomplished may seriously compromise the mission effectiveness of the deployed equipment or forces.
- To correct a potentially hazardous condition, which may result in serious injury to personnel or damage to the equipment.
- To conform to significant contractual requirements (that is, when lead time will necessitate slipping approved production, activation, or construction schedules if the changes are not incorporated).
- To effect through value engineering or other cost reduction efforts, net life cycle savings to the government of more than $100,000, where expedited processing of the change will be a major factor in realizing lower costs.

7.4.1.8 Maintenance Hints vs. Field Changes

A maintenance hint is a procedure not formerly documented that is useful in servicing electronic equipment. A maintenance hint is not a field change, because it does not change the configuration of the electronic equipment.

Example: A maintenance hint may be a revised method for disassembly and re-assembly of a complicated servomechanism that simplifies the procedure or decreases the time involved.

Continued on next page

7.4.1 Coast Guard-Initiated Field Changes, Continued

7.4.1.9 Depot Changes vs. Field Change

A depot change is not a field change because a modification to modules, subassemblies, or equipment is designated as depot level repairable, therefore the change is performed at a designated depot level maintenance facility.

Example of a Depot Change: A modified module that is designated for depot repair and is electrically, physically, functionally, and pin-for-pin interchangeable with the unmodified module, is simply returned to the supply pipeline upon modification.

Example of a "Depot Changed" Field Change: When a "Depot Changed" module or equipment is not directly interchangeable and requires mainframe wiring or component changes, it may be provided as a "Depot Changed" part for a Type 1 or Type 3 field change parts kit.

7.4.1.10 Distributing Field Change Packages Through the Engineering Logistics Center

A SMEF may request that field change parts be stored in the Headquarters Office/Headquarters Unit (HQO/HQU) Materiel Management Projects at the Engineering Logistics Center (Code 031)

- for a limited time to ensure that necessary units have received the parts kits and bulletin to install in the applicable equipment, or
- when field change part kits fabricated by the Coast Guard are not distributed by the Commandant or SMEF.

Assigned SMEFs can request a stock number for a Field Change Bulletin.

Note: Bulletins are available on the applicable SMEF's intranet Web site.

Reference: For more detail on establishing, maintaining and closing an HQO/HQU Materiel Management Project, refer to Headquarters Materiel Management Projects at the Engineering Logistics Center, COMDTINST M4000.13 (series).

Continued on next page

7.4.1 Coast Guard-Initiated Field Changes, Continued

7.4.1.11 Field Change Bulletin Description

The Field Change Bulletin is the authority for the installation of the field change. The parts of the Field Change Bulletin are described in the table below.

See 7.4.1.14-7.4.1.20 for examples of a Field Change Bulletin with enclosures.

<table>
<tr><th>Part</th><th>Description</th></tr>
<tr><td>Field Change Number</td><td>The number that uniquely identifies the field change.

For Coast Guard equipment, the field change number is assigned by the SMEF or designated EM.

For Navy-type equipment, field changes are numbered consecutively. The starting number depends on which branch initiated the field change, as described in the table below.

<table><tr><th>Field changes on Navy Type equipment initiated by the …</th><th>Are numbered consecutively, starting with …</th></tr><tr><td>Navy</td><td>1.</td></tr><tr><td>Coast Guard</td><td>91.</td></tr></table>
Example: It is possible to have field changes 1, 2, 3, 4, and 5 (Navy) and field changes 91, 92, and 93 (Coast Guard) installed in Navy type equipment.</td></tr>
<tr><td>Field Change Type</td><td>The type of field change that must be implemented.

See 7.4.1.2 for field change types.</td></tr>
<tr><td>Activity Control Number</td><td>A number issued by the ELC.</td></tr>
</table>

Continued on next page

7.4.1 Coast Guard-Initiated Field Changes, Continued

7.4.1.11
Field Change Bulletin Description (continued)

Part	Description
Stock Number	The Federal Stock System number assigned to an item. The bulletin identifies the stock number of the parts needed for the installation.
Required Sections	The field change bulletin is organized into the following sections: • Purpose • Description • Equipment Affected • Identification of Accomplishment • Materials Required • Tools Required • Test Equipment Required • Procedure, and • Routine Instructions.
Distribution Instructions	All Field Change Bulletins must contain distribution directions, especially in the case of the following servicing units: • Electronics Support Unit (ESU), • Electronic Support Detachment (ESD), and • Aid to Navigation (ATON).

Continued on next page

7.4.1 Coast Guard-Initiated Field Changes, Continued

7.4.1.11
Field Change Bulletin Description (continued)

Part	Description
Enclosures	The following enclosures are included, as needed, to clearly outline the field change to equipment managers and support personnel involved in implementing a field change: • corrections to technical documentation • parts lists • step-by-step installation procedures, and/or • OPNAV 4790/CK Configuration Change Form.

7.4.1.12
Field Change Parts Kit

A field change parts kit is included with Type 1 and Type 3 field changes. It includes the following items needed to implement the field change:

- parts
- special tools
- related parts lists
- installation procedures, and
- a copy of the field change bulletin.

7.4.1.13
Errata Sheet Purpose

If relatively minor mistakes have been made in the Field Change Bulletin, an Errata Sheet is issued to correct these errors, and distributed it to all units that received the related field change.

See 7.4.1.19 for an example of an Errata Sheet.

Continued on next page

7.4.1 Coast Guard-Initiated Field Changes, Continued

7.4.1.14 Field Change Example: Page 1

An example of page 1 of a Field Change Bulletin is shown below.

ELECTRONIC FIELD CHANGE BULLETIN

F. C. NO. 19 TYPE 1 TO AN/FPN-64A(V) LORAN-C TRANSMITTER SET

PURPOSE:

This field change reduces the off-air time when switching output/coupling networks in the AN/FPN-64(V) and AN/FPN-64A(V) LORAN-C Transmitter Sets.

DESCRIPTION:

This field change modifies the 2A1A2A1A7 RF Switch Control PCB to reduce the off-air time to 15 seconds when switching output/coupling networks. This field change also provides corrections to the technical manual to document the changes to the RF Switch Control PCB.

EQUIPMENT AFFECTED:

This field change is applicable to all AN/FPN-64(V), and AN/FPN-64A(V) LORAN-C Transmitter Sets.

IDENTIFICATION OF ACCOMPLISHMENT:

The presence of 510 k ohm resistors for R20 and R35 on the 2A1A2A1A7 RF Switch Control PCB identifies accomplishment of this field change.

MATERIALS REQUIRED:

RF Switch Control PCB, NSN XB 5998-01-068-5615, modified by Depot Change 03 (orange stripe on the edge of the circuit card).

TOOLS REQUIRED:

None.

PROCEDURE:

1. Follow the step-by-step installation instructions in enclosure (1).
2. Perform the technical manual corrections in enclosure (2).

Continued on next page

7.4.1 Coast Guard-Initiated Field Changes, Continued

7.4.1.15 Field Change Example: Page 2

An example of page 2 of a Field Change Bulletin is shown below.

3. Complete and return the Field Change Installation Feedback Report provided as enclosure (3).

ROUTINE INSTRUCTIONS:

1. Record completion of this field change by making an entry on the Field Change Accomplishment Plate, NSN OI 0264-LP-456-6411, available from the Naval Publications and Forms Center, Philadelphia, PA.
2. Maintenance support facilities shall maintain a library copy of this and all other applicable field change bulletins. Additional and replacement copies can be obtained from Coast Guard Engineering Logistics Center, Baltimore, MD. Order directly at no cost using MILSTRIP procedures; NSN CG 7610-01-GE8-6673 applies.
3. Upon completion, a copy of this field change bulletin shall be inserted in front of all applicable technical manuals. Cognizant commands shall ensure that the field change has been accomplished and that applicable technical manual annotations and reports have been made.

C. A. SCHUE, III

Encl: (1) Installation Instructions for FC 22/19 to the AN/FPN-64(V)/64A(V)
(2) Technical Manual Corrections for FC 22/19 to the AN/FPN-64(V)/64A(V)
(3) Field Change Installation Feedback Report

Continued on next page

7.4.1 Coast Guard-Initiated Field Changes, Continued

7.4.1.16 Field Change Enclosure: Installation Instructions Page 1

An example of page 1 of an "Installation Instructions" enclosure to a Field Change Bulletin is shown below.

Installation Instructions for FC 22/19 to the AN/FPN-64(V)/64A(V)

SAFETY NOTE

COMPLY WITH U.S. COAST GUARD SAFETY PRECAUTIONS AND THE ELECTRONICS MANUAL, COMDTINST M10550.25A

NOTE: Read all instructions before attempting to complete this field change.

1. Order three modified RF Switch Control PCBs, NSN XB 5998-01-068-5615 (one for the installed TOPCO, one for the spare TOPCO, and one for a MICA spare), and using normal APA requisitioning procedures. Once received, proceed to step 2.
2. Notify the control station that this field change is being installed and might cause a MOA when power is secured and reapplied to the TOPCO.
3. Place the MANUAL/AUTO switch on the PPU A11 Panel to MANUAL.
4. Secure power to the TOPCO by turning off CB1 (battery) and CB2 (AC) on the rear of the unit.
5. Open the TOPCO and locate the RF Switch Control PCB (green card extractor).
6. Remove the existing RF Switch Control PCB.
7. Insert the modified RF Switch Control PCB and close the TOPCO.
8. Return power to the TOPCO, by turning on CB2 (AC) and CB1 (battery) on the rear of the unit.
9. Place the MANUAL/AUTO switch on the PPU A11 Panel to AUTO.
10. Notify the control station that you will be switching output/coupling networks twice to test the new RF Switch Control PCB.
11. Switch output/coupling networks by pressing the COMMAND button on the TOPCO. Note how long the station is off air. It should be off air for approximately 15 seconds.

Continued on next page

7.4.1 Coast Guard-Initiated Field Changes, Continued

7.4.1.17 Field Change Enclosure: Installation Instructions Page 2

An example of page 2 of an "Installation Instructions" enclosure to a Field Change Bulletin is shown below.

12. Switch output/coupling networks again by pressing the COMMAND button on the TOPCO. Note how long the station is off air. It should be off air for approximately 15 seconds.

13. Notify the control station that the installation is complete.

14. Return all unmodified RF Switch Control PCBs to ELC using normal procedures for returning defective XB items. On the "Serviceable/Unserviceable Material Tag" for trouble indication write "Requires most recent depot change".

Continued on next page

7.4.1 Coast Guard-Initiated Field Changes, Continued

7.4.1.18 Field Change Enclosure: Technical Manual Corrections

An example of a "Technical Manual Corrections" enclosure to a Field Change Bulletin is shown below.

Technical Manual Corrections for FC 22/19 to the AN/FPN-64(V)/64A(V)

1. Make the following pen and ink corrections to the AN/FPN-64(V)/64A(V)Technical Manuals. Write "FC 22/19 to the AN/FPN-64(V)/64A(V)" at the bottom of each corrected page.
   a. Page 2-19, Table 2-2, Item 38, line 6, in the Function column, change 20 seconds to 15 seconds.
   b. Page 3-125, Figure 3-45, change both 20-Sec One-Shot to 15-Sec One-Shot.
   c. Page 3-126, Paragraph 3-222, 5th and 9th lines, change 20-sec to 15-sec.
   d. Page 3-126, Paragraph 3-223, 1st and 5th lines, change 20-sec to 15-sec.
   e. Page 3-186, Paragraph 3-355, sub-paragraph 1, 2nd line, change 20 sec nominal to 15 sec nominal.
   f. Page 3-189, Paragraph 3-360, sub-paragraph 7, change 20-sec to 15-sec.
   g. Page 3-189, Paragraph 3-360, sub-paragraph 8, change 20-sec to 15-sec.

2. Make the following page change:

REMOVE	INSERT
Page 5-121 (Original)	Page 5-121 (FC 22/19)

Continued on next page

7.4.1 Coast Guard-Initiated Field Changes, Continued

7.4.1.19 Errata Sheet Example: Page 1

An example of page 1 of an Errata Sheet is shown below.

ERRATA SHEET NO. 1
TO
F. C. NO. 19 TYPE 1 TO AN/FPN-64A(V) LORAN-C TRANSMITTER SET

PURPOSE:

This errata is being released to ensure timely modifications to the RF Switch Control PCBs and increase the number of spares in the pipeline. This errata modifies the installation instructions and provides resistors to accomplish this field change. Normally field units would not work on XB modules; however, the LORSTAs and the ELC repair depot would benefit from this, enabling the LORSTAs to accomplish this field change quickly and ensuring that adequate spare PCBs remain in stock.

LORSTAs that have ordered, but have not received the RF Switch Control PCBs, should cancel their orders. If modified PCBs have been received, verify that they function properly and install them in accordance with the original installation instructions in Field Change 22/19 to the AN/FPN-64(V)/64A(V). If the modified boards do not function properly, return them to ELC for repair.

PROCEDURE:

A qualified Electronics Technician shall perform the following procedure on each RF Switch Control PCB, using the proper soldering tools and techniques:

1. Identify the resistors to be replaced; R20 and R35, on the MICA spare RF Switch Control PCB.
2. De-solder and remove R20 and R35. Be very careful not to damage the circuit runs or eyelets.
3. Insert the new 510k-ohm resistors (provided by LSU) in the now vacant R20 and R35 locations.
4. Solder the new resistors in place, again being careful not to damage the circuit runs or eyelets.
5. Locate the black and brown stripes on the edge of the CCA. Using the paint pen provided, paint an orange stripe immediately following and the same length as the black and brown stripes.
6. Repeat steps 2 through 5 on the RF Switch Control PCB from the spare TOPCO.

Continued on next page

7.4.1 Coast Guard-Initiated Field Changes, Continued

7.4.1.20 Errata Sheet Example: Page 2

An example of page 2 of an Errata Sheet is shown below.

7. After installing the new 510k ohm resistors in both spare RF Switch Control PCBs (from the MICA and spare TOPCO), test them both by following steps 2 through 12 in the original installation instructions supplied in Field Change 22/19 to the AN/FPN-64(V)/64A(V).

8. Repeat steps 2 through 5 on the RF Switch Control PCB that was removed from the on-line TOPCO.

9. After installing the new 510k ohm resistors in the RF Switch Control PCB that was in the on-line TOPCO, test it by following steps 3 through 13 in the original installation instructions supplied in Field Change 22/19 to the AN/FPN-64(V)/64A(V).

10. After verifying that all the PCBs function properly, return one spare PCB into the spare TOPCO and the other one into the MICA for storage.

PARTS SUPPLIED WITH THIS ERRATA:

Item Name	NSN	Quantity
510k Ohm, ¼ Watt Resistors	5905-00-246-8690	6
Orange paint pen	None	1

ROUTINE INSTRUCTIONS:

1. Record completion of this errata by making an entry on the Field Change Accomplishment Plate, National Stock Number (NSN) OI 0264-LP-456-6411 (available from the Naval Publications and Forms Center, Philadelphia, PA).

2. Maintenance support facilities shall maintain a library copy of this and all other applicable field change bulletins. Additional and replacement copies can be obtained from Coast Guard Engineering Logistic Center, Baltimore, MD. Order directly using MILSTRIP procedures; no cost is involved. NSN CG 7610-01-GE8-6674 applies.

3. Upon completion, a copy of this errata shall be inserted in front of all applicable technical manuals. Cognizant commands shall ensure that this errata has been accomplished and that applicable technical manual annotations and reports have been made.

G. K. Weeks, Jr.

7.4.2 Field Changes Initiated by Other Sources

Introduction

This topic contains information on field changes initiated by other sources, including

- agency equipment field change authorization policy
- Navy field changes, and
- commercial field changes.

7.4.2.1 Equipment Field Changes Generated by Other Agencies

As a rule, field changes generated by other agencies are authorized for those agencies' equipment which are used by the Coast Guard.

7.4.2.2 Navy Field Changes

Coast Guard units are authorized to install Navy field changes to the appropriate equipment upon receipt of the field change. The table below describes the process used to notify the Coast Guard of Navy field changes to maintain compatibility of all Navy Type equipment, whether Navy-owned, or Coast Guard-owned.

Note: Questions concerning Navy Type field changes may be addressed to either the Engineering Logistics Center (ELC) (Code 016) or Commandant (CG-64).

Stage	Description
1	Navy In-Service Engineering Agent (ISEA) sends field changes to registered users of the Ship Configuration and Logistics Support Information System (SCLSIS) database. **Note**: Navy ISEA has similar functionality to a Coast Guard SMEF.

