

KNOWLEDGE AND SKILL GUIDELINES

for

MARINE TECHNICIANS WHO WORK ABOARD RESEARCH VESSELS

Introduction to these Guidelines

A tremendous diversity and range in skills and knowledge are required of marine technicians who work aboard research vessels. For example, some institutions may have one marine technician assigned to a vessel while others have staffs of more than thirty technicians supporting many vessels. Some marine technicians function as generalists attending to many tasks, while others are highly specialized. Some of the areas of specialization for these technicians include electronics, engineering, computer systems, and scientific support.

There are four task areas that the vast majority of technicians felt are critical to performing their work. These are: operating equipment and instrumentation (A1), maintaining equipment and instrumentation (A2), maintaining safety (D1), and interfacing between scientists and crew (E1). (*The letter-number codes in parentheses refer to the 'Knowledge and Skill Overview Chart' on page X.*) The majority of technicians rated collecting oceanographic data (B1) and collecting ship's underway data (B2) as important. Collecting geophysical data (B3), atmospheric data (B4), biological data (B5), and geochemical data (B6) were rated as important by specialized groups of technicians.

Technicians who support computer systems are the most specialized. The task areas important to these computer technicians are performing system administration (C2), performing scripting/programming (C3), and radio and satellite communications (E6). These tasks are of lesser importance to the majority of other technicians. Engineering technicians were the only group that rated designing and fabricating equipment and instrumentation (A6) high. The electronics technicians show some similarity to general marine technicians except that data collection is considered not as important. Job titles for technicians vary, and the job titles do not always describe the specializations. (*See the 'List of Validation Survey Participants' on pages xx-xx for a list of job titles for the validation survey participants.*)

All knowledge and skills areas listed were considered important to 80 percent or more of the technicians surveyed. *The italicized knowledge or skill areas in the overview chart were important to 40 to 79 percent of the technicians surveyed.* If more than 60 percent of the technicians felt a knowledge or skill area was not necessary it was removed from the list.

In the upper right corner of each task box is a number that corresponds to the average ranking of importance assigned by the technicians (#1-high). The tasks rated lower – up to #26, for example – were ranked lower in overall importance, but are still important to specialized technicians.

Personal characteristics of a marine technician who works aboard research vessels

This is a list of the personal characteristics the initial workshop participants felt characterized a good marine technician:

- Resourceful
- Physically fit
- Able to meet the highest standards, even when faced with limited resources
- Able to pay attention to detail; complete the job at hand
- Possessing a thick skin
- Able to act as an effective liaison among “competing” forces
- Skilled at maintaining the integrity of equipment and instrumentation; recognizing unnecessary and excessive risks
- Skilled at making decisions
- Responsible (for his/her equipment and crew)
- Able to work long hours
- Possessing ambition to learn this field; not to rise professionally outside the field
- Genuinely devoted to his/her work, challenges and all
- Able to balance personal life and life in the field
- Able to work in a team or independently, as needed
- Adaptable to constant change and technological innovations
- Capable of working under high-stress situations
- Committed to pursuing continuing education independently
- Able to recognize his/her limitations, seek help when necessary
- Able to define and grasp the essence of problems
- Able to solve problems and troubleshoot
- Flexible
- Able to communicate well
- Able to get the job done correctly, safely; has the appropriate demeanor
- Customer-oriented (vessels compete for science clients)
- Adaptable to the rigors of shipboard life; doesn’t get seasick from the outset
- Able to handle isolation and exposure to risk
- Able to function as a generalist

DEMOGRAPHICS OF MARINE TECHNICIANS AND SUPERVISORS

Ninety-one technicians and twenty supervisors participated in the workshop and validation survey (four did not indicate their position). Sixteen of the technicians had some supervisory role.

1. How long have you worked as a marine technician? (If you are a supervisor, please check below the number years you worked as a technician.)

