DEPARTMENT OF THE NAVY
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IN REPLY REFER TO

COMNAVSURFORINST 3540.3A CH-1
N7
22 Sep 08

COMNAVSURFOR INSTRUCTION 3540.3A CHANGE TRANSMITAL 1

From: Commander, Naval Surface Forces

Subj: ENGINEERING DEPARTMENT ORGANIZATION AND REGULATIONS MANUAL

Ref: (a) COMNAVSURFORINST 3502.1D, ARTICLE 2201
(b) COMNAVSURFOR MSG DTG 151706ZNOV07
(c) COMNAVSURFOR MSG DTG 182356ZAPR08
(d) COMNAVSURFOR MSG DTG 052046ZAUG08

Encl: (1) Appendix E - Engineering Plant Watch Standing Guide

1. Purpose. This instruction promulgates enclosure (1) as a tool and ready reference for all personnel who stand watch in an engineering plant. This guide builds on references (a) through (d) in discussing fundamental watch standing principles, the accurate assessment of the material condition of our ships, and provides a consolidated collection of requirements to aid in proper watch standing performance.

2. Background. Trained knowledgeable operators form the foundation upon which the Naval Engineering Program is built. Integrity, Formality, Procedural Compliance, Level of Knowledge, Questioning Attitude, Forceful Backup, and Organizational Risk Management are the bedrock principles that must be instilled in our watch standers. Vigilance and compliance with approved procedures are the vital first steps to guarantee safe engineering plant operations.

3. Scope. The watch standing guide is intended for all personnel who stand watch in a naval engineering plant, including those pursuing qualification.

4. Procedure. Ships are recommended to download enclosure (1) from the NKO or COMNAVSURFOR websites and publish the guide in a convenient booklet format.

5. Action. Add enclosure (1) to the basic instruction. Enclosure (1) will be available to all propulsion plant watch standers for use as a reference, both in and out of the propulsion plant.

6. Administration and Maintenance. CNSF N43 and N7 will review the guide annually for potential revision. Ships are encouraged to provide feedback to N43 and N7 as appropriate.

7. Cancellation. When above changes are entered in the basic instruction.

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Chief of Staff

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APPENDIX E
ENGINEERING PLANT WATCH STANDING GUIDE

Table of Contents **Page**

Seven Guiding Principles of the Naval Engineering Program

How we conduct ourselves in the operation and supervision of a naval engineering plant can be distilled down to relatively few overarching or guiding principles. There are seven guiding principles that underlie how we do business in the day-to-day operation and administration of the engineering plants in our care. These are not necessarily the only set of principles that could be distilled, but they have worked well for several years and so are presented here.

These principles are:

- Integrity
- Formality
- Procedural Compliance
- Level of Knowledge
- Questioning Attitude
- Forceful Backup
- Operational Risk Management

These principles apply all the time in everything we do. Whether we are defining operating or maintenance standards, training new watch standers, or trying to get to the root cause of an issue, these principles apply. At times, one or two of them may overlap, but you will find that matters can almost always be defined in terms of one or a combination of these principles. For example, when debriefing a watch standing issue, the root causes typically fall into one or more of the categories defined by the seven principles. Similarly, the corrective actions required to address the root causes fall into the same seven categories.

As you read through the definitions of each principle, then through the Watch Stander’s Guide that follows, you will notice that the practical examples given in the Guide all flow from the principles discussed here.

INTEGRITY

The dictionary simply defines integrity as firm or rigid adherence to a code or standard of values! Most new sailors can give a reasonable definition of integrity; many describe it as always doing what is right even when no one is watching. However, at first many do not fully appreciate the importance of integrity as it relates to the safe operation of our naval engineering plants. New sailors should be taught early and reminded frequently of this important concept.

The safe operation of a naval engineering plant is a complex process involving the coordinated efforts of a team of trained operators. Vital decisions are often made based on initial reports from watch standers. Inaccurate, incomplete, or misleading verbal or written reports can lead to poor decisions by those in charge with predictably poor results for the team. Integrity is the foundation upon which our team is built. *Integrity is a critical character trait that every naval engineering plant operator must possess*. Without it, you cannot be part of the team.