Continued on next page

7.4.2 Field Changes Initiated by Other Sources, Continued

7.4.2.2
Navy Field Changes (continued)

Stage	Description
2	Coast Guard units complete the Navy field change. **Note**: If the field change is outside the ability of the servicing technicians, the field command is completed on the next scheduled visit by the appropriate Systems Command (SYSCOM) Groom Team: • Space and Naval Warfare Systems Command (SPAWAR) • Naval Air Systems Command (NAVAIR), or • Naval Sea Systems Command (NAVSEA).
3	After installing the field change, the unit submits an OPNAV 4790/CK Configuration Change Form to ELC (Code 016). See 7.4.3 Documenting Completed Field Changes for more detail on the OPNAV 4790/CK Configuration Change.

7.4.2.3
Commercial Field Changes

Field changes issued directly by a commercial manufacturer are not permitted.

The process for verifying and incorporating commercial field changes into the Coast Guard field change process is described in the table below.

Stage	Description
1	A manufacturer issues a change bulletin for commercial electronic equipment used by the Coast Guard. **Note**: When any unit receives information concerning a change to commercial equipment, not previously published or authorized, the unit forwards the information to the appropriate SMEF via their respective MLC (t).

Continued on next page

7.4.2 Field Changes Initiated by Other Sources, Continued

7.4.2.3
Commercial Field Changes (continued)

Stage	Description
2	The SMEF • screens the commercial change bulletin to ensure applicability • creates a Coast Guard Field Change Bulletin, and • issues the Coast Guard Field Change Bulletin to Coast Guard operating units that have equipment that is applicable to the field change.
3	The Coast Guard unit implements the Coast Guard field change and completes all documentation.

7.4.3 Documenting Completed Field Changes

Introduction

This topic contains information on documentation requirements for completed field changes, including

- Field Change Accomplishment Plate
- OPNAV 4790/CK Configuration Change Form, and
- CMPlus entries required for field changes.

7.4.3.1 Field Change Accomplishment Plate

After completing the field change, the installer completes and affixes the Field Accomplishment Plate, using the guidelines below.

- Record all field changes completed for the equipment on the Field Change Accomplishment Plate.
- Affix the completed Field Change Accomplishment Plate to the electronic equipment, in a visible location.

Note: Field Change Accomplishment Plates are available from the Naval Publications and Forms Center (NPFC), Philadelphia under NSN 0264-LP-456-6411.

Continued on next page

7.4.3 Documenting Completed Field Changes, Continued

7.4.3.2 OPNAV 479/CK Configuration Change Form

The OPNAV 4790/CK Configuration Change Form is used to report to the Configuration Data Manager any configuration change, including installation, de-installation, or modification (after completing an authorized field change).

After a field change is installed

- the installer completes the OPNAV 4790/CK Configuration Change Form, and
- the unit's Commanding Officer (or designee indicated on the OPNAV 4790/CK)
  - verifies the information, and
  - signs and submits the form.

Configuration Data Manager's Address:
Engineering Logistics Center (Code 016)
707 Ordnance Road
Baltimore, MD 21226

Note: The OPNAV 4790/CK Configuration Change Form can be downloaded from the ELC (01) Web site at CG Central.

7.4.3.3 CMPlus Entries Required for Field Changes

Units must enter completed field changes into the CMPlus unit configuration management database.

8.0 Equipment Engineering Changes

Table of Contents

8.0 Equipment Engineering Changes

Overview

8.01 Scope

This part contains information on engineering changes to electronic equipment installed on all United States Coast Guard (USCG) units.

8.02 Definition: Engineering Changes

Engineering changes are additions or modifications that affect the functional and/or physical characteristics (that is, the configuration) of platforms, equipment, systems, or software.

Example: The installation of an Automated Identification System (AIS) qualifies as a platform configuration change.

See 5.4 Configuration Management for configuration management objectives and responsibilities.

8.03 References

Additional engineering change information may be found in the following resources.

Resource	Description	Location/Link
Naval Engineering Manual, COMDTINST M9000.6 (series)	Naval engineering policy and selected procedures.	CG CENTRAL
Configuration Control Manual, COMDTINST 4130.9 (series)	Guidance and specific requirements for implementing effective configuration management during the life cycle support of configuration items.	CG CENTRAL

Continued on next page

Overview, Continued

8.04 Contents

This part covers the following subjects.

8.1 Engineering Change Roles and Responsibilities

Introduction

This topic contains information on the engineering change

- roles and responsibilities of
  - Maintenance and Logistics Commands (MLCs)
  - Systems Management and Engineering Facilities (SMEFs), and
  - Engineering Logistics Centers (ELCs), and
- responsibilities of
  - Commandant, Office of Command, Control (C2), and Navigation Systems (CG-64),
  - Commandant, Office of Naval Engineering (CG-45), and
  - Headquarters and local Configuration Control Boards (CCBs).

8.1.1 MLC Role in the Engineering Change Process

The Maintenance and Logistics Command (MLC)

- provides electronics, telecommunications, and information resource management and technical support to areas and district units, and
- coordinates existing MLC, area, or district resources (funds and personnel) to support system engineering changes.

During the engineering change process, the MLC

- assists the System Manager with ensuring that units are in compliance with appropriate configurations
- evaluates requests for platform and system engineering changes
- validates proposed system engineering changes
- develops approved platform and system engineering changes
- participates in concurrent clearance reviews of platform and system engineering changes, and
- deploys authorized system engineering changes.

See 8.2 Engineering Change Process Summary for a description of the engineering change process.

Continued on next page

8.1 Engineering Change Roles and Responsibilities, Continued

8.1.2 SMEF Role in the Engineering Change Process

The Systems Management and Engineering Facility (SMEF) manages electronic equipment and systems that significantly impact other systems or mission completion.

The SMEF

- during the engineering change process
  - classifies, validates, develops, and deploys system engineering changes, and
  - reviews and approves prototypes for system engineering changes (see 8.2 Engineering Change Process Summary for detail on the stages of the process)
- approves Coast Guard field changes that apply to SMEF-managed equipment (see 7.4 Field Changes for more detail), and
- develops and distributes Field Change Bulletins documenting approved changes to a configuration baseline (see 8.6 Engineering Change Communication and Reporting Requirements for field change bulletin distribution requirements).

Note: Commandant (CG-64) assigns SMEFs.

8.1.3 ELC Role in the Engineering Change Process

The Engineering Logistics Center (ELC) manages vessel platforms including cross platform configurations for electronic and ordnance systems.

During the engineering change process, the ELC

- categorizes requests for engineering changes
- reviews and approves requests for engineering change prototypes
- validates proposed system engineering changes
- develops approved platform and system engineering changes
- participates in concurrent clearance reviews of system engineering changes developed by a SMEF for cutters or standard boats and shore units, and
- deploys authorized platform and system engineering changes.

See 8.2 Engineering Change Process Summary for a description of the engineering change process.

Continued on next page

8.1 Engineering Change Roles and Responsibilities, Continued

8.1.4 Commandant Engineering Change Responsibilities

The engineering change responsibilities of Commandants (CG-45) and (CG-64) are described in the table below.

Commandant	Responsibilities
Commandant, Office of Naval Engineering (CG-45)	During the engineering change process • guides proposed platform engineering changes on floating units (that is, Loran stations) through the validation phase of the process (see 8.4 Validation Phase of the Engineering Change Process for more detail), and • as a member of the concurrent clearance review team, issues authorization for deployment of platform engineering changes on floating units (see 8.5 Development and Deployment Phases of the Engineering Change Process for more detail). **IMPORTANT**: Commandant (CG-45) has authority for final approval when a proposed change will significantly impact the engineering and/or logistics support infrastructure or will create organizational or support changes beyond the cognizance of the Center of Excellence (COE).
Commandant, Office of Command, Control (C2), and Navigation Systems (CG-64)	During the engineering change process • guides proposed platform engineering changes on shore units through the validation phase of the process (see 8.4 Validation Phase of the Engineering Change Process for more detail), and • as a member of the concurrent clearance review team, issues authorization for deployment of platform engineering changes on shore units (see 8.5 Development and Deployment Phases of the Engineering Change Process for more detail).

Continued on next page

8.1 Engineering Change Roles and Responsibilities, Continued

8.1.5 Configuration Control Board Engineering Change Responsibilities

The engineering change responsibilities of Headquarters and local configuration control boards (CCBs) are described in the table below.

Headquarters/Local CCB	Responsibilities
Headquarters CCB	• Reviews, classifies, and provides concept approval of platform engineering changes, and • controls configuration changes. See 8.4 Validation Phase of the Engineering Change Process for the classifications of proposed engineering changes.
Local CCB (LCCB)	• Approves Class II engineering change proposals • refers Class I engineering changes (and Class II changes for which resources are insufficient) to the Headquarters CCB for action, and • approves platform engineering changes for action when authorization for the change has been issued. See 8.4 Validation Phase of the Engineering Change Process for descriptions of Class I and II funding classifications. **IMPORTANT**: All configuration changes approved by the local CCB must comply with Headquarters CCB policy and be recorded and available for review.

8.2 Engineering Change Process Summary

Introduction

This topic contains

- a summary of the engineering change process, and
- a flowchart of the process.

8.2.1 Summary of the Engineering Change Process

The engineering change process is summarized in the table below.

Stage	Who is Responsible	Description
		Phase 1: Concept Approval
1	Field unit or area/district staff	Submits an Engineering Change Request (ECR) Form to the servicing Maintenance and Logistics Command (MLC) for evaluation. See 8.3 Concept Approval Phase of the Engineering Change Process for detail on accessing and completing an ECR Form.
2	MLC	• Evaluates the engineering change request from the perspective of requirements and impact on current operations • completes a cost benefit analysis and weight estimate • recommends a category, priority classification for completion, and source of funding for the proposed engineering change, and • endorses and forwards the request to the Engineering Logistics Center (ELC).
3	ELC	• Reviews and categorizes the engineering change as a – platform engineering change, or – system engineering change, and • forwards the ECR to the appropriate authority for classification, based on the engineering change category. See 8.3 Concept Approval Phase of the Engineering Change Process for more detail.

Continued on next page

8.2 Engineering Change Process Summary, Continued

8.2.1
Summary of the Engineering Change Process (continued)

Stage	Who is Responsible	Description
Phase 2: Validation		
4	Authority responsible for classifying the engineering change request	Classifies the engineering change request in terms of • priority for completion, and • impact on funding. **Note**: The authority responsible for classification depends on the category of the engineering change. See 8.4 Validation Phase of the Engineering Change Process for more detail.
5	Authority responsible for validating the proposed engineering change	Validates (that is, approves or disapproves) the proposed engineering change for development. **Notes**: • The authority responsible for validation depends on the category of the engineering change. • If the engineering change is disapproved, notification is sent to the initiator with the reason for disapproval. See 8.4 Validation Phase of the Engineering Change Process for more detail.

Continued on next page

8.2 Engineering Change Process Summary, Continued

8.2.1
Summary of the Engineering Change Process (continued)

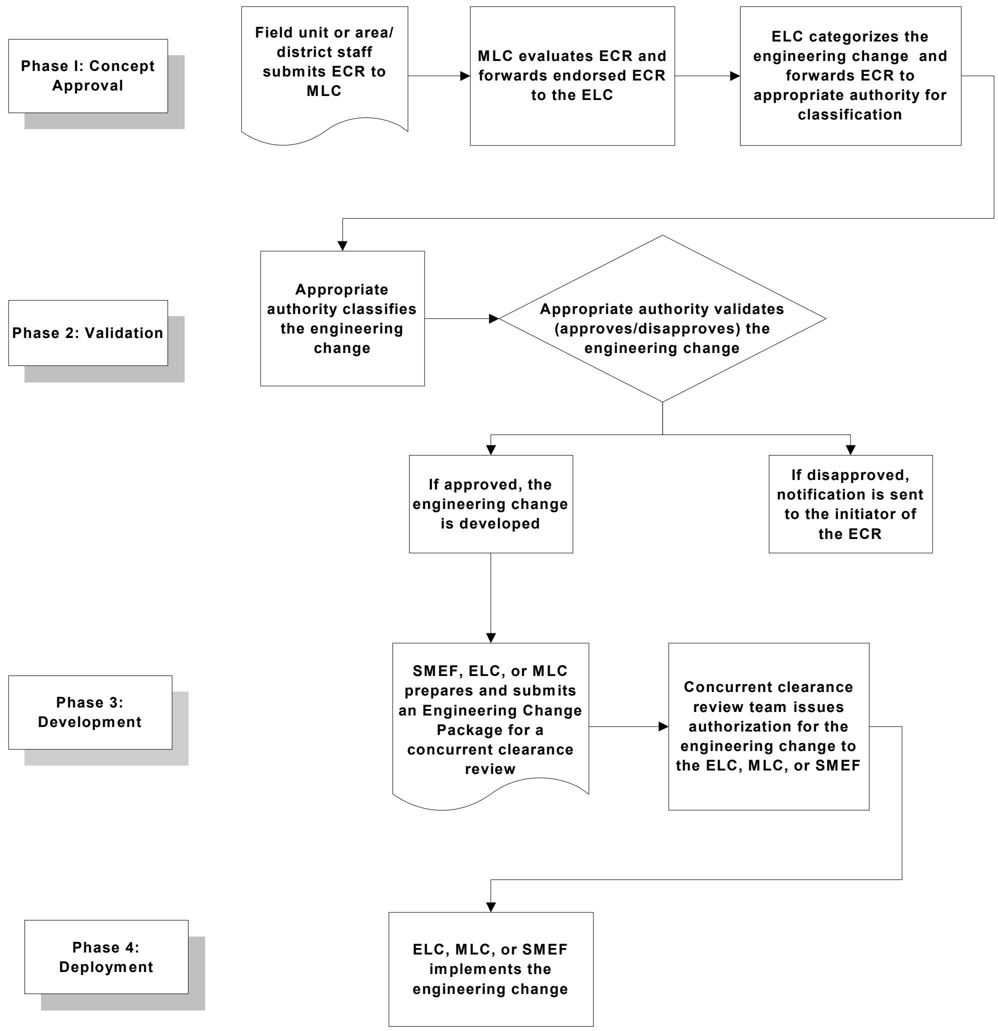
Stage	Who is Responsible	Description
		Phase 3: Development
6	• ELC • MLC, or • Systems Management and Engineering Facility (SMEF)	• Prepares an Engineering Change Package, which consists of documentation detailing how the change will be accomplished and supported, and • submits the package for a concurrent clearance review. **Note**: If a prototype to evaluate the engineering change was requested and approved, a prototype evaluation plan is developed and the prototype is installed during this phase. See 8.5 Development and Deployment Phases of the Engineering Change Process for more detail.
7	Concurrent clearance review team	Issues authorization for deployment of the engineering change to the appropriate ELC, MLC, or SMEF. **Notes**: • The members of the concurrent clearance review team depend on the category of the engineering change. • The authorized local CCB (LCCB) approves platform engineering changes for action once authorization is issued by the concurrent clearance review team. See 8.5 Development and Deployment Phases of the Engineering Change Process for more detail.
		Phase 4: Deployment
8	• ELC • MLC, or • SMEF	Implements the authorized engineering change. See 8.5 Development and Deployment Phases of the Engineering Change Process for more detail.

Continued on next page

8.2 Engineering Change Process Summary, Continued

8.2.2 Flowchart of the Engineering Change Process

Below is a flowchart illustrating the engineering change process.



8.3 Concept Approval Phase of the Engineering Change Process

Introduction

This topic contains information on the concept approval phase of the engineering change process, including

- how to initiate an engineering change request (ECR)
- the categories of engineering changes, and
- the authorities to whom categorized engineering changes are forwarded.

8.3.1 Initiating an Engineering Change Request

Field units and area/district staffs initiate engineering changes by submitting an Engineering Change Request (ECR) Form (CG-5682). Form CG-5682 is available from

- Adobe Forms on the SWSIII, and
- USCG Electronic Forms on CG Central

To complete Form CG-5682

- provide as much supporting detail as possible to assist with the proper evaluation of the request, and
- include a request for an engineering change prototype (*if applicable*).

Submit the form (either electronically or on paper) to the servicing Maintenance and Logistics Command (MLC) via the chain of command (that is, the Sector or District Commander), with an *information copy* to the operational commander.

Note: The servicing MLC is either
- MLC (t), Electronics Division, or
- MLC (v), Naval Engineering Division.

Reference: For detailed instructions on completing Form CG-5682, refer to Chapter 041 in the Naval Engineering Manual, COMDTINST M9000.6 (series) on CG Central.