Years as a technician	Number of Responses
Less than 1 year	7
1 – 5 years	38
6 – 10 years	23
11 – 15 years	14
More than 15 years	33

2. Are you male or female?

Gender	Number of Responses
Male	91
Female	22

3. What is the highest level of education you have completed?

Highest level of education completed	Number of Responses
Did not complete high school	0
High school graduate or equivalent	2
Completed occupational, trade, or apprenticeship program after high school	8
Some college, no degree	8
College degree (2 years)	8
College degree (4 years)	63
Advanced degree	24

4. What level of education is needed to do your job?

What level of education is needed to do your job?	Number of Responses
Less than high school	0
High school graduation or equivalent	0
Some occupational, trade, or apprenticeship training after high school	19
Some college, no degree	9
College degree (2 years)	11
College degree (4 years)	52
Advanced degree	19

**Knowledge and Skill Guidelines for Marine Technicians
who Work aboard Research Vessels**

Workshop Participant List

Workshop Coordinator: Deidre Sullivan
Workshop Facilitator: Claire Denise
Workshop Recorders: Tony Laska and Nicole Crane

Workshop Date: October 23, 1998

Panel of Marine Technicians

Tony Amos	University of Texas
Stacey Anfuso	Scripps Institute of Oceanography
Dwight Arrants	Duke University
Tim Deering	University of Delaware
Richard Findley	University of Miami, Harbor Branch Oceanographic Institute
Steven J. Hartz	University of Alaska Seward Marine Center
Bill Martin	University of Washington
Richard S. Muller	Moss Landing Marine Laboratories
Steve Poulos	University of Hawaii
Jan Szelag	University of Rhode Island
Marc Willis	Oregon State University

Knowledge and Skill Overview Chart for Marine Technicians who Work aboard Research Vessels

Job description: Individuals who apply basic seamanship, science, computer, and engineering skills to the marine environment – including the open ocean, coastal regions, estuaries, rivers, swamps, and lakes. They may work aboard ships or other vessels, directly underwater (e.g., diving, in submarines), remotely underwater (e.g., ROVs), in a marine laboratory or onshore support facility, or in any number of other marine and coastal settings.

JOB FUNCTIONS	<i>TASK AREAS</i>					
A. Use equipment/ instrumentation	A1 #1 Operate equipment/ instrumentation	A2 #2 Maintain equipment/ instrumentation	A3 #5 Repair equipment/ instrumentation	A4 #10 Install equipment/ instrumentation	A5 #13 Verify equipment/ instrumentation calibration records	A6 #19 <i>Design and fabricate equipment/ instrumentation</i>
B. Collect data	B1 #9 Collect physical and oceanographic data	B2 #14 Collect ship's underway data	<i>B3 #20 Collect geo- physical data</i>	<i>B4 #23 Collect atmospheric and meteorological data</i>	B5 #24 <i>Collect biological data</i>	<i>B6 #25 Collect geochemical data</i>
C. Manage and maintain computers and networks	C1 #11 Use software programs	C2 #17 Perform system administration	<i>C3 #26 Perform scripting/ programming</i>			
D. Direct deck operations	D1 #3 <i>Maintain safety</i>	D2 #6 Launch and retrieve sampling equipment	D3 #8 Mobilize/de- mobilize scientific equipment	D4 #18 Store/ handle hazardous materials	D5 #22 <i>Operate small boats</i>	
E. Perform ancillary duties	E1 #4 Interface between scientists and crew	E2 #7 <i>Inventory, evaluate, and order equipment and supplies</i>	E3 #12 Facilitate pre- and post-cruise logistics	E4 #15 Provide training	E5 #16 Write reports and recommendations	<i>E6 #21 Satellite communication/ radio communication</i>

The tasks in regular font were considered to be important to the majority of technicians. *The tasks in italics are important to specialized technicians.* The numbers in the upper right hand corner of each task box indicate how the technicians ranked the importance of this task.

(#1 = highest, #26 = lower, but still very important to specialized technicians)

Knowledge and Skill Guidelines for Marine Technicians who Work aboard Research Vessels