The code or standard of values we expect from every operator includes:

- Honesty. Make concise, accurate, and honest reports that do not mislead.
- Responsibility. Take responsibility for your actions. Never avoid accountability. Open, honest and timely admission of your own mistakes and those of others is the standard that enables process improvement. To encourage integrity, commands should strive to correct honest mistakes short of criminal negligence with training vice punishment. It is far better for a watch stander to admit a mistake, than for extensive resources to be expended to determine why a propulsion plant anomaly occurred.
- Trust, but verify. We trust that every operator is trying to do their best, yet we know that humans are capable of mistakes. In the operation of an engineering plant, mistakes may have catastrophic consequences so we provide additional safeguards by asking others to verify. This is not a lack of trust. It is forceful backup. Expect it and appreciate it, but having integrity means never letting your own guard down because of it. You are always the first line of defense.
- Ownership. Place the appropriate level of concern on every task assigned. Take pride in doing all tasks you are assigned to perfection.
- Accountability. When you sign or initial a document or a log, you do so with the knowledge that you are placing your honor and integrity on the line by saying it is accurate to the very best of your knowledge.
- Issue Resolution. Always take the appropriate steps to report, document, and resolve issues vice ignoring them. When faced with choices, always choose the technically correct path.

FORMALITY

The dictionary defines formality as the rigorous adherence to established forms, rules, or customs.

The steam, hot water, electrical and mechanical systems associated with engineering plants carry with them some inherent dangers but they should never be un-safe. The difference lies in the formality with which we operate these plants and the no-nonsense approach we expect from every operator. Formality can be further described as that culture or mindset that encompasses multiple watch standers, watch teams, an entire department, or ship. It is the mindset or climate of standards that govern their behavior as a group or individually while on watch or in the plant. It includes:

How we act.
- As a team
- As an individual

How we communicate.
- Precise orders
- Verbatim repeat-backs
- Listening to the repeat-back
- Accurate log keeping and timely review

How we perform maintenance.
- Work Controls, Notification, Briefing, and Supervision

How we resolve issues.
- Dual reporting via watch and divisional chains of command
- Formal documentation
- Timely technical resolution

How we involve the team.
- Announcements
- Night Orders

How we enable backup from others.
- Status Announcements
- Interactive discussion conducted so that others may be involved
- Point, Read, Think, then Operate

How we foster ownership

- Individual responsibility
- Individual accountability
- Supervisory oversight at key points during maintenance or evolutions
- What we will or will not accept as our standard of excellence.
- If you note a problem, yet fail to act; you just became part of the problem and set a poor standard!

PROCEDURAL COMPLIANCE

This pillar takes formality a step further. Established procedures are defined as approved written instructions from higher authority. They include EOSS, Tech Manuals, TYCOM instructions and notes, C. O. approved local operating procedures and Temporary Standing Orders (TSO) and other local ship or department instructions.

Most of these procedures have evolved over many years from the lessons learned following mistakes made by others. Don't re-learn old lessons the hard way. Use the books that are provided and insist that others use them. Know how to verify that they include the most recent changes. Your training and experience provide you with the knowledge to find the right procedure. The fact that you: (a) can't find it, or (b) don't understand it, or (c) can't make it work as written, are issues that should be a big red flag to you. Don't ignore those flags; seek guidance from your chain of command. Never invent your own procedure.

LEVEL OF KNOWLEDGE

Your level of knowledge is the foundation upon which you base your decisions. A sound level of knowledge of whole plant operations leads to intelligent decisions. It is by no means enough that you can memorize the immediate actions, procedures, systems diagrams, and a list of plant trivia that are so often the product of our training and qualification program. Without a solid understanding of the reasons why, behind those actions, procedures, systems, and set points you will soon begin to forget them. On the other hand if you understand the reason for a particular action you are much more likely to make the "intelligent" decision. When studying, ask yourself and others why? Ask it frequently (see the Questioning Attitude pillar). Know what to expect – and why – when you throw a switch or turn a valve hand wheel. Never stop improving your level of knowledge. If you aren't getting better, then surely you must be getting worse.

QUESTIONING ATTITUDE

Questioning Attitude is both a critical thinking skill and an exercise in vigilance. It is an individual personal trait that is learned, yet requires practice to remain sharp. It demands an alert frame of mind, an understanding of how the plant is operating, and a conscious effort to evaluate actual indications versus expected indications.