Continued on next page

8.3 Concept Approval Phase of the Engineering Change Process, Continued

8.3.2 Categories of Engineering Changes

When the Engineering Logistics Center (ELC) receives an endorsed ECR from the MLC, the ELC categorizes the requested engineering change as a

- platform engineering change, or
- system engineering change.

The criteria for the platform and system engineering change categories are described in the table below.

Engineering Change Category	Criteria
Platform engineering change	A modification to a shore unit cutter or standard boat that involves • changes in weight and moment that significantly affect intact or damaged stability • changes to hull structure or compartmentation • changes affecting mission characteristics and capabilities, or • changes to standard boats to meet outfitting requirements specified on an Allowance Equipage List (AEL). **Example of weight and moment changes**: • A 0.0001 foot change in kilograms, or • an addition or reduction of more than 1/20th of one percent of the full load displacement (that is, 112 pounds per 100 tons of displacement). **Note**: When in doubt about the effect of a change in weight or moment, request technical advice from the ELC Platform Manager or MLC Type Desk.

Continued on next page

8.3 Concept Approval Phase of the Engineering Change Process, Continued

8.3.2
Categories of Engineering Changes (continued)

Engineering Change Category	Criteria
System engineering change	• A change to any system component or subassembly documented on an Allowance Parts List (APL) to an approved software, fluid, or paint system that will improve the reliability, operational efficiency, or maintenance of the system or equipment • form, fit, or functional change to a closure or fitting, or • damage control classification change.

[redacted]

Coast Guard field changes are a type of system engineering change that involves modifications to electronic equipment used by the Coast Guard. See 7.4 Field Changes for more detail.

Continued on next page

8.3 Concept Approval Phase of the Engineering Change Process, Continued

8.3.3 Authorities to Whom Categorized ECRs are Forwarded

After categorizing the engineering change, the ELC forwards the ECR to the appropriate authority, as described in the table below.

See 8.4 Validation Phase of the Engineering Change Process for more detail on approval of engineering changes.

When the engineering change is categorized as a …	Then the ELC forwards the ECR to …
platform engineering change	Commandants (CG-45) or (CG-64) for review and concept approval by the Headquarters Configuration Control Board (CCB). **Note**: The approval process for changes on • floating units are managed by Commandant, Office of Naval Engineering (CG-45), and • shore units are managed by Commandant, Office of Command, Control (C2), and Navigation Systems (CG-64). See 8.1 Engineering Roles and Responsibilities for more detail on Commandant responsibilities.
system engineering change	the SMEF or designated EM for review, development, and approval.

8.4 Validation Phase of the Engineering Change Process

Introduction

This topic contains information on the validation phase of the engineering change process, including

- authorities responsible for classifying engineering change requests
- priority and funding classification
- authorities responsible for validating (that is, approving or disapproving) engineering changes for development, and
- sources of funding for engineering changes.

8.4.1 Authorities Responsible for Classifying Engineering Change Requests

The authorities responsible for classifying engineering change requests in terms of priority for completion and impact on funding are identified in the table below.

See
- 8.4.2 for detail on priority classifications, and
- 8.4.3 for detail on funding classifications.

Engineering Change Category	Responsible Authority
Platform engineering change	Headquarters Configuration Control Board (CCB) **Notes**: • Commandants (CG-45) and (CG-64) are responsible for guiding platform engineering changes through the approval process (see 8.1 Engineering Change Roles and Responsibilities for more detail). • The results of the CCB review are documented on the Engineering Change Request (ECR) Form (CG-5682) and forwarded to the authority responsible for validation (see 8.4.5 for more detail).
System engineering change	• Systems Management and Engineering Facility (SMEF) • Engineering Logistics Center (ELC), or Maintenance and Logistics Command (MLC).

Continued on next page

8.4 Validation Phase of the Engineering Change Process, Continued

8.4.2 Priority Classifications of Proposed Engineering Changes

The criteria for classifying proposed engineering changes in terms of priority for completion, and the timeframe for completion according to the class, are described in the table below.

Priority Classification	Criteria	Timeframe for Completion
Class A	Engineering changes required to *urgently correct* conditions that impair the • service characteristics of a cutter, or • safety and health of personnel.	Class A changes must be completed • at the first opportunity, or • within the *first* availability cycle after the engineering change authorization is issued. See 8.5 Development and Deployment Phases of the Engineering Change Process for detail on engineering change authorization.
Class B	Engineering changes required to *improve* the • service characteristics of a cutter • health and comfort of personnel, or • efficiency and economy of operating and maintaining the cutter.	Class B changes must be completed within *two* availability cycles after the engineering change authorization is issued. See 8.5 Development and Deployment Phases of the Engineering Change Process for detail on engineering change authorization.

Continued on next page

8.4 Validation Phase of the Engineering Change Process, Continued

8.4.2
Priority Classifications of Proposed Engineering Changes (continued)

Priority Classification	Criteria	Timeframe for Completion
Class C	Engineering changes requested for *planned future modifications* that • are impossible or undesirable to complete quickly on all vessels of the same class • are contingent upon Commandant funding or the need to renew a specific item, and • will not impact operational ability if delayed. **Example of a Class C change**: A future configuration change such as an improved joiner bulkhead panel. **Note**: Contingencies are identified on the ECR Form (CG-5682).	Once the contingencies are fulfilled, Class C changes are *mandatory* and must be completed within two years.

Continued on next page

8.4 Validation Phase of the Engineering Change Process, Continued

8.4.3 Funding Classifications of Proposed Engineering Changes

The criteria for classifying engineering changes in terms of the impact on funding, and the funding requirements for each class, are described in the table below.

Funding Classification	Criteria	Funding Requirement
Class I	The changes to the operating characteristics or performance of the platform, equipment, system, or software • *will* have a significant impact on logistics support, training or maintenance support structure, and equipment or software policies • *cannot* be implemented with existing SMEF resources (funding and personnel), and • must be funded in accordance with Class I funding requirements.	The SMEF Commanding Officer must provide budgetary estimates and schedules with a Class I engineering change proposal when it is submitted for approval. **Note**: Assistant Commandant for Engineering and Logistics (CG-4) provides funding and guidance for the method of implementing the engineering change.
Class II	The changes to the operating characteristics or performance of the platform, equipment, system, or software • *will not* have a significant impact on logistics support, training or maintenance support structure, and equipment or software policies, and • *can* be implemented with existing SMEF resources.	The annual SMEF budget for anticipated Class II engineering changes should be adequate to implement Class II changes during the fiscal year.

Continued on next page

8.4 Validation Phase of the Engineering Change Process, Continued

8.4.4 Validation of Proposed Engineering Changes

Upon receipt of a classified engineering change request, the appropriate authority

- validates (approves/disapproves) the proposed engineering change for development, and
- if the proposed engineering change is approved, determines a source of funding (see 8.4.5 for the three sources of funding).

IMPORTANT: Engineering changes without funding support *cannot* be approved for development.

The authorities responsible for approving/disapproving proposed engineering changes for development, and the factors considered, are described in the table below.

Engineering Change Category	Validation Authority	Factors Considered
Platform engineering change	• Assistant Commandant for Engineering and Logistics (CG-4) • Assistant Commandant for Operations (CG-O), and/or • Assistant Commandant for Command, Control, Communications, Computers, and Information Technology (C4IT) Directorate (CG-6). **Note**: If the platform engineering change is *disapproved*, a notification with the reason for disapproval is sent to the initiator with an information copy to the ELC.	• Engineering, operational, and resource requirements • Impact on future operations

Continued on next page

8.4 Validation Phase of the Engineering Change Process, Continued

8.4.4
Validation of Proposed Engineering Changes (continued)

Engineering Change Category	Validation Authority	Factors Considered
System engineering change	ELC, MLC, or SMEF **Note**: If the system engineering change is *disapproved*, a notification with the reason for disapproval is sent to the initiator. The SMEF or designated Equipment Manager (EM) is responsible for sending an information copy to the ELC.	• Technical feasibility • Life cycle costs, and • Availability of funding **Note**: When funding is required from Headquarters, the ELC, MLC, or SMEF consults with Headquarters to determine the availability of funding.

8.4 Validation Phase of the Engineering Change Process, Continued

8.4.5 Funding Sources for Engineering Changes

Funding for engineering changes comes from one of three sources based on the total cost of the engineering change.

The three funding sources and the criteria for using funds from each source are described in the table below.

Funding Source	Total Cost Category	Criteria
Unit AFC 30	Low cost	The total cost (including design, materials, and installation) is less than, or equal to, the MLC-established AFC 30 Current Ship Maintenance Project (CSMP) funding threshold for the particular cutter class.
MLC AFC 42	Medium cost	The total cost (including design, materials, and installation) • is greater than the MLC-established AFC 30 CSMP funding threshold for the particular cutter class, and • does not exceed five percent of the affected cutter class annual AFC 45 standard support level (SSL).
Program Manager 3X/4X/ACI	High cost	The total cost (including design, materials, and installation) is greater than five percent of the affected cutter class annual AFC 45 SSL.

Reference: For information on Acquisition, Construction, and Improvements (AC&I) threshold levels, refer to the Financial Resource Management Manual (FRMM), COMDTINST M7100.3 (series).

8.5 Development and Deployment Phases of the Engineering Change Process

Introduction

This topic contains information on the development and deployment phases of the engineering change process, including

- preparation of a Platform/System Engineering Change Package
- submission of the package for a concurrent clearance review
- authorization of the engineering change for deployment
- installation of an engineering change prototype (if applicable)
- process for development and installation of an engineering change prototype, and
- documentation of the completion of an engineering change on the Engineering Change Approval Form (CGHQ-3379).

8.5.1 Preparation of an Engineering Change Package

When an engineering change is approved for development, the Engineering Logistics Center (ELC), Maintenance and Logistics Command (MLC), or Systems Management and Engineering Facility (SMEF) prepares a Platform/System Engineering Change Package.

Note: An Engineering Change Approval Form (CGHQ-3379) is included in the contents of the Engineering Change Package. See 8.5.6 for CGHQ-3379 completion requirements.

Reference: For a detailed description of the contents of an Engineering Change Package, refer to Chapter 041 of the Naval Engineering Manual, COMDTINST M9000.6 (series)

Engineering changes are developed from the perspectives of

- configuration management
- life cycle logistics support, and
- installation.

Continued on next page

8.5 Development and Deployment Phases of the Engineering Change Process, Continued

8.5.2 Concurrent Clearance Review of Engineering Changes

When the Platform/System Engineering Change Package is completed, the ELC, MLC, or SMEF submits the package for a concurrent clearance review.

The members of the concurrent clearance review team are identified in the table below.

If the Engineering Change Package was prepared for a …	Then the members of the concurrent clearance review team include …
platform change	• MLC • Commandant, Office of Naval Engineering (CG-45) for changes on floating units, or • Commandant, Office of Command, Control (C2), and Navigation Systems (CG-64) for changes on shore units, and • associated Operations (G-O) facility managers. **Note**: If the Platform Engineering Change Package is for an electronics engineering change, a SMEF is included on the concurrent clearance review team. **IMPORTANT**: If the development of a proposed platform engineering change leads to changes in cost or scope beyond the funding limitation, it must be returned to the Headquarters Configuration Control Board (CCB) for re-evaluation.
system engineering change developed by a SMEF for cutters or standard boats	• MLC (t), Electronics Division, or • MLC (v), Naval Engineering Division, and • ELC.
system engineering change developed by a SMEF for shore units	applicable command or program. **Example**: Changes to National Distress and Rescue System to comply with the Rescue 21 Program.
system engineering change developed by the ELC	MLC (t) or (v).

Continued on next page

8.5 Development and Deployment Phases of the Engineering Change Process, Continued

8.5.3 Authorization of an Engineering Change

Once concurrent clearance feedback issues are resolved, authorization for the engineering change is issued to the appropriate commands for deployment through the signed Engineering Change Approval Form (CGHQ-3379).

Note: Engineering Change Approval Form (CGHQ-3379) is available from

- Adobe Forms on the SWIII, and
- USCG Electronic Forms on CG Central.

The commands to whom the engineering change authorization is issued are identified in the table below.

If the engineering change is a …	Then the engineering change authorization is issued to the …
platform engineering change	ELC. **Note**: The authorized local CCB (LCCB) • approves the engineering change for action, and • forwards a copy of the approval to the ELC to use as a basis for implementing the engineering change.
system engineering change	• ELC • MLC, or • SMEF.

Continued on next page

8.5 Development and Deployment Phases of the Engineering Change Process, Continued

8.5.4 Installation of an Engineering Change Prototype

An engineering change prototype is a full-scale installation used to

- evaluate the usefulness and effectiveness of a platform or system engineering change, and/or
- develop or modify the engineering change installation specifications.

See 8.5.5 for a summary of the prototype development and installation process.

IMPORTANT: The development and installation of an engineering change prototype should be completed during the development phase of the engineering change process.

8.5.5 Prototype Development and Installation Process

The prototype development and installation process is described in the table below.

Stage	Description
1	The servicing MLC • receives an ECR that includes a request for an engineering change prototype, and • forwards the ECR to the responsible – ELC for prototypes on floating units, and – SMEF for prototypes on shore units.
2	The ELC or SMEF consults with the initiator of the request to evaluate the technical impact of the prototype.
3	If appropriate, the ELC or SMEF issues a prototype authorization letter to the applicable commands for approval.

Continued on next page

8.5 Development and Deployment Phases of the Engineering Change Process, Continued

8.5.5
Prototype Development and Installation Process (continued)

Stage	Description
4	When the prototype request is approved, the SMEF or designated Equipment Manager (EM) • develops a prototype evaluation plan, and • forwards the plan to the unit on which the prototype will be installed.
5	The applicable unit • installs the prototype • completes the prototype evaluation plan, and • returns the completed prototype evaluation plan to the ELC with a copy to the SMEF or EM and applicable commands.
6	The prototype installation is approved/disapproved by the • ELC for prototypes on floating units, and • SMEF for prototypes on shore units. **Note**: Disapproved prototypes are removed. The resource that funded the installation is responsible for funding its removal.
7	Upon approval of the prototype installation *and* final approval and authorization of the associated engineering change, the prototype is • upgraded to the approved installation configuration (if necessary), and • considered as a permanent installation.

Continued on next page

8.5 Development and Deployment Phases of the Engineering Change Process, Continued

8.5.6 Documenting Completion of an Engineering Change on Form CGHQ-3379

Upon completion of an engineering change, the unit

- enters the applicable information in the "Completion" section of the Engineering Change Approval Form (CGHQ-3379)
- sends copies of the completed form to the
  - ELC, and
  - servicing MLC, and
- retains a copy of the form in its files.

If specified by the engineering change, a copy of the Configuration Change Form (OPNAV 4790/CK) must be submitted *with* the Engineering Change Approval Form (CGHQ-3379) for units supported by

- Management Information for Configuration and Allowances (MICA), or
- Combined Allowance for Logistics and Maintenance (CALMS).

The Configuration Change Form (OPNAV 4790/CK) may be downloaded from the ELC(01) Web site CG Central.

8.6 Engineering Change Communication and Reporting Requirements

Introduction

This topic contains information on communication and reporting of engineering changes, including

- authorization for direct interactions between Systems Management and Engineering Facilities (SMEFs) and units
- requirements for
  - dissemination of technical information
  - distribution of Field Change Bulletins, and
  - dissemination of SMEF advisories
- maintenance of engineering change records, and
- SMEF annual reporting requirements.

8.6.1 Authorization for Direct Interactions Between SMEFs and Units

Maintenance and Logistics Commands (MLCs) and district commanders may authorize direct interactions between Systems Management and Engineering Facilities (SMEFs) and units on a case-by-case basis.

The purpose of direct interactions between SMEFs and units is to

- coordinate certain engineering services in order to provide technical advice
- assist Headquarters acquisition managers with
  - specification and proposal reviews, and
  - preparation and review of proposed technical approaches
- assist the Inventory Control Point in managing logistics support for equipment, and
- provide technical advice or assistance for SMEF-managed equipment
  - for depot level repair, project engineering, or training activities, or
  - to MLCs or district/section offices, other government agencies, or foreign governments when specifically authorized by the Commandant.

Continued on next page

8.6 Engineering Change Communication and Reporting Requirements, Continued

8.6.2 Technical Information Dissemination Requirements

System Managers may disseminate technical information to the field concerning support of the equipment or software for which they are responsible.

The requirements for disseminating directive and non-directive technical information are described in the table below.

Technical Information	Requirement
Directive	Submit the information to Assistant Commandant, Command, Control, Communications, Computers, and Information Technology (C4IT) Directorate (CG-6) for promulgation under the Coast Guard directives system.
Non-directive	• Submit the information to Commandant (CG-64) to be disseminated via the Electronic Systems Information Page at CG Central, *or* • disseminate the information through a SMEF advisory (see 8.6.4 for more detail).