Critical work function A: Use equipment/instrumentation

TASK	Performance Indicators How do we know when the task is performed well?	Technical Knowledge and Skills What marine technicians need to know and/or be able to do in order to perform this task well
A1. Operate equipment/ instrumentation	<ul style="list-style-type: none"> • Equipment/instrumentation is operated safely and according to guidelines. • Equipment/instrumentation obtains results that are within expected limits. • Results meet quality control standards. • Results meet expectations of principal investigator. • Data are properly collected, stored, and delivered to user in a timely manner. • Log book is current and correct. • Correct calibration standards are used. 	<ul style="list-style-type: none"> • Knowledge of equipment specifications • Ability to operate CTDs, sonars, echo-sounders, current profilers, corers, nets, winches, air guns, GPS, telecommunications equipment, underwater cameras, XBTs, salinometers, etc. • Ability to apply computer skills • Ability to read, follow, and understand technical manuals and written procedures • Knowledge of parameters being measured, such as salinity or wind speed • Ability to recognize valid data • Ability to communicate clearly, both orally and in writing
A2. Maintain equipment/ instrumentation	<ul style="list-style-type: none"> • Equipment/instrumentation maintenance is performed on schedule. • Equipment/instrumentation operates with high reliability. • Equipment/instrumentation functions within specifications. • Log book is current. • Customers are satisfied. 	<ul style="list-style-type: none"> • Ability to schedule maintenance events • Knowledge of equipment specifications • Knowledge of and ability to apply basic electronic and mechanical skills • Ability to use and care for cables and connectors • Ability to use and care for tools • Ability to read, follow, and understand technical manuals and written procedures • Knowledge of parameters being measured, such as salinity or wind speed • Ability to write clear, concise log entries

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Critical work function A: Use equipment/instrumentation (continued)

TASK	Performance Indicators How do we know when the task is performed well?	Technical Knowledge and Skills What marine technicians need to know and/or be able to do in order to perform this task well
A3. Repair equipment/ instrumentation	<ul style="list-style-type: none"> • Relevant repairs are coordinated with manufacturer. • Lock out/tag out procedures are followed. • Log book is current. • Equipment is returned to working condition. 	<ul style="list-style-type: none"> • Knowledge of electronic and mechanical test equipment • Ability to troubleshoot systems • Ability to use computer diagnostics • Ability to perform relevant computer, electronic, and mechanical repairs on equipment • Ability to read schematics and mechanical drawings • Ability to apply time management skills • See A1 and A2.
A4. Install equipment/ instrumentation	<ul style="list-style-type: none"> • Placement is correct and equipment is secured properly. • Equipment/instrumentation operates to required specifications. • Equipment/instrumentation meets American Bureau of Shipping, Code of Federal Regulations, OSHA, USCG, Naval INSURV, UNOLS, and RVOC Safety Standards and state and local policies. • Log book is initiated. 	<ul style="list-style-type: none"> • Knowledge of basic wiring – what equipment draws and how to get power to it • Ability to locate and comply with relevant standards, policies, applicable laws, and regulations • Ability to interface equipment • Ability to secure equipment safely • See A3.

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Critical work function A: Use equipment/instrumentation (continued)

TASK	Performance Indicators How do we know when the task is performed well?	Technical Knowledge and Skills What marine technicians need to know and/or be able to do in order to perform this task well
A5. Verify equipment/ instrumentation calibration records	<ul style="list-style-type: none"> • Equipment/instrumentation functions within manufacturer’s specifications. • Equipment/instrumentation complies with current calibration standards. • Calibration records are complete, current, and documented. • Log book is current. 	<ul style="list-style-type: none"> • Familiarity with calibration procedures and standards • Maintain calibration records • Ability to apply computer skills • Basic understanding of scientific notation • Knowledge of the scientific method • Knowledge of and ability to apply mathematical skills, including statistics, algebra, and geometry • Mechanical aptitude and dexterity • Ability to communicate clearly, both orally and in writing
A6. Design and fabricate equipment/ instrumentation	<ul style="list-style-type: none"> • Equipment/instrumentation meets installation requirements. • Equipment/instrumentation meets the needs of the project. • Documentation is current, proper, and understandable. 	<ul style="list-style-type: none"> • Knowledge of current technologies available • Ability to create basic schematics and mechanical drawings • Ability to outline and communicate a given design to others in oral and written form • See A2.

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Critical work function B: Collect data