If you enter the plant expecting everything to be normal that is precisely what you will find until a problem becomes so significant it reaches out and “bites” you. On the other hand, if you enter the plant with an attitude that you will find something worth fixing, the tendency will be to find small problems before they become serious. An operator with a questioning attitude frequently asks:

What is wrong with this picture?
Is this the correct valve or switch?
Am I sure?
What do I expect to happen when I operate it?
Is my shipmate doing the right thing or about to make a mistake?
Why Alpha is different from Bravo or #1 from #2?

Believe your indications but don’t forget – an indication is just that… an indication. An abnormal reading on a gage is useless until an operator evaluates its significance, understands the situation, and takes appropriate action. When numerous operators walk by this indication and ignore it, the opportunity for early (and easy) problem resolution is lost. **You get what you inspect not what you expect.**

FORCEFUL BACKUP

You’ve probably heard the term “backup” or a closely related term in many different situations. If you played baseball or softball as a kid, or just watched it as a kid or adult, you saw numerous examples in every game. Whenever an outfielder went to field a ball hit his or her way, a good teammate always provided backup in case the ball got by, even when the first outfielder was expected to easily make the play. In the operation or maintenance of an engineering plant, backup is watching one another’s back to make sure procedures are being done correctly. It’s the pulse check the Chief uses to ensure an evolution is being done correctly. The “forceful” part is closely tied to integrity. Being forceful when backing up a shipmate is having the courage to point him or her back down the right path if

they’ve started to stray. Being forceful is also being able to seek and obtain clarification to get to the right procedure when a supervisor errantly directs you to the wrong one. Forceful backup (with a healthy dose of integrity) is stopping an unsafe act when it would be just as easy to ignore it and keep going.

Forceful backup is also a cornerstone of proper supervision. Proper supervision does not indicate a lack of trust of your subordinates. On the contrary, your supervision is there as a backup to ensure their success.

Other engineering plant examples (not all inclusive):

- Log reviews
- Multiple independent checks of tag outs
- Multiple independent checks for valve lineups
- Listening for the verbatim repeat-back after issuing an order

As a final observation, it has been noted during the investigation process for many mishaps that someone saw something that was not quite right, but failed to say or do anything that might have prevented the mishap from occurring. That situation is precisely what forceful backup is meant to prevent.

OPERATIONAL RISK MANAGEMENT (ORM)

All Engineering Plant operations have inherent risk involved. ORM is the tool to minimize and control those risks. Knowing the risk involved will help determine the outcome and significantly enhance the overall decision making of every process. This process can be applied to everyday life as well. For instance, if you plan to travel any distance you should weigh all the factors for the trip. These factors will include; weather, travel conditions, time of day, distance, time to travel, and your personal abilities to make the trip. ORM shall always be applied in the engineering plant for all evolutions, whether for drills or simple valve line-ups.

The following are the four ORM Principles:

1. Accept risks when benefits outweigh the cost.
2. Accept no unnecessary risk.
3. Anticipate and manage risk by planning.
4. Make risk decisions at the right level.

The Five Steps of ORM are:

1. Identify the Hazards
2. Hazard Assessment
3. Make Risk Decisions
4. Implement Controls
5. Supervise

Hazard is defined as “A condition with the potential to cause personal injury or death, property damage or mission degradation”. Risk is defined as “An expression of possible loss in terms of severity and probability”. ORM shall be used rigorously in all engineering processes, especially watch standing. You have to ask yourself, “Should I be doing this?” A supervisor should ask the person conducting the evolution “How many times have you done this evolution and when was the last time?” These questions will help determine the controls needed to ensure success.

Sample Application of the Guiding Principles

One example where all of the pillars come together is in the proper preparation of a tag out. If one person involved in preparing a tag out assumes the other person “must know what they’re doing” and will therefore “catch any mistake that I make,” we have created what is called a 1 of 1 vote. If both Sailors make this mistake, then the probability of making a mistake will be higher.

Two “good” Sailors backing up each other are ten times better than your best Sailor working on his or her own. Assume a “good” Sailor makes a mistake in 1/100 times while the “best” Sailor makes a mistake in 1/1000 times. 1/100 times 1/100 equals 1/10,000 versus 1/1000.