Continued on next page

8.6 Engineering Change Communication and Reporting Requirements, Continued

8.6.3 Field Change Bulletin Distribution Requirements

Field Change Bulletins (FCBs) document approved changes to a configuration baseline.

See 5.4 Configuration Management for detail on configuration baselines.

The SMEF is responsible for

- developing FCBs, and
- coordinating the printing and distribution of FCBs with the Equipment Manager.

Note: The cognizant facility commanding officer has final signature approval for FCBs.

See 7.4.1 Coast Guard-Initiated Field Changes for more detail on FCB distribution requirements, as well as an example of an FCB.

8.6.4 SMEF Advisory Dissemination Requirements

SMEF advisories (or Software Change Notices) document software releases and changes to a configuration baseline. These notices are used to disseminate information (directive or non-directive) rapidly.

SMEF advisories are usually followed up by

- disseminating directive or non-directive information to the field (see 8.6.2 for more detail), or
- distributing a Field Change Bulletin (see 8.6.3 for more detail).

Note: The cognizant facility commanding officer has final approval authority for SMEF advisories.

Continued on next page

8.6 Engineering Change Communication and Reporting Requirements, Continued

8.6.5 Engineering Change Record Maintenance Requirements

The responsibilities and requirements for maintaining records of engineering changes are described in the table below.

Who is Responsible	Requirements
Engineering Logistics Center (ELC)	Maintains a • master engineering change file for all cutter and boat classes containing original signed copies of all issued engineering changes, and • case files of engineering change proposals containing all relevant documents.
Each unit	• Maintains a file of pending and completed engineering changes as part of the general engineering files (with appropriate entries in machinery history, hull history, and so forth) in accordance with Chapter 090, Naval Engineering Manual, COMDTINST M9000.6 (series), and • updates the engineering change database. **Note**: Vessels with CMPlus software must update the engineering database in accordance with CMPlus user guide.

Continued on next page

8.6 Engineering Change Communication and Reporting Requirements, Continued

8.6.6 SMEF Annual Reporting Requirements

Each SMEF must submit an annual resource report to Commandant (CG-64) to be received in Headquarters by August 15th of the current year.

The title of the report must describe the equipment and/or systems managed by the SMEF.

The reporting requirements for the two sections of the report are described in the table below.

Section	Reporting Requirements
1	• Hours expended by system management and engineering personnel, and • SMEF funds expended.
2	The following configuration management activities: • progress in acquiring data defining the configuration baseline (actual and anticipated completion dates) • configuration changes being processed, and • management problems requiring assistance from Headquarters. See 5.4 Configuration Management for SMEF configuration management responsibilities.

9.0 Test Equipment Life Cycle Management

Table of Contents

9.0 Test Equipment Life Cycle Management

Overview

9.01 Scope

This part covers

- definitions for the common terms and priority codes associated with electronic test equipment
- scope and responsibilities of establishing, administering, and ensuring compliance for the electronic test equipment program
- test equipment allowances
- policies, resources, and authorities for the acquisition and procurement of standardized test equipment
- type of test equipment maintenance, calibration, and/or repair that is performed at each maintenance level
- calibration guidelines and types of common repair and calibration facilities for electronic test equipment
- funding for test equipment calibration and repair, including guidelines for utilizing General Services Administration (GSA) discounts and non-warranty repair and calibration funds, and
- authorization and guidelines for disposing of test equipment.

9.02 References

Additional information on test equipment life cycle management may be found in the following resources.

Resource	Description	Location/Link
NAVSEA ST000-AA-IDX-010-TEI	Test Equipment Index	---
Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series)	Avionics test equipment policy	---
Ordnance Manual, COMDTINST M8000.2 (series)	Naval Ordnance (NAVORD) funding from the Navy for Navy-Owned Weapons Systems	---

Continued on next page

Overview, Continued

9.02
References (continued)

Resource	Description	Location/Link
Support of Navy-Type, Navy-Owned Electronics Equipment, COMDTINST M7100.2 (series)	The process for requesting funds for Navy support	CG Central
Navy Instrument Calibration Procedures (NICP) publications	NICP publications, including Calibration Procedures and Calibration Intervals	---
Property Management Manual, COMDTINST M4500.5 (series)	The disposition of electronic test equipment and excess property, Survey Boards, and the preparation of survey reports and excess property reports	CG Central

9.03
Contents

This part covers the following subjects.

9.1 Electronic Test Equipment Terms and Definitions

Introduction

This topic contains electronic test equipment terms and definitions, including

- definitions of the four types of test equipment and accessory parts
- common test equipment-related terms, and
- the classification of priority codes used to identify the preference for different test equipment models.

9.1.1 Definition: Electronic Test Equipment

Electronic test equipment is equipment used to measure, compare, analyze, or adjust the electrical and electronic parameters, signals, and waveforms of electronic equipment.

9.1.2 Types of Electronic Test Equipment and Accessory Parts

The types of electronic test equipment and accessory parts are defined in the table below.

Type	Definition
General Purpose Electronic Test Equipment (GPETE)	Test equipment that • measures or generates a range of parameters of electronic functions common to two or more equipment, or • generates a range of parameters or electronic functions common to two or more equipment or systems of basically different design.
Specific Electronic Test Equipment (SPETE)	Test equipment for use with a specific equipment or system, excluding medical equipment. **Note**: SPETE may be • of special design, or • specially modified GPETE.
Calibration Test Equipment	Calibration test equipment is equipment used solely to calibrate GPETE or SPETE.

Continued on next page

9.1 Electronic Test Equipment Terms and Definitions, Continued

9.1.2 Types of Electronic Test Equipment and Accessory Parts (continued)

Type	Definition
Avionics Test Equipment	Special purpose test equipment that is designed for, and used to, support aircraft avionics only.
Accessory Parts	Items that are used in conjunction with GPETE or SPETE to facilitate ease of measurements. **Examples**: Printed circuit board extenders, special cable connectors, and cable extenders.

9.1.3 Definition: Traceable Standards

A ***traceable standard*** is a calibration standard that is traceable back to the established and accepted National Institute of Science and Technology (NIST) standard.

9.1.4 Definition: Original Equipment Manufacturer (OEM)

The ***Original Equipment Manufacturer (OEM)*** is the original manufacturer of an item.

Note: Support and test equipment requirements are usually contained in the OEM's equipment technical manual.

9.1.5 Definition: NT/NO

Navy-Type/Navy- Owned (NT/NO) equipment is standard Navy type equipment that is

- procured by the Navy, or with Navy funds, and
- used by the Coast Guard in support of Navy mission requirements.

9.1.6 Definition: Sub Category (SCAT) Code

Sub Category (SCAT) codes are used in the Test Equipment Index to group different models of GPETE that perform the same function.

Reference: For more detail on the Test Equipment Index, refer to NAVSEA ST000-AA-IDX-010-TEI.

Continued on next page

9.1 Electronic Test Equipment Terms and Definitions,
Continued

9.1.7 Test Equipment Priority Codes

The priority code is a three-character code used to identify the order of preference for different test equipment models within a SCAT code on the Test Equipment Index.

Test equipment model priority codes are defined in the table below.

Priority Code	Classification	Definition
006–021	Standard	The most advanced and satisfactory equipment approved for service use. **Note**: Priority codes 013 or 014 indicate that the applicable model is a *standard* item.
022–037	Substitute Standard	Equipment that is approved for service use, but does not have the satisfactory military characteristics to qualify as “Standard” equipment.
038–071	Limited Standard	Equipment that is approved for service use, does not have the satisfactory military characteristics to qualify as “Standard” or “Substitute Standard” equipment, but is a usable substitute. **Note**: Supply regulations do not allow repair of items with priority greater than 038. However, this may be superceded by mission requirements.
072–094	Obsolescent	Equipment that no longer has satisfactory military characteristics but must be continued in service until improved replacements are available. **Note**: Units should request replacement equipment through their cognizant Maintenance and Logistics Command (MLC).
095–099	Obsolete	Equipment that has been declared unsuitable for their original military purpose. **Note**: Units should request replacement equipment through their cognizant MLC. Disposal of obsolete equipment is expedited.

9.2 Test Equipment Program Administration and Compliance

Introduction

This topic contains information on test equipment program administration and compliance, including

- the scope, process, and responsibilities of establishing and administering the electronic test equipment program, and
- criteria and responsibilities for the electronic test equipment quality assurance (QA) program.

9.2.1 Electronic Test Equipment Program Process Summary

The Maintenance and Logistics Command (MLC) is the delegated authority and is responsible for establishing and administering the electronic test equipment program.

A summary of the electronic test equipment program process is described in the table below.

Stage	Description	See
1	The MLC monitors the electronic equipment in the field to determine the test equipment allowances for each unit. **Note**: Units needing additional test equipment must submit a request that justifies the need to the MLC.	9.3 Test Equipment Allowances
2	The MLC secures funding and procures and distributes the test equipment.	9.4 Test Equipment Acquisition and Procurement
3	The MLC establishes and monitors a quality assurance (QA) program to • maintain test equipment • identify and monitor test equipment calibration facilities, and • establish calibration schedules.	9.2.3 for more detail

Continued on next page

9.2 Test Equipment Program Administration and Compliance, Continued

9.2.1
Electronic Test Equipment Program Process Summary (continued)

Stage	Description	See
4	The area units, district units, and Headquarters comply with the test equipment program and use it as a guide to • perform regular maintenance, testing, and reporting, and • submit test equipment to depot facilities – to be calibrated according to the scheduled calibration intervals, and – for repair as needed.	9.5 Test Equipment Maintenance and Repair
5	The MLC • approves disposal of electronic test equipment as needed, and • procures replacement equipment.	9.6 Test Equipment Disposition

Continued on next page

9.2 Test Equipment Program Administration and Compliance, Continued

9.2.2 MLC Test Equipment Program Scope and Exceptions

The MLC test equipment program must address the following areas for all electronic test equipment:

- acquisition, issue, and replacement
- repair and calibration, and
- disposal.

Exceptions: The equipment or circumstances explained in the table below are not included in the MLC test equipment program.

Exception	Explanation
Avionics procurement and control	MLCs are responsible for the inventory, maintenance, and calibration of avionics test equipment. Commandant (CG-41) is responsible for procuring and controlling avionics test equipment. **Reference**: For more detail on avionics test equipment policy, refer to the Aeronautical Engineering Maintenance Management Manual, COMDTINST M13020.1 (series).
Research and Development (R&D) Center	Commandant (CG-66) and the Coast Guard R&D Center exercise complete control over the acquisition, maintenance, calibration and disposal of the electronic test equipment used in the R&D program.
New equipment or systems	The Acquisition Manager for a new equipment or system automatically • provides Special Purpose Electronic Test Equipment (SPETE) to all units having or supporting that equipment or system, and • informs both MLCs. MLCs are responsible for the inventory, maintenance, and calibration of new equipment or systems.

Continued on next page

9.2 Test Equipment Program Administration and Compliance, Continued

9.2.2
MLC Test Equipment Program Scope and Exceptions (continued)

Exception	Explanation
Newly commissioned units	The Acquisition Manager for a newly commissioned platform automatically • provides SPETE and General Purpose Test Equipment (GPETE) to the newly commissioned unit, and • informs the appropriate MLC.
New projects	The Project Manager automatically provides the SPETE and GPETE required due to changes, replacements, removals, or upgrades of equipment, systems, or Coast Guard Planned Maintenance System (CGPMS) procedures for those equipment or systems.
Navy-owned weapons equipment	Test equipment required to maintain Navy-Owned weapons systems are supported with Naval Ordnance (NAVORD) funding received by the Navy. **Reference**: For more information about NAVORD funding for Navy-Owned weapons systems, refer to the Ordnance Manual, COMDTINST M8000.2 (series).

9.2.3 Electronic Test Equipment QA Program Criteria

The MLC must establish a QA program for electronic test equipment to ensure that calibration and repair services are meeting the needs of the service at a reasonable cost and in a timely manner. The factors that must be considered are listed below.

- Calibration interval is appropriate to ensure adequate test equipment availability for current environment and planned use.
- Calibration and repair facility performance meets requirements for traceable standards, timely service, appropriate labeling, and so on.
- Calibration schedule is being met or deviation from the schedule is within MLC established standards.

Continued on next page

9.2 Test Equipment Program Administration and Compliance, Continued

9.2.4 Electronic Test Equipment QA Program Responsibilities

Electronic test equipment QA program responsibilities are described in the table below.

Role	Responsibilities
MLC	• Establishes a QA program for electronic test equipment. • Makes improvements to the MLC QA program based on feedback from the Electronics Support Units (ESUs) and Electronics Support Detachments (ESDs), as appropriate.
Headquarters	If not participating in the MLC QA program, Headquarters must establish a local QA program using the MLC QA program as a guide.
• ESUs • ESDs	Uses the MLC QA program and provides feedback to the MLC for improvements.
• Area Units • District Units	• Complies with the MLC test equipment QA program. • Reports discrepancies as required or appropriate.

9.3 Test Equipment Allowances

Introduction

This topic contains information on test equipment allowances, including

- goal for the test equipment basic allowance
- resources the Maintenance and Logistics Command (MLC) uses to determine test equipment basic allowances issued by the Coast Guard
- basis for the Navy-Type/Navy-Owned (NT/NO) test equipment basic allowance, and
- information that units must submit when requesting allowance changes.

9.3.1 Goal for Test Equipment Basic Allowance

The goal when establishing an electronic test equipment basic allowance is to balance

- keeping the electronic test equipment at the level needed to support the installed electronic equipment, and
- minimizing the number of different "types" of test equipment in the unit inventory to ensure that the test instruments can be adequately maintained.

Note: When possible, the Coast Guard Planned Maintenance System (CGPMS) maintenance procedures are written so that the procedures can be performed on a generic type of General Purpose Electronic Test Equipment (GPETE), regardless of the manufacturer or model number of the test equipment.

Continued on next page

9.3 Test Equipment Allowances, Continued

9.3.2 Resources for Determining the Coast Guard Test Equipment Basic Allowance

The roles, responsibilities, and resources available for determining the basic allowance for electronic test equipment are described in the table below.

Electronic Test Equipment Location	Resources for Determining Basic Allowance
• Shore units • Floating units	The Maintenance and Logistics Command (MLC) uses the following resources to determine the basic allowance for that unit: • the electronic equipment listed in the configuration record for the unit, and • the maintenance philosophy described in the Equipment/System Integrated Logistics Support Plan (EILSP) for each type of equipment. **Note**: MLCs make changes to units' test equipment allowances as the appropriate Headquarter units' Program/Project Managers establish new requirements. See 9.5 Test Equipment Maintenance and Repair for detail on the EILSP maintenance philosophy.
Headquarters units	Headquarters units are responsible for determining their own test equipment requirements, and establishing a test equipment program commensurate with these needs, based on the maintenance philosophy described in the EILSP for each type of equipment being supported. **Note**: The CGPMS manager can provide a unit-unique test equipment list based on installed equipment to assist in decision-making/outfitting.

Continued on next page

9.3 Test Equipment Allowances, Continued

9.3.3 NT/NO Test Equipment Basic Allowance

The Navy provides Special Purpose Electronic Test Equipment (SPETE) to aid the maintenance and support of Navy Type/Navy Owned (NT/NO) equipment used by the Coast Guard for Navy mission requirements. NT/NO test equipment is distributed directly by the Navy or through the MLC, based on the

- type of NT/NO equipment installed, and
- Coast Guard maintenance and support philosophy for that equipment.

9.3.4 Requesting Allowance Changes

Operating units must submit requests for allowance changes to MLC(t) via the operational chain of command with the following information:

- the intended use of the requested test equipment
- what equipment it is to support
- what tests are to be performed
- what ranges and tolerances are required, and
- any other information that will justify obtaining the requested test equipment.

Note: When there is a change to a unit's test equipment allowance, the CGPMS Manager must be notified.

9.4 Test Equipment Acquisition and Procurement

Introduction

This topic contains information on test equipment acquisition and procurement, including

- who is authorized to acquire electronic test equipment
- why it is important to standardize test equipment
- information included in the Test Equipment Index
- inventory reporting requirements for electronic test equipment
- who is responsible for notifying the Coast Guard Planned Maintenance System (CGPMS) Manager of electronic test equipment acquisitions, and
- the accounting and funding policies for procuring and calibrating test equipment.

9.4.1 Authorized Agents for Electronic Test Equipment Acquisition

Maintenance and Logistics Commands (MLCs) are the authorized agents for the acquisition of replacement electronic test equipment. District and area units must not acquire electronic test equipment without MLC approval.