TASK	Performance Indicators How do we know when the task is performed well?	Technical Knowledge and Skills What marine technicians need to know and/or be able to do in order to perform this task well
B1. Collect physical and oceanographic data	<ul style="list-style-type: none"> • Samples are collected properly. • Quality control standards are met. • Scientific sampling objectives are met. • Replicate and/or check samples agree. • Data have no gaps. • Data are stored and delivered to user in a timely manner. • Documentation is complete; log book is current and correct. • Data meet expectations of the principal investigator. • Customers are satisfied. 	<ul style="list-style-type: none"> • Ability to operate sampling equipment • Ability to operate deck gear (e.g., winches, tuggers, A-frames) • Knowledge of basic physical oceanography, including wind and waves, salinity, acoustics, bathymetry, and ocean circulation • Knowledge of quality control procedures • Knowledge of trigonometry and geometry • Ability to write clear, concise log entries • Ability to gather required data, to the customer's satisfaction
B2. Collect ship's underway data	<ul style="list-style-type: none"> • Samples are collected properly. • Quality control standards are met. • Scientific sampling objectives are met. • Replicate and/or check samples agree. • Data have no gaps. • Data collected correlate with ship's position. • Data are stored and delivered to user in a timely manner. • Documentation is complete; log book is current and correct. • Data meet expectations of the principal investigator. • Customers are satisfied. 	<ul style="list-style-type: none"> • Ability to operate sampling equipment • Ability to operate deck gear (e.g., winches, tuggers, A-frames) • Knowledge of basic physical oceanography, including wind and waves, salinity, acoustics, bathymetry, and ocean circulation • Ability to understand and use GPS • Knowledge of navigation (theory and equipment) • Ability to read charts • Ability to apply computer skills • Knowledge of quality control procedures • Ability to write clear, concise log entries • Ability to gather required data, to the customer's satisfaction

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Critical work function B: Collect data (continued)

TASK	Performance Indicators How do we know when the task is performed well?	Technical Knowledge and Skills What marine technicians need to know and/or be able to do in order to perform this task well
B3. Collect geophysical data	<ul style="list-style-type: none"> • Samples are collected properly. • Quality control standards are met. • Scientific sampling objectives are met. • Replicate and/or check samples agree. • Data have no gaps. • Data are stored and delivered to user in a timely manner. • Documentation is complete; log book is current and correct. • Data meet expectations of the principal investigator. • Customers are satisfied. 	<ul style="list-style-type: none"> • Ability to operate sampling equipment • Ability to operate deck gear (e.g., winches, tuggers, A-frames) • Knowledge of basic physical oceanography, including wind and waves, salinity, acoustics, bathymetry, and ocean circulation • Knowledge of marine geology, including bathymetry, magnetics, and gravity • Ability to use equipment such as pipe dredges, rock dredges, piston cores, box cores, air guns, seismic systems, and sound sources • Knowledge of quality control procedures • Ability to write clear, concise log entries • Ability to gather required data, to the customer's satisfaction
B4. Collect atmospheric and meteorological data	<ul style="list-style-type: none"> • Samples are collected properly. • Quality control standards are met. • Scientific sampling objectives are met. • Replicate and/or check samples agree. • Data have no gaps. • Data are stored and delivered to user in a timely manner. • Documentation is complete; log book is current and correct. • Data meet expectations of the principal investigator. • Customers are satisfied. 	<ul style="list-style-type: none"> • Ability to operate sampling equipment • Ability to operate deck gear (e.g., winches, tuggers, A-frames) • Knowledge of basic physical oceanography, including wind and waves, salinity, acoustics, bathymetry, and ocean circulation • Knowledge of atmospheric and meteorological disciplines, including weather patterns, solar radiation, wind patterns, sea state, and cloud cover • Knowledge of basic math, such as trigonometry and geometry • Knowledge of quality control procedures • Ability to write clear, concise log entries • Ability to gather required data, to the customer's satisfaction

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Critical work function B: Collect data (continued)

TASK	Performance Indicators How do we know when the task is performed well?	Technical Knowledge and Skills What marine technicians need to know and/or be able to do in order to perform this task well
B5. Collect biological data	<ul style="list-style-type: none"> • Scientific sampling objectives are met. • Samples are collected properly. • Quality control standards are met. • Replicate and/or check samples agree. • Data have no gaps. • Data are stored and delivered to user in a timely manner. • Documentation is complete; log book is current and correct. • Data meet expectations of the principal investigator. • Customers are satisfied. • Dive plan is followed (if appropriate). 	<ul style="list-style-type: none"> • Ability to operate sampling equipment • Ability to operate deck gear (e.g., winches, tuggers, A-frames) • Knowledge of basic physical oceanography, including wind and waves, salinity, acoustics, bathymetry, and ocean circulation • Knowledge of biological disciplines, including basic biology, primary productivity, and marine animals • Ability to use equipment such as nets, trawls, dredges, acoustic profilers, PAR sensors, and fluorometers • Knowledge of basic lab procedures • Ability to assist with quantitative sampling and understand scientists' instructions • Knowledge of quality control procedures • Ability to write clear, concise log entries • Ability to gather required data, to the customer's satisfaction • Ability to obtain SCUBA certification at appropriate level
B6. Collect geochemical data	<ul style="list-style-type: none"> • Scientific sampling objectives are met. • Samples are collected properly. • Quality control standards are met. • Replicate and/or check samples agree. • Data have no gaps. • Data are stored and delivered to user in a timely manner. • Documentation is complete; log book is current and correct. • Data meet expectations of the principal investigator. • Customers are satisfied. 	<ul style="list-style-type: none"> • Ability to operate sampling equipment • Ability to operate deck gear (e.g., winches, tuggers, A-frames) • Knowledge of basic physical oceanography, including wind and waves, salinity, acoustics, bathymetry, and ocean circulation • Knowledge of geochemical disciplines, including salinity, trace metals, nutrients, gases, and oceanographic tracers (e.g., CFCs) • Knowledge of clean lab techniques • Knowledge of quality control procedures • Ability to write clear, concise log entries • Ability to gather required data, to the customer's satisfaction