Exceptions:

- Headquarters units may acquire electronic test equipment, as authorized by their program sponsor, but must inform the MLC and the Coast Guard Planned Maintenance System (CGPMS) Manager of the acquisition.
- MLCs may delegate acquisition authority to district and area units for specific categories of electronic test equipment, for example, hand held voltage, resistance, and/or current meters.

Continued on next page

9.4 Test Equipment Acquisition and Procurement, Continued

9.4.2 Importance of Procuring Standardized Test Equipment

The major goal when evaluating test equipment for procurement, particularly commercial off-the-shelf equipment, is to minimize support and calibration costs and downtime. The best way to meet this goal is, when possible, to procure standardized equipment that is the same make and model as that procured by

- Coast Guard MLCs, and
- other government agencies (OGAs).

Rationale: Most test equipment procured by OGAs is included in their support and calibration programs. OGA support and calibration programs are usually available to the Coast Guard.

See 9.1 Electronic Test Equipment Terms and Definitions for priority codes that identify the order of preference for different test equipment models.

9.4.3 Test Equipment Index

The Test Equipment Index is an excellent guide for identifying

- standard test equipment
- equipment specifications, commercial equivalents
- national stock numbers (NSNs), and
- acceptable substitutes for equipment currently in use throughout the Coast Guard.

Note: The Test Equipment Index is provided as standard distribution to MLCs and Headquarters units.

Reference: For more detail on the Test Equipment Index, refer to NAVSEA ST000-AA-IDX-010-TEI (CD-ROM).

Continued on next page

9.4 Test Equipment Acquisition and Procurement, Continued

9.4.4 Electronic Test Equipment Inventory Reporting Requirements

All units, including Headquarters, are responsible for reporting all electronic test equipment in the appropriate system as described in the table below.

Note: Accurate reporting ensures an accurate inventory, which is used to determine the following requirements and support for electronic test equipment:
- initial issue and replacement requirements
- repair and calibration requirements
- appropriate support and accountability, and
- disposal requirements.

System	Reporting Requirements	References
Fleet Logistics System (FLS)	Enter all electronic test equipment.	• Supply Policy & Procedures Manual (SPPM), COMDTINST M4400.19 (series) • Policy and Procedures Manual (PPM), or • CG Central

Continued on next page

9.4 Test Equipment Acquisition and Procurement, Continued

9.4.5 Notification to CGPMS of Test Equipment Acquisitions

Acquisitions of electronic test equipment must be reported to the CGPMS as described in the table below.

Type of Acquisition	Who Is Responsible for Notifying the CGPMS Manager
New acquisition	Program Manager
New replacement acquisitions	MLC

9.4.6 Test Equipment Cost Accountability

Per the Central Chief Financial Officer (CFO) Act of 1990, configuration record items are recorded in Oracle Assets under its own Minor Category. Any test equipment that costs as much or more that the capitalization threshold of $25K is capitalized and recorded separately in its own Minor Category.

9.4.7 Test Equipment Funding

Funds to procure and calibrate test equipment are authorized by the cognizant MLC policy. Depending upon the purpose and scope of use of the test equipment, funds may be either

- AFC 30, or
- AFC 42.

See 5.2 Equipment Acquisition and Procurement for descriptions of Allotment Fund Codes (AFCs).

9.5 Test Equipment Maintenance and Repair

Introduction

This topic contains information on test equipment maintenance and repair, including

- a description of the information included in the Equipment/System Integrated Logistics Support Plan (EILSP)
- the applications of electronic test equipment
- test equipment maintenance performed at the depot, intermediate, and organizational levels
- resources, guidelines, and responsibilities for establishing and monitoring calibration intervals
- guidelines for using calibration labels and tags on test equipment
- the types of common repair and calibration facilities for electronic test equipment
- using General Services Administration (GSA) discounts and non-warranty repair and calibration funds for qualifying test equipment to reduce calibration and repair costs, and
- Navy-Type/Navy-Owned (NT/NO) test equipment reporting that is required to receive Navy support funds and calibration services.

9.5.1 EILSP Maintenance Philosophy

The Equipment/System Integrated Logistics Support Plan (EILSP), which the Equipment/Systems Manager creates at the time a piece of electronic equipment is procured

- specifies the maintenance philosophy and maintenance requirements of the electronic equipment, and
- identifies the test equipment needed to support the electronic equipment by Sub Category (SCAT) code, or the commercial equipment specified in the technical manual.

Reference: For more detail on SCAT codes in the Test Equipment Index, refer to NAVSEA ST000-AA-IDX-010-TEI (CD-ROM).

Continued on next page

9.5 Test Equipment Maintenance and Repair, Continued

9.5.2 Application of Electronic Test Equipment

The application of electronic test equipment is determined by the configuration of the individual test instrument.

Number of Functions	Examples
One function	• Single range voltmeter. • Electrical dummy load.
Multifunction	A test set can provide various functions for: • stimuli (for example, generate signals of various frequencies, currents, voltages, and so on), and • measurements (for example, volt, ohm, ampere, and so on).

9.5.3 Depot Level Maintenance for Test Equipment

Corrective repair and calibration is performed at the depot level. Depots for test equipment may be

- commercial vendors
- manufacturer representatives
- Department of Defense (DoD) Calibration Facilities (CALFAC), or
- other government agency (OGA) facilities as designated by the Maintenance and Logistics Command (MLC).

9.5.4 Intermediate Level Maintenance for Test Equipment

No intermediate level maintenance or repair is planned. However, the MLCs may designate properly staffed and equipped electronics shops as intermediate level maintenance facilities.

Continued on next page

9.5 Test Equipment Maintenance and Repair, Continued

9.5.5 Organizational Level Maintenance for Test Equipment

Organizational level maintenance is generally limited to routine cleaning and minor maintenance that does not require the re-calibration of the test equipment. Examples of routine maintenance activities and guidelines are described in the table below.

IMPORTANT: Due to critical calibration and accuracy requirements, internal maintenance must *not* be done at the unit or organizational level unless
- it is specified in the technical manual, and
- the unit has qualified technicians.

Routine Maintenance Activities	Guidelines
Proper handling and storage	Ensure proper handling and storage of all test equipment to prolong serviceability, calibration reliability, and accuracy.
Cleaning	• Maintain the outer case to keep it clean from grease, oil, dust, dirt, rust and other foreign matter. • Maintain the equipment chassis to keep it clean from dust, dirt and other foreign matter.
Inspections	• Inspect and ensure that all accessories are available and in working order. • Inspect gaskets and replace as necessary.
Replace parts as needed	• Replace fuses and lamps as necessary. • Replace broken or missing knobs, screws, handles, faceplates, and so on.
Monitor calibration	Resolve all outages or suspected “out-of-calibration” conditions with the proper authority in accordance with current MLC instructions.

Continued on next page

9.5 Test Equipment Maintenance and Repair, Continued

9.5.5
Organizational Level Maintenance for Test Equipment (continued)

Routine Maintenance Activities	Guidelines
Adhere to calibration intervals	Monitor the test equipment program's calibration interval schedule to ensure that test equipment is sent to the proper depot level maintenance facility for calibration and/or repairs. **Note**: When sending test equipment to a calibration facility, include all accessories (for example, probes, cables, extender cards, and so on) for that specific piece of test equipment.
Inspect and check test equipment received from a CALFAC	CALFACs calibrate and repair electronic test equipment. Use the guidelines below to inspect and check test equipment received from a CALFAC. • Inspect for visual discrepancies. • Check for proper operation. • Compare measurements with similar test equipment to easily detect major problems. • Note discrepancies and report to the MLC via the cognizant Electronics Support Unit (ESU)/Electronics Support Detachment (ESD).

Continued on next page

9.5 Test Equipment Maintenance and Repair, Continued

9.5.6 Resources for Establishing Calibration Interval Standards

Standards and test equipment used for quantitative measurement should be calibrated to a level of accuracy commensurate with their use. Resources for minimum and maximum calibration intervals are provided in the table below.

Note: Calibration should be performed at intervals established on the basis of stability, purpose, and degree of usage. For example,

- intervals should be shortened when the results of preceding calibrations were inaccurate, or
- intervals may be lengthened when
  - the results of previous calibrations and usage indicate that an extended calibration interval will not adversely affect the accuracy of the system, or
  - resources are inadequate to calibrate at the recommended intervals.

Resource	Description/When to Use
• Navy Instrument Calibration Procedures (NICP), or • Navy Local Calibration Procedures (NLCP)	These standards take precedence, when available. Provides the basic calibration intervals for most general-purpose electronic test equipment. These intervals closely follow the average of the calibration intervals used by the other military services.
Calibration instructions and data obtained from • the technical manual, and/or • commercial sources	Use when NICPs are not available.

Continued on next page

9.5 Test Equipment Maintenance and Repair, Continued

9.5.6
Resources for Establishing Calibration Interval Standards (continued)

Resource	Description/When to Use
MLC Instruction	In many instances, the Coast Guard will not be able to calibrate as specified in the NICP/NLCP due to availability of replacement equipment, operational schedules, and labor resource limitations. The MLC determines and publishes an MLC instruction indicating the maximum intervals between calibrations under normal conditions. If the MLC interval is longer than CALFAC or other intervals, use the MLC interval as the "not-to-exceed" limit. See 9.5.7 for details.

9.5.7 MLC Calibration Intervals: Responsibilities

The responsibilities associated with establishing the MLC calibration intervals for electronic test equipment are described in the table below.

Who is Responsible	Description
All MLCs in collaboration	Collaborate to develop and maintain a Coast Guard calibration interval standard guide based on the • manufacturer's recommended practice • current industry and DoD practices • operating environment, and • equipment condition.
Individual MLCs	• Develop a suitable program, and • publish the necessary instructions by which the electronic test equipment can be repaired and calibrated.

Continued on next page

9.5 Test Equipment Maintenance and Repair, Continued

9.5.7
MLC Calibration Intervals: Responsibilities (continued)

Who is Responsible	Description
MLC commander or Headquarters unit	Determine specific intervals and calibration procedures based on • usage • previous performance • funding • methods • calibration equipment • calibration tolerances • manufacturer recommendations, and • labor resource limitations.
Electronics personnel	Review and become familiar with the procedures set forth by the MLC.

9.5.8 Calibration Program Monitoring Responsibilities

The responsibilities associated with monitoring the calibration program are described in the table below.

Who is Responsible	Description
Each MLC	In accordance with its policies, monitors the calibration program to ensure General Purpose Electronic Test Equipment (GPETE) and Special Purpose Electronic Test Equipment (SPETE) are being calibrated in accordance with the schedule and promulgated instructions. MLCs randomly select and inspect units to ensure compliance with the calibration program guidelines. If a unit is not in compliance with the calibration program, the MLC notifies the Operational Commander.
Unit's Electronics Material Officer (EMO)	Monitors the calibration program at the unit to • ensure compliance with MLC guidance, and • communicate unresolved discrepancies to their MLC.

Continued on next page

9.5 Test Equipment Maintenance and Repair, Continued

9.5.8
Calibration Program Monitoring Responsibilities (continued)

Who is Responsible	Description
Contracting Officer Technical Representative (COTR)	The Contracting Officer's Technical Representative (COTR) must ensure that calibration requirements and provisions are contained in the contract Statement of Work (SOW) as appropriate. Contract maintenance facilities and personnel must comply with the terms of the governing contract.

9.5.9 Calibration Labels and Tags

Each item of test equipment must have a tag or label attached that denotes the

- calibration status of the instrument
- calibrating facility, and
- date last calibrated.

IMPORTANT:
- Out of calibration test equipment must be tagged as Out-of-Commission (OOC) and must not be used.
- Do not calibrate test equipment that is marked as excess and pending disposal.

Note: The tag or label will differ from area to area depending on whether the instrument was calibrated by the factory, commercial facility, or other military facility.

Continued on next page

9.5 Test Equipment Maintenance and Repair, Continued

9.5.10 Common Repair and Calibration Facilities for Electronic Test Equipment

Each MLC is responsible for

- ensuring the repair and calibration of Coast Guard electronic test equipment, and
- specifying or acquiring the repair and calibration facilities most suited for its needs.

The most common repair and calibration facilities throughout the Coast Guard are described in the table below.

Type of Repair and Calibration Facility	Description
Factory (warranty and non-warranty)	Repairs and calibration of commercial electronic test equipment that are completed by • the factory, or • an Original Equipment Manufacturer (OEM) authorized repair facility. See 9.5.11 for more detail.
Commercial Facility	Electronic test equipment is repaired and calibrated by a commercial facility that uses standards whose calibration is certified as being traceable to the national standard.
Other Military Services	The Coast Guard uses the repair facilities of other military services extensively by negotiating an inter-service support agreement with the service concerned. The prime sources used are the • Naval Calibration Facilities, and • Air Force Precision Measurement Equipment Laboratories (PMEL).

Continued on next page

9.5 Test Equipment Maintenance and Repair, Continued

9.5.11 GSA Discounts and Non-Warranty Repair and Calibration Fund

Program Managers must inform MLCs and units of the correct warranty procedures for test equipment purchased under General Services Administration (GSA) contracts.

GSA Feature	Guidelines
Discount	Consult GSA schedules for details on service discounts for non-warranty repair or calibrations available from several test equipment manufacturers.
Non-warranty repair and calibration fund	MLC commanders and commanding officers of Headquarters units • may be able to reduce the costs of repairing and calibrating qualified test equipment by using a company's GSA non-warranty repair and calibration funds, and • should contact the nearest company representatives to determine – local availability – policy, and – procedures for using the GSA repair and calibration funds. **About the GSA Funds**: • Every time a government agency purchases a piece of electronics equipment from participating companies using the GSA schedules, a percentage of the GSA catalog list price for that product is credited to a non-warranty repair and calibration fund maintained by the individual company. • Any government agency can use the fund to repair and calibrate that company's instruments, regardless of whether the piece of equipment has been purchased on a GSA contract. • All equipment of the particular manufacturer qualifies. **Note**: Any policies and procedures adopted for use of the fund should be incorporated into applicable test equipment maintenance doctrine.

Continued on next page

9.5 Test Equipment Maintenance and Repair, Continued

9.5.12 NT/NO Test Equipment Required Reporting to Receive Navy Funds

The MLC manages calibration and maintenance support for NT/NO test equipment using Navy funds. To ensure funding for Navy support, the unit must complete the required reporting for NT/NO equipment as described in the table below.

Reference: For the process for requesting funds for Navy support, refer to Support of Navy-Type/Navy-Owned Electronics Equipment, COMDTINST M7100.2 (series).

Required Reporting	Purpose
NT/NO test equipment must be entered in the unit's • Configuration record, and • Navy Weapons System File (WSF).	Required to obtain Navy support funding and calibration services from Commandant (CG-64) or MLC.
A Ship's Configuration Change Form (CCF) OPNAV 4790CK	Reports NT/NO equipment to the configuration data manager at the Engineering Logistics Center (ELC).

9.6 Test Equipment Disposition

Introduction

This topic contains information on test equipment disposition, including

- guidelines for test equipment that is excess and pending disposal
- authorization requirements for the disposal of electronic test equipment, and
- where to find disposition procedures for electronic test equipment.

9.6.1 Excess Test Equipment

Clearly mark and do not calibrate test equipment that is excess and pending disposal.

9.6.2 MLC Authority for Disposition of Electronic Test Equipment

Maintenance and Logistics Commands (MLCs) are the authorized agents for the disposal of electronic test equipment. Units must comply with MLC requirements for test equipment disposition, as described in the table below.

Unit	MLC Requirements
• District Units • Area Units	Must obtain cognizant MLC approval to dispose of electronic test equipment.
Headquarters	• May identify electronic test equipment as excess as authorized by their program sponsor. • Must inform the MLCs of excess test equipment to maximize reuse. • Must obtain MLC approval to dispose of General Purpose Electronic Test Equipment (GPETE).

9.6.3 Test Equipment Disposition Procedures

The Property Management Manual provides procedures for

- the disposition of electronic test equipment
- Survey Boards
- disposing of excess property, and
- preparing survey and excess property reports.

Reference: For more information, refer to the Property Management Manual, COMDTINST M4500.5 (series).

10.0 Appendices

Table of Contents

10.0 Appendices

Overview

10.01 Scope

This part contains the following supplemental information that may be useful to electronics technicians, supervisors, and managers:

- acronyms used throughout this manual
- forms and publications used in support of electronics and by electronics technicians
- training responsibilities, requirements, and other training related information.

10.02 Contents

This part contains the following appendices.