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Critical work function C: Manage and maintain computers and networks

TASK	Performance Indicators How do we know when the task is performed well?	Technical Knowledge and Skills What marine technicians need to know and/or be able to do in order to perform this task well
C1. Use software programs	<ul style="list-style-type: none"> • Appropriate software is selected for each task. • Desired end product is produced efficiently. 	<ul style="list-style-type: none"> • Ability to use software such as databases, spreadsheets, word-processing, communication (e-mail), ARC-View, and Power Point • Ability to process, reduce, display, and store data
C2. Perform system administration	<ul style="list-style-type: none"> • System functions within specifications. • System operates with high reliability. • Maintenance is performed on schedule. • Log books are current and legible. • Multiple systems are interfaced successfully. • Scientific data are recorded, backed up, and made accessible. • Customers are satisfied. 	<ul style="list-style-type: none"> • Knowledge of and ability to install and maintain operating systems, software, hardware, and networks • Knowledge of and ability to troubleshoot/repair operating systems, software, hardware, and networks • Ability to write clear, concise log entries • Knowledge of incremental back-up techniques • Knowledge of storage media (e.g., CD, diskette, Zip, FTP)
C3. Perform scripting/programming	<ul style="list-style-type: none"> • Program performs planned tasks. • Program is well-documented. • Source code is provided. 	<ul style="list-style-type: none"> • Knowledge of scripting languages, including PERL, C-Shell, Korn Shell, Bourne Shell, Tcl/TK, and Awk/gawk/nawk • Familiarity with programming languages such as C, C++, Fortran, Visual Basic, and Lab-View • Ability to document program/source code in clear, concise language

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Critical work function D: Direct deck operations

TASK	Performance Indicators How do we know when the task is performed well?	Technical Knowledge and Skills What marine technicians need to know and/or be able to do in order to perform this task well
D1. Maintain safety	<ul style="list-style-type: none"> • Safety procedures are in place and implemented. • All persons are familiar with safety procedures. • Safety briefings are well-documented. • Workers' compensation claims are minimized. 	<ul style="list-style-type: none"> • Knowledge of and ability to implement ship's safety procedures • Ability to conduct a safety briefing
D2. Launch and retrieve sampling equipment	<ul style="list-style-type: none"> • Sampling equipment is launched safely and effectively. • Sampling equipment is retrieved without damage. • Sampling efforts are successful. 	<ul style="list-style-type: none"> • Ability to operate launch and recovery equipment (e.g., pelican hooks, happy hooker ring) • Ability to manipulate winches, cranes, and frames safely • Ability to operate a forklift • Knowledge of seamanship and rigging • Knowledge of hand signals • Understanding of and ability to apply underway deck safety protocol • Ability to recognize unsafe conditions and react properly

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Critical work function D: Direct deck operations (continued)