10-A Acronyms

10-A.1 Electronics Manual Acronyms

Introduction

This appendix contains an alphabetical listing of acronyms used throughout this manual.

10-A.1.1 Acronyms: A

Acronym	Description
A_O	Operational Availability
AC&I	Acquisition, Construction, and Improvement
ACFC	AC Flash Controller
ACMS	• Aid Control Monitor System • Aircraft Computerized Maintenance System
ADF	Automatic Direction Finder
ADP	Acquisition Development Plan
AEL	Allowance Equipage List
AF	Audio Frequency
AFC	Allotment Fund Code
AIM	Accountable Item Management
AIS	Automated Identification System
ALDIST	Electronics Advisory
ALE	Automatic Link Establishment
ALS	Automated Loran Station
AMMIS	Aircraft Maintenance Management Information System
AMVER	Automated Merchant Vessel Reporting
ANSI	American National Standards Institute
ANTs	Aid to Navigation Teams
APA	Appropriations Purchase Account
APL	Allowance Parts List
APO	Air/Army Post Office
ARSC	Aircraft Repair and Supply Center
ASP	Acquisition Support Plan
ASTM	American Society for Testing and Materials
AToN	Aid to Navigation
AVC	Audio Visual Controller
AVT	Aviation Technician

Continued on next page

10-A.1 Electronics Manual Acronyms, Continued

10-A.1.2
Acronyms: B

Acronym	Description
BCMP	Boat Class Maintenance Plan

10-A.1.3
Acronyms: C

Acronym	Description
CALFAC	Calibration Facility
CALMS	Combined Allowance for Logistics and Maintenance
CAPN	Computerized American Practical Navigator
CASP	Computer Aided Search Planning
CASREPED	Casualty Reported
CB	Configuration Baseline
CCAs	Circuit Card Assemblies
CCB	Configuration Control Board
CCM	Communications, Control, and Monitor
CCMP	Cutter Class Maintenance Plan
CCS	Command and Control System
CCTV	Closed Circuit Television
CDPD	Cellular Digital Packet Data
CEU	Civil Engineering Unit
C4IT	Command, Control, Communications, Computers, and Information Technology
CG	Coast Guard
CGDN+	Coast Guard Data Network Plus
CGPMS	Coast Guard Planned Maintenance System
CGSWIII	Coast Guard Standard Workstation III
CI	• Configuration Item • Commandant Instruction
CIC	Combat Information Center
CID	Configuration Identification
CIM	Commandant Instruction Manual
CIO	Chief Information Officer
CIRT	Computer Incident Response Team
CKO	Chief Knowledge Officer

Continued on next page

10-A.1 Electronics Manual Acronyms, Continued

10-A.1.3
Acronyms: C (continued)

Acronym	Description
CM	Configuration Management
CMP	Contract Management Plan
CMPlus	Configuration Management Plus system
CMS	COMSEC Material System
CO	Commanding Officer
COE	Center of Excellence
COED	Computer Operated Engineering Data
COMDAC INS	Command Display and Control Integrated Navigation System
COMDTINST	Commandant Instruction
COMMSTA	Communication Station
COMSEC	Communications Security
COMSTCOM	Commercial Satellite Communications
COMTAC	Communications Tactical
CONSTA	Control Station
COSAL	Coordinated Shipboard Allowance List
COTR	Contracting Officer Technical Representative
COTS	Commercial Off-the-Shelf
CPBs	Coastal Patrol Boats
CPIC	Capital Planning, Investment, and Control
CPR	Cardiopulmonary Resuscitation
CRT	Cathode Ray Tube
CSMP	Current Ship Maintenance Project
CSSLT	Communication Systems Senior Leadership Team
C2CEN	Command and Control Engineering Center
C2PC	Command and Control Personal Computer
CUDIX	Common User Digital Exchange

Continued on next page

10-A.1 Electronics Manual Acronyms, Continued

10-A.1.4
Acronyms: D

Acronym	Description
DAA	Designated Approving Authority
DAMA	Demand Assigned Multiple Access
D/D	Analog Diagnostic Signature Database
DGPS	Differential Global Positioning System
DHS	Department of Homeland Security
DISA	Defense Information Systems Agency
DLA	Defense Logistics Agency
DMS	Docket Management System
DoD	Department of Defense
DOT	Department of Transportation
DPS	Dynamic Positioning System
DRMO	Defense Reutilization and Marketing Office
DSC	• Differential Scanning Calorimetry • Digital Selective Calling

10-A.1.5
Acronyms: E

Acronym	Description
EA	Electronic Assembly
ECPINS	Electronic Chart Precise Integrated Navigation System
ECR	Engineering Change Request
EDRP	Engineering Data for Provisioning
EFOIA	Electronic Freedom of Information Act
EIB	Engineering Information Bulletin
EILSP	Equipment/System Integrated Logistics Support Plan
EIMB	Electronics Installation and Maintenance Book
EIR	Electronic Installation Record
ELC	Engineering Logistics Center
EM	Electrician’s Mate/Equipment Manager
EMs	Electronic Modules
EMI	Electromagnetic interference
EMO	Electronics Material Officer
EMR	Electromagnetic radiation
EPSBRT	Enhanced Portable Satellite Broadcast Receive Terminal

Continued on next page

10-A.1 Electronics Manual Acronyms, Continued

10-A.1.5
Acronyms: E (continued)

Acronym	Description
ESD	• Electronic Support Detachment • Electrostatic Discharge
ESS	Equipment Support Sheet
ESU	Electronics Support Units
ET	Electronics Technician

10-A.1.6
Acronyms: F

Acronym	Description
FAA	Federal Aviation Administration
FAM	Fixed Asset Module
FBR	Feedback Report
FCC	Federal Communications Commission
FEDLOG	Federal Logistics
FISMA	Federal Information Security Management Act
FOIA	Freedom of Information Act
FPO	Fleet Post Office
FTE	Full-Time Equivalent

10-A.1.7
Acronyms: G

Acronym	Description
GBL	Government Bills of Lading
GCCS-M	Global Command and Control System-Maritime
GFE	Government Furnished Equipment
GHz	Gigahertz
GM	Gunner's Mate
GMDSS	Global Maritime Distress and Safety System
GPETE	General Purpose Electronic Test Equipment
GPO	Government Printing Office
GPP	General Purpose Property
GPS	Global Positioning System
GRI	Group Repetition Interval

Continued on next page

10-A.1 Electronics Manual Acronyms, Continued

10-A.1.7
Acronyms: G (continued)

Acronym	Description
GSA	General Services Administration
GSCCS-M	Global Command And Control System—Maritime

10-A.1.8
Acronyms: H

Acronym	Description
HERF	Hazards of Electromagnetic Radiation to Fuels
HERO	Hazards of Electromagnetic Radiation to Ordnance
HF	High Frequency
HFDL	High Frequency Data Link
HM&E	Hull, Mechanical, and Electrical
HQ	Headquarters
HQO	Headquarters Office
HQPC	Headquarters Program Coordinator
HQU	Headquarters Unit

10-A.1.9
Acronyms: I

Acronym	Description
IA	Information Assurance
IBUDS	Integrated Budget Development System
IC	Integrated Circuit
ICGS	Integrated Coast Guard Systems
ICP	Inventory Control Point
IEEE	Institute of Electrical and Electronics Engineers
IFAM	Inventory Fixed Asset Management
IFF	Identification Friend or Foe
ILS	Instrument Landing System
IMO	International Maritime Organization
IMP	Index of Maintenance Procedures
INMARSAT	International Maritime Satellite
IRAC	Interdepartmental Radio Advisory Committee
IRM	Information Resource Management

Continued on next page

10-A.1 Electronics Manual Acronyms, Continued

10-A.1.9
Acronyms: I (continued)

Acronym	Description
ISC	Integrated Support Commands
ISCS	Integrated Shipboard Control System
ISD	Industrial Support Detachment
ISEA	In-Service Engineering Agent
ISSO	Information Systems Security Officer
IT	• Information Systems Technician • Information Technology

10-A.1.10
Acronyms: J

Acronym	Description
JCP	Joint Committee on Printing

10-A.1.11
Acronyms: K

Acronym	Description
kHz	Kilohertz
KOH	Potassium Hydroxide

10-A.1.12
Acronyms: L

Acronym	Description
LAN	Local Area Network
LAPL	Lead Allowance Part List
LCCB	Local Configuration Control Board
LEIS	Law Enforcement Information System
LLLTV	Low Light Level Television
LLTV	Low Light Television

Continued on next page

10-A.1 Electronics Manual Acronyms, Continued

10-A.1.12
Acronyms: L (continued)

Acronym	Description
LOEIMP	List of Equipment Index of Maintenance Procedures
LOP	Line of Position
Loran	Long Range Aid to Navigation
LORSTA	Loran Station
LPC	Lighthouse Power Controller
LPMS	Locally Planned Maintenance System
LRU	• Lowest Repairable Unit • Lowest Replaceable Unit
LSO	Landing Signal Officer
LSU	Loran Support Unit

10-A.1.13
Acronyms: M

Acronym	Description
MAMs	Maintenance Assist Modules
MARFLIR	Marine Forward Looking Infrared
MARS	Military Affiliated Radio System
MCC	Material Control Codes
MCEB	Military Communications Electronics Board
MF	Medium Frequency
MHz	Megahertz
MICA	Management Information for Configuration and Allowances
MIL-HDBK	Military Handbook
MIL-STD	Military Standard
MILSATCOM	Military Satellite Communications
MILSTRAP	Military Standard Transaction Reporting and Accounting Procedures
MILSTRIP	Military Standard Requisitioning and Issue Procedures
MIP	Maintenance Index of Procedures
MISLE	Marine Information for Safety and Law Enforcement
MLC	Maintenance and Logistics Command
MLCANT	Maintenance and Logistics Command Atlantic
MLCPAC	Maintenance and Logistics Command Pacific
MOA	Memorandum of Agreement

Continued on next page

10-A.1 Electronics Manual Acronyms, Continued

10-A.1.13
Acronyms: M (continued)

Acronym	Description
MPC	Maintenance Procedure Card
MPCMS	Machinery Plant Control and Monitoring System
MPE	Maximum Permissible Exposure
MSO	Marine Safety Officer
MTI	Mandatory Turn-In
MTR	Module Test/Repair
MTRTS	Module Test and Repair Tracking System
MU	Master Unit
MUG	MICA User Guide

10-A.1.14
Acronyms: N

Acronym	Description
NAVAID	Navigational Aid
NAVAIR	Naval Air Systems Command
NAVCEN	Navigation Center
NAVEDTRA	Naval Education and Training
NAVELEX	Naval Electronic Systems Command
NAVMACS	Naval Modular Automated Communication System
NAVORD	Naval Ordnance
NAVSEA	Naval Sea Systems Command
NAVSHIP	Navy Ship
NAVSUP	Naval Supply Systems Command
NAVTEX	Navigation Telex Radio
NCRP	National Council on Radiation Protection and Measurements
NDGPS	Nationwide Differential Global Positioning System
NDRS	National Distress and Response System
NDS	National Distress System
NEETS	Navy Electricity and Electronics Training Series
NESU	Naval Engineering Support Units
NFE	No Failure Evident
NiCad	Nickel Cadmium
NIS	Navigation Information System
NIST	National Institute of Science and Technology

Continued on next page

10-A.1 Electronics Manual Acronyms, Continued

10-A.1.14
Acronyms: N (continued)

Acronym	Description
NLCCS	New Loran-C Consolidated Control System
NPFC	Naval Publications and Forms Center
NPMS	Navy Planned Maintenance System
NSN	National Stock Number
NSTISSAM	National Security Telecommunications and Information Systems Security Advisory Memorandum
NSTM	Navy Ship Technical Manual
NSWC	Naval Surface Warfare Center
NT/CGO	Navy-Type/Coast-Guard Owned
NT/NO	Navy-Type/Navy-Owned
NUWC	Naval Undersea Warfare Center
NWP	Naval Warfare Publication

10-A.1.15
Acronyms: O

Acronym	Description
O&M	Operations and Maintenance
OCCB	Overarching Configuration Control Board
OE	Operating Expense
OEM	Original Equipment Manufacturer
OGA	Other Government Agency
OinC	Officer in Charge
OM&S	Operating Materials and Supplies
OMB	Office of Management and Budget
OOC	Out-of-commission
OOD	Officer of the Deck
OPFAC	Operational Facility
OS	Operation Specialist
OSC	Operations Systems Center
OSS	Optical Surveillance Systems
OTCIXS	Officer in Tactical Command Information Exchange System

Continued on next page

10-A.1 Electronics Manual Acronyms, Continued

10-A.1.16
Acronyms: P

PA	Privacy Act
PBQs	Performance Based Qualifications
PC	Printed Circuit
PCB	Printed Circuit Board
PCBs	Polychlorinated Biphenyls
PCMS	Primary Control Monitor Sets
PDR	Provisioning Technical Documentation
PEL	Permissible Exposure Limit
PEPIRB	Personal Emergency Position Indicating Radio Beacon
PMEL	Precision Measurement Equipment Laboratories
PMS	Planned Maintenance System
PPI	Plan Position Indicator
PPM	• Parts Per Million • Policy and Procedures Manual

10-A.1.17
Acronyms: R

Acronym	Description
RACON	Radar Beacon
RADHAZ	Radiation Hazard
RCM	Reliability Centered Maintenance
R&D	Research and Development
RDF	Radiation Direction Finder
RF	Radio Frequency
RFI	Ready-For-Issue
RF-ITV	Radio Frequency In-Transit Visibility
RIK	Replacement-in-Kind
RLC	Range Light Controller
RMC	Regional Maintenance Center
RP	Resource Proposal
R/T	Receiver/Transmitter
RU	Remote Unit

Continued on next page

10-A.1 Electronics Manual Acronyms, Continued

10-A.1.18
Acronyms: S

Acronym	Description
SAFENET	Survivable Adaptable Fiber Optic Embedded Network
SANS	Ship Arrival Notification System
SATCOM	Satellite Communication
SCAT Code	Sub Category Code
SCCS	Shipboard Command and Control System
SCLSIS	Ship Configuration and Logistics Support Information System
SDA	System Development Agent
SDL	Standard Distribution List
SDLC	System Development Life Cycle
SHF	Super High Frequency
SIPRNET	Secret Internet Protocol Router Network
SIR	System Improvement Report
SITOR	Simplex Teletype Over Radio
SMEF	Systems Management and Engineering Facility
SM&R	Source, Maintenance, and Recoverability
SMT	Surface Mounted Technology
SOW	Statement of Work
SPAWAR	Space and Naval Warfare
SPETE	Specific Electronic Test Equipment
SPPM	Supply Policies and Procedures Manual
SRAN	Short Range Aid to Navigation
SSIC	Standard Subject Identification Code
SSL	Standard Support Level
SSR	Surface Search Radar
STR	System Trouble Reports
SUPCEN	Supply Center
SYSCOM	Systems Command

Continued on next page

10-A.1 Electronics Manual Acronyms, Continued

10-A.1.19
Acronyms: T

Acronym	Description
TACAN	Tactical Air Navigation
TCA	1,1,1-Trichloroethane
TCO	Total Cost of Ownership
TCTO	Time Compliance Technical Orders
TDR	Technical Data Record
TFE	Timing and Frequency Equipment
TISCOM	Telecommunication and Information Systems Command
TRACEN	Training Center
TU	Transfer Unit
2M	Miniature/Microminiature

10-A.1.20
Acronyms: U

Acronym	Description
UHF	Ultra High Frequency
UMD	Upper Memory Block
USCG	United States Coast Guard

10-A.1.21
Acronyms: V

Acronym	Description
VAC	Volts Alternating Current
VHF	Very High Frequency
VMS	Vessel Management System
VSWR	Voltage Standing-Wave Ratio
VTC	Vessel Traffic Control
VTS	Vessel Traffic Service

Continued on next page

10-A.1 Electronics Manual Acronyms, Continued

10-A.1.22
Acronyms: W

Acronym	Description
WABG	Ice Breaker
WAN	Wide Area Network
WHEC	High Endurance Cutter
WLB	Seagoing Buoy Tender
WLIC	Inland Construction Tender
WLM	Coastal Buoy Tender
WMEC	Medium Endurance Cutter
WPB	Patrol Boat
WSB	Work Schedule Books
WSF	Weapons System File

10-B Forms and Publications

Overview

10-B.01 Scope

This appendix contains information on forms and publications used in support of electronics and by Coast Guard electronics technicians.

10-B.02 References

Additional information about electronics forms and publication can be found in the following resources.