TASK	Performance Indicators How do we know when the task is performed well?	Technical Knowledge and Skills What marine technicians need to know and/or be able to do in order to perform this task well
D3. Mobilize/ de-mobilize scientific equipment	<ul style="list-style-type: none"> • Equipment arrives at/departs from destination in good working order. • Equipment is safely crane-lifted on and off vessel. • Equipment is stowed and secured properly for sea-going conditions. 	<ul style="list-style-type: none"> • Ability to pack, secure, install, and ship equipment/instrumentation • Ability to operate winches, cranes, and frames • Ability to operate a forklift • Understanding of seamanship and rigging • Knowledge of shipboard layouts • Ability to obtain SCUBA certification at appropriate level
D4. Store/handle hazardous materials	<ul style="list-style-type: none"> • MSDS sheets are readily available. • Materials are properly stored, per regulations. • Materials are properly inventoried, per regulations. • Appropriate containment procedures are in effect. • Safety protocol is in place. • Spills are cleaned up quickly and properly. • Chain of custody forms is complete. 	<ul style="list-style-type: none"> • Ability to read MSDS sheets • Knowledge of and ability to apply appropriate state, federal, institutional, and international regulations, such as DOT, OSHA, and IAT • Ability to respond to accidents • Knowledge of basic chemistry and hazardous materials • Knowledge of basic radioisotope safety, such as lab procedures and isolation
D5. Operate small boats	<ul style="list-style-type: none"> • Small boats are operated safely. • Assigned mission is completed satisfactorily. • Compliance with state, federal, institutional, and international regulations is maintained. 	<ul style="list-style-type: none"> • Knowledge of and ability to apply seamanship skills • Knowledge of and ability to use outboard engines • Knowledge of and ability to use navigation tools, such as GPS and Loran • Ability to use radios, including knowledge of communication protocols • Ability to use basic survival skills • Knowledge of and ability to apply appropriate state, federal, institutional, and international regulations

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Critical work function E: Perform ancillary duties

TASK	Performance Indicators How do we know when the task is performed well?	Technical Knowledge and Skills What marine technicians need to know and/or be able to do in order to perform this task well
E1. Interface between scientists and crew	<ul style="list-style-type: none"> • Communications are clear and concise. • Scientists are well-informed as to the capabilities and limitations of the vessel. • All parties are informed of plan of action, time line, and individual roles. • Crew has been briefed on scientific mission. 	<ul style="list-style-type: none"> • Ability to communicate clearly, both orally and in writing • Knowledge of and ability to use good customer relations skills • Ability to solve problems
E2. Inventory, evaluate, and order equipment and supplies	<ul style="list-style-type: none"> • Adequate equipment and supplies are on hand. • Equipment and supplies are ordered in a timely manner. • Proper inventory of equipment and supplies is maintained. 	<ul style="list-style-type: none"> • Ability to maintain an inventory of equipment and supplies • Knowledge of inventory systems • Knowledge of equipment consumption rates • Ability to locate and contact vendors and manufacturers • Knowledge of purchasing procedures • Ability to use the Internet, web browsers, and search engines • Ability to use written, oral, customer relations, and communication skills •
E3. Facilitate pre - and post-cruise logistics	<ul style="list-style-type: none"> • Perform operations properly, with minimal assistance and oversight. • Perform tasks correctly and efficiently. • Crew members are properly briefed. • Operations are performed with maximum safety. • Data and equipment integrity are maintained. • Necessary equipment is identified, secured, and returned after cruise. 	<ul style="list-style-type: none"> • Ability to communicate clearly, both orally and in writing • Knowledge of shipping procedures and time lines • Knowledge of customs requirements

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Critical work function E: Perform ancillary duties (continued)

TASK	Performance Indicators How do we know when the task is performed well?	Technical Knowledge and Skills What marine technicians need to know and/or be able to do in order to perform this task well
E4. Provide training	<ul style="list-style-type: none"> • Trainees perform tasks correctly and efficiently. • Trainees perform operations properly, with minimal assistance and oversight. • Crew members are properly briefed. • Operations are performed with maximum safety. • Data and equipment integrity are maintained. 	<ul style="list-style-type: none"> • Knowledge of training procedures • Ability to assess trainees' skills • Knowledge of safety procedures • Ability to conduct a safety briefing • Ability to communicate clearly, both orally and in writing • Ability to maintain data and equipment in good condition
E5. Write reports and recommendations	<ul style="list-style-type: none"> • Complete and well-written reports are on hand when requested. • Reports are completed on time. 	<ul style="list-style-type: none"> • Ability to communicate clearly, both orally and in writing • Knowledge of technical terms • Ability to meet deadlines
E6. Satellite communication/ radio communication	<ul style="list-style-type: none"> • Messages get through. • Customer billing is handled without problems. 	<ul style="list-style-type: none"> • Knowledge of communication systems, including Inmarsat and e-mail procedures • Ability to communicate clearly, both orally and in writing • Knowledge of and ability to use good customer relations skills • Ability to solve problems