Resource	Description	Link
COMDTINST M5213.6 (series)	Catalog of Forms Manual	CG Central
COMDTINST M16500.13 (series)	Aids to Navigation Manual	CG Central
COMDTINST M9000.6 (series)	Naval Engineering Manual	CG Central

10.B.03 Contents

This appendix covers the following subjects.

10-B.1 Electronics Forms

Overview

Introduction

This section describes forms commonly used by Coast Guard electronics personnel in the areas of

- equipment maintenance
- engineering changes
- mandatory turn-in, and
- training.

10-B.1.01 Contents

This section covers the following subjects.

10-B.1.1 Summary of Electronics Forms and Where to Find Them

Introduction

This topic

- identifies sources where forms can be found, and
- provides a listing of the forms described in this section, with links to more detailed information.

10-B.1.1 Where to Find Forms

Many forms are available in electronic format

- on the USCG Central Portal
- on the USCG Standard Workstation under USCG Applications
- Forms that cannot be found at the above locations may be ordered, using the procedures in the Catalog of Forms, COMDTINST M5213.6 (series).

10-B.1.2 Summary of Forms, by Form Number

The forms described in this section are listed, numerically by form number, in the table below.

Form Number	Title	For more information see..
CG-2588	Radio Direction Finder Calibration Chart	10-B.1.2 Equipment Maintenance Forms
CG-2920	Current Ships Maintenance Project	10-B.1.2 Equipment Maintenance Forms
CG-3029	Small Arms Training Record	10-B.1.5 Training Forms
CG-3307	Administrative Remarks	10-B.1.5 Training Forms
CGHQ-3379	Engineering Changes Approval (Cutters)	10-B.1.3 Engineering Change Forms
CG-4094	Shore Station Maintenance Report	10-B.1.2 Equipment Maintenance Forms
CG-4139	Radio Beacon Field Intensity Measurement	10-B.1.2 Equipment Maintenance Forms
CG-5223	Short-Term Resident Training Request (STTR)	10-B-1.5 Training Forms

Continued on next page

10-B.1.1 Summary of Electronics Forms and Where to Find Them, Continued

10-B.1.2
Summary of Forms, by Form Number (continued)

Form Number	Title	For more information see..
CG-5288	Weekly Training Plan	10-B.1.5 Training Forms
CG-5289	Departmental Training Record	10-B.1.5 Training Forms
CG-5290	Record of Drills and Exercises	10-B.1.5 Training Forms
CG-5451	Feedback Reports	10-B.1.5 Training Forms
CG-5452	Monthly PMS Schedule	10-B.1.2 Maintenance Forms
CG-5682	Equipment Engineering Change Request (ECR)	10-B.3 Engineering Change Forms
DD-1348	Issue Release/Receipt Document	10-B.1.4 Mandatory Turn-In (MTI) Form
NAVSHIP-531	Resistance Test Record	10-B.1.2 Equipment Maintenance Forms
OPNAV 4790/CK	Configuration Change	10-B.3 Engineering Change Forms

10-B.1.2 Equipment Maintenance Forms

Introduction

This topic describes the following forms that are commonly used in equipment maintenance:

- CG-2920 Current Ship Maintenance Project
- CG-4094 Shore Station Maintenance Report
- CG-4139 Radio Beacon Field Intensity Measurement
- CG-5452 Monthly PMS Schedule
- CG-5453 Annual PMS Schedule
- CG-5454 Equipment History Form, and
- NAVSHIP-531 Equipment Test Record.

10-B.1.2.2 CG-2920 Current Ships Maintenance Project

If an electronics repair involves work items beyond the capacity of the unit's electronics force, the unit must submit a completed CG-2920 Current Ships Maintenance Project to the Engineering Officer for additional assistance.

10-B.1.2.3 CG-4094 Shore Station Maintenance Record

If an electronics repair involves work items beyond the capacity of the unit's electronics force, the unit must submit a completed CG-4094 Shore Station Maintenance Report to the Engineering Officer for additional assistance.

10-B.1.2.4 CG-5452 Monthly PMS Schedule

Form CG-5452 Monthly PMS Schedule, is used by technicians to plan, schedule, and display monthly planned maintenance for a specific unit.

See 7.2.2 Coast Guard Planned Maintenance System (CGPMS): Documents and Forms for more information on PMS documentation and reporting requirements.

10-B.1.2.5 CG-5453 Annual PMS Schedule

Form CG-5453 Annual PMS Schedule, is used by technicians to plan, schedule, and display annual planned maintenance for a specific unit.

See 7.2.2 Coast Guard Planned Maintenance System (CGPMS): Documents and Forms for more information on PMS documentation and reporting requirements.

Continued on next page

10-B.1.2 Equipment Maintenance Forms, Continued

10-B.1.2.6 CG-5454 Equipment History Form

Form CG-5454 Equipment History is used to record equipment maintenance history and comments when

- no technical data record (TDR) is provided for equipment, or
- it is necessary to record information in addition to that required by the TDR.

See 7.2.2 Coast Guard Planned Maintenance System (CGPMS): Documents and Forms for more information on PMS documentation and reporting requirements.

Continued on next page

10-B.1.2 Equipment Maintenance Forms, Continued

DEPARTMENT OF TRANTPORTATION
U.S. COAST GUARD
CG-2588 (Rev. 8-80)

RADIO DIRECTION FINDER CALIBRATION CHART

UNIT	DATE	D/F TYPE	SERIAL NUMBER

CONDUCTED BY	APPROVED BY (Commanding Officer)

FREQUENCY ______

ADD 15 10 5 CORRECTION 0 5 10 15 SUBTRACT

190 210 230 250 270 290 310 330 350 0 010 030 050 070 090 110 130 150 170

180 200 220 240 260 280 300 320 340 0 020 040 060 080 100 120 140 160 180

INDICATOR SCALE READING

FREQUENCY ______

ADD 15 10 5 CORRECTION 0 5 10 15 SUBTRACT

190 210 230 250 270 290 310 330 350 0 010 030 050 070 090 110 130 150 170

180 200 220 240 260 280 300 320 340 0 020 040 060 080 100 120 140 160 180

INDICATOR SCALE READING

RADIAL ACCURACY CHECK: GOOD ☐ BAD ☐

DATE ______, BEARINGS ______

STANDARD CONDITIONS DURING D/F OPERATIONS

FOR HOMING PURPOSES ONLY

FREQUENCY — ADD 15 10 5 CORRECTION 0 5 10 15 SUBTRACT

330 350 0 010 030

340 0 020

FREQUENCY

330 350 0 010 030

340 0 020

PREVIOUS EDITIONS ARE OBSOLETE

7530-00-F01-1460

10-B.1.3 Engineering Change Forms

Introduction

This topic describes the following forms, which are used in the engineering change process:

- CG-5682 Engineering Change Request (ECR)
- CGHQ-3379 Engineering Change Approval, and
- OPNAV 4790/CK Configuration Change.

10-B.1.3.1 CG-5682 Engineering Change Request (ECR)

Form CG 5682 Engineering Change Request (ECR) is submitted to the cognizant MLC by field units and area/district staffs to initiate a request for an engineering change.

See 8.0 Equipment Engineering Changes for details on the engineering change process.

Reference: For detailed instructions on using Form CG-5682, refer to
- the Naval Engineering Manual, COMDINST M9000.6 (series), Chapter 041, and
- Coast Guard Configuration Management, COMDTINST M4130.6 (series).

10-B.1.3.2 CGHQ-3379 Engineering Change Approval (Cutters)

Form CGHQ-3379 Engineering Change Approval is used

- by the Engineering Change Board to document authorization of an engineering change, and
- by units to notify the support infrastructure that an engineering change has been completed.

Note: Form CGHQ-3379 can be found in Adobe Forms under CGHQ forms.

See 10-B.1.3 Engineering Change Forms for information on using CGHQ-3379 to report the completion of an engineering change.

Continued on next page

10-B.1.3 Engineering Change Forms, Continued

10-B.1.3.3 OPNAV 4790/CK Configuration Change

Form OPNAV 4790/CK, Configuration Change, is used by MICA/CALMS supported units to notify the ELC of any changes to a unit's configuration.

Submission of this form ensures that

- the unit's MICA will be updated, and
- the unit will be issued the appropriate spares.

OPNAV 4790/CK is available on CG Central.

See 8.6 Engineering Change Communication and Reporting Requirements for information on submitting OPNAV 4790/CK upon completion of an engineering (configuration) change.

10-B.1.4 Mandatory Turn-In (MTI) Form

10-B.1.4.1 DD-1348 Single Line Item Release/Receipt Document

Form DD-1348, Single Item Release/Receipt Document, is used by units when returning defective, repairable equipment to the ELC, in accordance with the Mandatory Turn-in (MTI) Program.

See 5.5.5 Mandatory Turn-In (MTI) Program for Defective Equipment for details, which include instructions for completing Form DD-1348.

10-B.1.5 Training Forms

Introduction

This topic describes the following forms used in technician training:

- CG-3029 Small Arms Training Record
- CG-5223 Short-Term Resident Training Request (STTR), and
- the forms used to plan and record the unit's technical training program.

10-B.1.5.1 CG-5223 Short-Term Resident Training Request (STTR)

Form CG-5223 Short-Term Resident Training Request is submitted to request specialized training from a Class "C" school.

See 10-C.3 Class A and C Schools and Training Centers for information on training offered by Class "C" schools.

Reference: For complete instruction on completing form CG-5223, refer to FY (current year) Coast Guard Formal Training Schedule, COMDTNOTE 1540.

10-B.1.5.2 Training Plans and Records

The following forms are used for both planning and record keeping of the unit's technical training program:

- CG-5288, Weekly Training Plan
- CG-5289, Departmental Training Record, and
- CG-5290 Record of Drills and Exercises.

Note: Use of the forms listed above is required on floating units and highly recommended at other units.

10-B.2 Publications

Overview

Introduction

This section contains

- information on the procurement of publications that
  – are required for a particular unit, or
  – may be of interest to Coast Guard electronics personnel, and
- descriptions of the following types of publications:
  – Electronics Material Identification Manual (M4410.5)
  – military handbooks (ML-HDBKs)
  – standards and specifications
  – other military publications, and
  – commercial and other government agency (OGA) publications

10-B.2.02 Contents

This chapter covers the following subjects.

10-B.2.1 Publications Distribution and Ordering

Introduction

This topic contains information on

- the distribution of publications that are required for a Coast Guard unit, including how to
  - make a one-time request for additional publications
  - request a change in the unit's publication allowance, and
  - submit a unit change of address, and
- how to order equipment technical manuals, catalogs, and stock lists.

10-B.2.1.1 Publications Required / Not Required

The size and mission of a particular unit determines whether publications are

- required
- not required, but could prove useful, or
- not required and of no special interest.

10-B.2.1.2 Required Publication Distribution

Required publications are normally distributed automatically, to the addresses listed in the Standard Distribution List, COMDTNOTE 5605. However, units are responsible for obtaining any required publications that are not currently being held.

Notes:
- One-time requests for additional publications may be submitted at the discretion of the unit's commanding officer. See 10-B.2.1.3 for details.
- Units may request changes in the allowance of publications that are automatically distributed to the unit. See 10-B.2.1.4 for details.

Reference: Refer to Directives, Publications, and Report Index, COMDTNOTE 5600 for information on
- the distribution, allowance, and procurement of publications, and
- which publications are required for your unit.

Continued on next page

10-B.2.1 Publications Distribution and Ordering, Continued

10-B.2.1.3 Requesting Changes in Publications Allowance

Requests for changes in the allowance of required publications that are automatically distributed to the unit by submitting a completed CG-5323 Request for Allowance Change to Commandant (CG-61) via the regular chain of command.

Note: The MLC/district commander considers the needs of all units of a particular type when evaluating allowance change requests.

10-B.2.1.4 Ordering Equipment Technical Manuals, Catalogs, and Stock Lists

Electronic equipment technical manuals are considered part of the equipment. Each new piece of equipment, when installed, comes with two technical manuals.

Additional technical manuals for Coast Guard type and commercial type electronics equipment—as well as ELC catalogs and stock lists—may be obtained by submitting a completed DD-1348 DoD Single Line Item Requisition System Document to the ELC in Baltimore, MD.

Note: Additional manuals are ordered at the unit's own expense.

10-B.2.2 Military Handbooks (MIL-HDBKs)

Introduction

This topic describes the following military handbooks (ML-HDBKs), which may be required or of interest to Coast Guard electronics personnel:

- MIL-HDBK-188 Communications Systems
- MIL-HDBK-216 RF Lines and Fittings
- MIL-HDBK-232 Red/Black Installation, and
- MIL-HDBK-419 Grounding, Bonding & Shielding.

10-B.2.2.1 MIL-HDBK-188 and 188/3 Communication Systems

MIL-HDBK-188 and 188/3, Guides for Developers and Users of Communications Systems Standards

- identify handbooks, standards, and specifications applicable to communications systems installations, and
- includes addresses for various industry standard associations, such as ANSI, IEEE, EIA, and SAE.

10-B.2.2.2 MIL-HDBK-216 RF Lines and Fittings

MIL-HDBK-216, RF Transmission Lines and Fittings, provides pertinent information on RF cables, RF connectors, and fittings, including

- physical and electrical characteristics
- important assembly techniques and fabrication precautions, and
- connector adaptors.

Note: Cable and connector type numbers listed in the handbook may be cross-referenced to National Stock Numbers (NSNs) in the Master Cross Reference List (MCRL).

10-B.2.2.3 MIL-HDBK-232 Red/Black Installation

MIL-HDBK-232, Red/Black Engineering-Installation Guidelines, provides minimum standards for installation of secure and non-secure information systems.

Continued on next page

10-B.2.2 Military Handbooks (MIL-HDBKs), Continued

10-B.2.2.4 MIL-HDBK-419 Grounding, Bonding & Shielding

MIL-HDBK-419, Grounding, Bonding, and Shielding for Electronic Equipment & Facilities, provides basic information, techniques and procedures, and methods for grounding systems, subsystems, and other components of ground networks.

10-B.2.3 Standards and Specifications

Introduction

This topic contains information on

- the following standards, which provide detailed information, installation techniques, and/or specific applications of a particular item or subject:
  - MIL-STD-1460 Soldering
  - MIL-STDs for-Grounding, Bonding, and Shielding
  - MIL-STD-242 Electronic Equipment Parts, and
  - ANSI/TIA/EIA standards applicable to telecommunications cabling, and
- equipment specifications.

10-B.2.3.1 MIL-STD-1460 Soldering

MIL-STD-1460, Procedures for Soldering Electrical Connections and Printed Wiring Assembles

- lists all tools, preparations, techniques, and training requirements for electronic soldering, and
- includes illustrations and visual standards for checking the quality of the connections.

10-B.2.3.2 MIL-STDs for-Grounding, Bonding, and Shielding

The following military standards provide minimum basic requirements for grounding, bonding, and shielding:

- MIL-STD-188-124, Grounding, Bonding and Shielding for Common Long Haul/Tactical Communications
- MIL-STD-1310G, Shipboard Bonding, Grounding, and Other Techniques for Electromagnetic Compatibility and Safety, and
- MIL-STD-1857, Grounding, Bonding, and Shielding Design Practices.

10-B.2.3.3 MIL-STD-242 Electronic Equipment Parts

MIL-STD-242, Selected Standards for Electronic Equipment Parts, lists common standards for resistors, capacitors, fuses, microcircuits, and so on.

Note: Part numbers listed in the detailed specifications may be cross-referenced to National Stock Numbers (NSNs) in the Master Cross Reference List (MCRL).

Continued on next page

10-B.2.3 Standards and Specifications, Continued

10-B.2.3.4 ANSI/TIA/EIA Standards

A series of internationally-accepted standards by the American National Standards Institute (ANSI), Telecommunications Industry Association (TIA) and Electronics Industry Alliance (EIA) include

- ANSI/TIA/EIA-568A, Commercial Telecommunications Cabling Standard
- ANSI/TIA/EIA-569A, Commercial Standard for Telecommunications Pathways and Spaces, and
- ANSI/TIA/EIA-570A, Residential Telecommunications Cabling Standard.

10-B.2.3.5 Specifications

Specifications

- provide detailed information about the significant characteristics or methods of manufacture required to produce an item or class of items, and
- often list military part numbers that may be cross-referenced to National Stock Numbers (NSN) in the Master Cross Reference List (MCRL).

Example: MIL-I-23053/15A Military Heavy-Wall Polyolefin Heat Shrinkable Tubing

- describes two classes of heat shrink tubing that have an adhesive/sealant liner, and
- lists a series of military part numbers which may be cross-referenced to the National Stock Number (NSN) in the Master Cross Reference List (MCRL).

10-B.2.4 Other Military Publications

Introduction

This topic describes

- the following resources for procuring Navy-issued publications:
  – Navy Stock List of Forms and Publications (NAVSUP 200D), and
  – Navy Logistics Library (NLL), and
- procedures for ordering
  – Cognizant Symbol I (COG I) publications
  – Navy-issue laminated placards
  – Army an Air Force publications, and
  – DoD specifications and standards.

10-B.2.4.1 Other Military Publication Distribution and Ordering

Other military publications described in this topic are automatically distributed to units that are required to have them on site.

If a publication is not required but would prove useful to technicians, they may be requisitioned as described in this topic.

Reference: Refer to the Directives, Publications, and Reports Index, COMDTNOTE 5600 as the final authority for all publications your unit is required to have on hand.

10-B.2.4.2 Navy Stock List of Forms and Publications (NAVSUP 200D)

Navy electronics publications are indexed in the Navy Stock List of Forms and Publications (NAVSUP 600D), which is a valuable resource for obtaining stock numbers and identification data for Navy forms and publications, including

- technical manuals
- field changes, and
- placards.

Units that do not have NAVSUP 600D should request to be put on the standard distribution list (SDL).

Continued on next page

10-B.2.4 Other Military Publications, Continued

10-B.2.4.3 Navy Logistics Library (NLL)

The Navy Logistics Library (NLL)

- is the central Navy catalog and ordering medium for Navy publications, and
- provides access to on-line Navy forms.

The NLL Web site address is www.nll.navsup.navy.mil.

10-B.2.4.4 COG I Publications

Cognizant Symbol I (COG I) publications are issued on a non-reimbursable basis from the Naval Publications and Forms Center.

The procedure for ordering COG I publications is described in the table below.

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Complete Form DD-1348, DoD Single Line Item Requisition System Document.

Note: Requisitions for publications are free issue, so a fund code is not required.</td></tr>
<tr><td>2</td><td>Use the information in the table below to determine the appropriate code to enter in the Signal Code box.

<table><tr><th>To have the publication shipped to the activity listed in block …</th><th>Use Signal Code …</th></tr><tr><td>10</td><td>D.</td></tr><tr><td>15</td><td>M.</td></tr></table></td></tr>
<tr><td>3</td><td>Send the completed DD-1348 to the following address:

NAVPUBFORMCEN
5801 Tabor Avenue
Philadelphia, PA 19120</td></tr>
</table>

Continued on next page

10-B.2.4 Other Military Publications, Continued

10-B.2.4.5 Navy-Issue Laminated Placards

Standard Navy-issue laminated placards, which are listed in Section XIII of NAVSUP 2002, are issued on a reimbursable basis.

The procedure for requisitioning Navy-issue laminated placards is described in the table below.

Step	Action
1	Complete Form DD-1348, DoD Single Line Item Requisition System Document. ***Note***: Because placards are reimbursable, a fund code is *required* on each requisition.
2	Mail the completed DD-1348 to the following address: NAVPUBFORMCEN 5801 Tabor Avenue Philadelphia, PA 19120

10-B.2.4.6 Army an Air Force Publications

Forward requests for Army and Air Force publications to Commandant (G-CMA) as follows:

- write a letter of request, and
- complete and enclose Form DD-1149, Requisition and Invoice/Shipping Document.

Exception: Aviation units must procure Air Force publications in accordance with the current Aviation Technical Note concerning aircraft maintenance publications.

Continued on next page

10-B.2.4 Other Military Publications, Continued

10-B.2.4.7 DoD Index of Specifications and Standards (DODISS)

The Department of Defense Index of Specifications and Standards (DODISS)

- is a complete listing of all DOD-approved specifications, standards, and handbooks, and
- includes industry and association standards approved for use by DoD and Federal agencies.

DoD-approved specifications, standards, and handbooks may be ordered online, from the Department of Defense Single Stock Point for Military Specifications Standards, and Related Publications at http://dodssp.daps.dla.mil/

10-B.2.5 Other Government Agency (OGA) and Commercial Publications

Introduction

This topic contains information on procuring the following publications that may be useful to Coast Guard electronics personnel:

- publications issued by other government agencies (OGAs), and
- commercial electronics reference books.

10-B.2.5.1 Benefits of Commercial or OGA Publications

Because the pace of electronics research and development may exceed the government's ability to evaluate and promulgate policy in certain areas, technicians and managers are encouraged to make use of commercial and OGA publications in order to

- stay abreast of the latest information, and
- make recommendations to the chain of command based on pertinent developments.

10-B.2.5.2 Procuring Other Government Agency Publications

Publications that are issued at no-cost by other government agencies (OGAs) and are not distributed by the Commandant may be obtained in limited quantities from local offices of those agencies.

OGA publications that are available for a fee from the Government Printing Office may be obtained directly as follows:

- Complete Form OF-347, Order for Supplies or Services, and
- mail the completed form to the following address:

Superintendent of Documents
Government Printing Office
Washington, DC 20401.

Note: Charge the expense to your unit's allotted funds**.**

Continued on next page

10-B.2.5 Other Government Agency (OGA) and Commercial Publications, Continued

10-B.2.5.3 Procuring Commercial Electronics Reference Books

Although commercial publications are used extensively in Coast Guard electronics, electronics reference books are not normally stocked in the Coast Guard or Navy Supply system.

Commercial electronics reference books may be procured from local commercial supply sources.

Note: Charge the expense to your unit's allotted funds.

10-C Training

Overview

10-C.01 Scope

This appendix contains information on

- responsibilities for the training of Coast Guard (CG) Electronics Technicians (ETs) and Information Systems Technicians (ITs)
- training requirements for ETs and ITs
- CG training centers and schools that conduct fundamental and specialized skills training, and
- how to
  - request training at a Class C school or when needed for specific equipment and systems, and
  - provide feedback on training received at a local unit or away from the unit.

10-C.02 References

Additional information related to training, education, and professional development may be found in the following resources.

Resource	Description	Link
Commandant Instruction Manuals (CIMs)		
Personnel Manual, COMDTINST M1000.6 (series)	Includes information on grades and ratings, promotions, advancements, and qualifications.	CG Central
Enlisted Performance Qualifications Manual, COMDTINST M1414.8 (series)	Includes the current version of performance based qualifications (PBQs).	CG Central

Continued on next page

Overview, Continued

10-C.02 References (continued)

Resource	Description	Link
Enlisted Qualification Codes Manual, COMDTINST M1414.9 (series)	Codes that supplement enlisted rating structure by identifying special skills and knowledge.	CG Central
Training and Education Manual, COMDTINST M1500.10 (series)	Training guidance and course information for CG military and civilian personnel.	CG Central
	Commandant Instructions (CIs)	
CG Philosophy on Training, Education, and Development, COMDTINST M1500.23 (series)	Procedures to actualize the training, education, and development philosophy.	CG Central
Pipeline Training for Electronic Technicians Reporting to Loran, Stations, COMDTINST M1543.1 (series)	Training required for Electronics Technicians prior to reporting aboard Loran-C stations.	CG Central
Cutter Training and Qualification Manual, COMDTINST M3502.4 (series)	Mandatory pre-arrival training.	
	Publications	
CG Institute Pamphlet E46003	List of correspondence courses.	
	Web Site	
Human Resources	Information on all types of available training, educational benefits, and support for Coast Guard personnel.	CG Central

Continued on next page

Overview, Continued

10-C.03 Contents

This appendix covers the following subjects.

10-C.1 Training Responsibilities

Introduction

This topic contains information on the

- purpose of training for Coast Guard (CG) electronics personnel
- training responsibilities of the Systems Force Management Division, and
- responsibilities for unit formal training programs.

10-C.1.1 Purpose of Training for Electronics Personnel

Coast Guard (CG) electronics personnel receive training to

- develop or enhance the technical skills required to operate or maintain equipment or systems, and
- advance to the next pay grade.

Training is provided through

- resident service schools
- non-resident courses
- formal unit or departmental training
- training teams
- drills and exercises
- on-the-job training, and
- personal study.

See
- 10-C.2 Electronics and Information Systems Technician Training for detail on initial training provided to Electronics Technicians (ETs) and Information Systems Technicians (ITs), and
- 10-C.3 Class A and C Schools and Training Centers for detail on the training provided at Class A and C schools and training centers.

Continued on next page

10-C.1 Training Responsibilities, Continued

10-C.1.2 Training Responsibilities of the Systems Force Management Division

The Systems Force Management Division is responsible for training

- under the general direction of the Director, Systems Resources Directorate (CG-4), and
- in liaison with training, acquisition, program, support, and facility managers.

The training responsibilities of the Systems Force Management Division are described in the table below.

Training Responsibility	Description
• Training requirements • specialized training and education, and • identification of problems/solutions	• Establishes training requirements for electronics personnel • manages specialized training and education programs, and • recommends cost-effective solutions for job performance problems.
• CG-4 training plans, and • applicability of sponsored training	• Develops CG-4 master training plans, and • reviews CG-4 sponsored training for applicability.
Qualification codes for systems ratings	Develops and manages the following qualification codes for systems ratings: • enlisted performance qualification codes, and • competency qualification codes. ***Reference***: For information or questions about systems ratings, refer to the • Enlisted Performance Qualifications Manual, COMDTINST M1414.8 (series), and • Enlisted Qualification Codes Manual, COMDTINST M1414.9 (series). ***Note***: Both of these manuals can be accessed on CG Central

Continued on next page

10-C.1 Training Responsibilities, Continued

10-C.1.3 Training Responsibilities of EMOs, Supervisors, and Senior Personnel

All units should have an established formal training program that provides

- orientation training
- training on
  - personnel qualification standards, and
  - performance based qualifications (PBQs)
- cross-training
- resident training, and
- educational opportunities.

The training responsibilities of Electronics Material Officers (EMOs), supervisors, and senior technical personnel for unit formal training are described in the table below.

All …	Are responsible for …
EMOs and supervisors	training subordinates through their unit's formal training program.
senior technical personnel	encouraging and counseling junior personnel on the training and educational opportunities available to them, including • tuition assistance • distance learning • correspondence courses • military schools, and • off-duty education.

Continued on next page

10-C.1 Training Responsibilities, Continued

10-C.1.3 Training Responsibilities of EMOs, Supervisors, and Senior Personnel (continued)

All …	Are responsible for …
individual unit members	• basing their technical skill requirements on the latest version of performance based qualifications (PBQs), and • enrolling in correspondence courses to enhance their current skills. ***References***: • For the latest version of PBQs, refer to the – Human Resources Web site on CG Central, or – Enlisted Performance Qualifications Manual, COMDTINST M1414.8 (series) also on CG Central. • For a list of available correspondence courses, and other training and educational resources, refer to the Human Resources Web site on CG Central.

10-C.2 Electronics and Information Systems Technician Training

Introduction

This topic contains information on the training provided to

- Electronics Technicians (ETs), and
- Information Systems Technicians (ITs).

10-C.2.1 Electronics Technician Training

To prepare for their first duty assignment, Electronics Technicians (ETs) complete

- initial training at a Class A school, and
- general training at a Class C school.

Class C general training covers the knowledge and skills necessary to safely use tools and test equipment for installing, operating, repairing, and maintaining a wide variety of electronic systems, including

- command and control systems
- tactical computer systems, and
- navigation, surveillance, and communications systems.

See 10-C.3 Class A and C Schools and Training Centers for more detail on Class A and C schools.

Continued on next page

10-C.2 Electronics and Information Systems Technician Training, Continued

10-C.2.2 Information Systems Technician (IT) Training

Information Systems Technicians (ITs) receive initial training at a Class A school (located at the Training Center Petaluma) for installing, maintaining, and repairing telecommunications systems that encompass the latest technologies, which include

- telephone systems and equipment
- voice, data, switching, and routing equipment
- terminal equipment
- telecommunications links, and
- interior/exterior telecommunications distribution systems.

See 10-C.3 Class A and C Schools and Training Centers for more detail on Class A schools and Training Center Petaluma.

Note: ITs are responsible for managing computer systems at Electronic Support Detachments (ESDs) and on capital cutters.

10-C.3 Class A and C Schools and Training Centers

Introduction

This topic contains information on the training provided at

- Class A and C schools
- Training Center Petaluma
- Training Center Yorktown, and
- Command and Control Center (C2CEN).

10-C.3.1 Training Provided at Class A and C Schools

The training provided at Class A and B schools, and the location of the schools, is described in the table below.

See 10-C.3.2 for detail on Class A and C training provided at Coast Guard training centers.

School	Location	Training Provided
Class A schools	Military training centers	Initial training, which includes • the fundamentals of particular ratings, and • core and sub-specialty training. See 10-C.2 Electronics and Information Systems Technician Training for detail on the initial training provided to Electronics Technicians (ETs) and Information Systems Technicians (ITs).
Coast Guard and Navy Class C schools (including Air Force technical schools)	Civilian and military training centers	General or advanced training for new, specialized, and sophisticated equipment and systems. See • 10-C.2 Electronics and Information Systems Technician Training for detail on general training provided to ETs, and • 10-C.4 Training Requests and Feedback for detail on requesting training at a Class C school.

Continued on next page

10-C.3 Class A and C Schools and Training Centers, Continued

10-C.3.2 Training Centers Petaluma and Yorktown

The training provided at the Coast Guard training centers in Petaluma and Yorktown is described in the table below.

Training Center	Location	Training Provided
Training Center Petaluma	Petaluma, CA	Class A schools located at the training center provide initial training for ETs and ITs. See C-10.2 Electronics and Information Systems Technician Training for detail on the training provided to ETs.
Training Center Yorktown	Yorktown, VA	Class C schools located at the training center provide training in • fiber optics • programmable logic controllers, and • electronic aids to navigation (AToN) equipment, including the differential global positioning system (DGPS) transmitter suite. See 10-C.4 Training Requests and Feedback for detail on requesting training at a Class C school.

Continued on next page

10-C.3 Class A and C Schools and Training Centers, Continued

10-C.3.3 Command and Control Engineering Center (C2CEN)

The Command and Control Engineering Center (C2CEN), located in Portsmouth, VA, provides and hosts operation and maintenance training.

See 2.2 Centers of Excellence for more detail on the C2CEN.

The training provided or hosted by C2CEN is described in the table below.

Operations and maintenance training for ...	Is ...
• 210 foot and 270 foot endurance cutter classes • 378 foot high endurance cutter class shipboard command and control systems (SCCSs), and • the optical surveillance system (OSS)	provided by C2CEN.
the integrated shipboard control system (ISCS) on • 175 foot coastal buoy tenders (WLMs), and • 225 foot seagoing buoy tenders (WLBs).	hosted by C2CEN.

10-C.4 Training Requests and Feedback

Introduction

This topic contains information on

- requesting training
  – at a Class C school, and
  – when needed for specific equipment and systems, and
- providing feedback on training received at a local unit or away from the unit.

C-10.4.1 Requesting Training at a Class C School

To request training (*except* for mandatory pre-arrival training) at a Class C school

- complete a Short-Term Resident Training Request (Form CG-5223), and
- forward the completed form, via the chain of command, to the Commandant, Office of Systems Force Management (G-SRF).

References:
- For instructions on completing and submitting Form CG-5223, refer to the current year Formal Training Schedule, COMDTNOTE 1540.
- For information on mandatory pre-arrival training, refer to the Cutter Training and Qualification Manual, COMDTINST M3502.4 (series).

Continued on next page

10-C.4 Training Requests and Feedback, Continued

10-C.4.2 Requesting Training for Equipment or Systems

When a unit determines that technical training is needed for specific electronic equipment or systems, a letter requesting training is sent via the chain of command to the Commandant, Office of Systems Force Management (G-SRF).

Letters requesting training must include

- the requestor's name and unit
- the system or equipment requiring training
- a statement describing the need, and
- contact information for questions.

A copy of the letter is sent to the Systems Management and Engineering Facility (SMEF) responsible for the equipment or system.

> **Note**:
> Equipment that is unique to the unit, or has limited installations, may not qualify for Commandant sponsored training.
>
> Training that is required, but does not qualify for Commandant sponsored training, should be sponsored as directed by the unit's chain of command.

Continued on next page

10-C.4 Training Requests and Feedback, Continued

10-C.4.3 Providing Feedback on Training Conducted At or Away From the Unit

Feedback is critical for identifying deficiencies in training. Provide training feedback, via the chain of command, as described in the table below.

When training is conducted ...	Then the unit ...
at the local unit	members provide feedback to their supervisors.
away from the local unit (for example, at a training center)	supervisors and members complete and return the training survey.