If two “good” Sailors properly perform independent checks of the proposed tag out and you include a diligent layer of supervision (e.g. the reviewing officer), the probability of failure gets considerably smaller. This is called the “Rule of a Million.” Two “good” Sailors (1/100 times 1/100) and a diligent supervisor (1/10,000 times 1/100 equals 1/1,000,000) can reduce the risks of an error to one in a million times.

If the preparers are system experts who are concerned for their shipmates (your “best” Sailors) and want to ensure the likelihood of failure is as small as it can be, the odds are even better.

As evident in the above discussion, application of the guiding principles can improve a situation against failure. How did

application of the principles (pillars) get us there? Picking out some of the key points above reveals:

Concerned for their shipmates	Integrity
System expertise	Level of Knowledge
Independent checks	Procedural Compliance
	Formality
	Forceful Backup
Diligent supervision/Isolation	Forceful Backup
Verification	Questioning Attitude
Controlling Risks	
Organizational Risk Management	

Some of the pillars overlap in this example, but the point is that the difference between success and failure by any team depends on the performance of <u>everyone</u> involved. Every good Sailor should strive to minimize mistakes.

Chapter 1. Watch Standing Philosophy

Formality of Watch Standing [1] [2]

1. All watch standers should present a professional, military appearance.

2. All watch standers must be physically capable of standing the watch:

    a. Not ill or injured

    b. Well rested

    c. Well hydrated

3. Watch standers not physically capable of standing watch have the responsibility to notify their chain of command to arrange for a watch relief.

4. Watches should be stood in a professional manner.

Watch Turnover. [3]

1. A good watch turnover prepares you for events expected during your watch and, thorough situational awareness, prepares you to immediately recognize and effectively combat the unexpected.

2. Inspect the watch station to determine the status of vital systems and equipment.

3. Conduct a "talk through" of watch station status with the watch stander on watch, noting:

    (a) Significant items noticed during review of logs.

    (b) Remedial action being taken on equipment out of commission and any maintenance in progress.

    (c) Any abnormal equipment conditions, lineups or possible problem areas reported during previous watches.

    (d) Discrepancies noticed during the pre-relief inspection.

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[1] "Station of Watch Officers", "General Duties of Watch Officers and Watch Standers", OPNAV Instruction 3120.32C, Standard Organization and Regulations of the U.S. Navy (SORM), Articles 402.c, 403.c

[2] "Maintaining Formality", Naval Ships Technical Manual (NSTM), Chapter 079, Section 49.1.3.6

[3] "Watch Relief", NSTM, Chapter 079, Section 49.4

(e) Expected evolutions planned for your watch and the status of preparations.

4. Watch relief should only occur when plant conditions are stable.

5. When satisfied with your knowledge of the plant and watch station conditions, formally take the watch stating, "I relieve you."

6. The off-going watch stander then states, "I stand relieved", and signs the appropriate log(s) noting the time of relief.

7. Watch relief should only occur with permission of the EOOW/EDO authorized to grant a watch relief.

(a) Sounding and Security relieved with EOOW permission.

(b) Space Supervisor and subordinate watch stations relieved with EOOW permission.

Use of Procedures

1. Procedures must be followed verbatim.

2. Consult a supervisory watch if a procedure is not completely understood.

3. Almost every evolution is covered by a written procedure. Expend the energy to find the procedure, and use it.

4. If a written procedure does not work as written, or can be made easier to use, talk to your chain of command about submitting a change to the applicable manual.

Questioning Attitude [6]

1. Standing watch requires that you *always* pay close attention to plant conditions. Having a questioning attitude means asking yourself probing questions, such as:

a. that parameter normal?

b. Did that do what I expected?

[6] "Instrument Readings", NSTM, Chapter 079, Section 49.5

c.. Where is the flow noise I anticipated?

2. Asking questions (and ensuring that you find the answer) is a very effective method of preventing small problems from becoming large ones.

3. A good watch stander is suspicious; he/she expects problems. Every unexplainable change, no matter how small it may seem, should be treated as an indication there is a problem that should be promptly and thoroughly investigated.

Formal Communications

1. Each order given must be repeated back verbatim to ensure the order was understood correctly. If you are given an order that you do not understand or that you believe is incorrect, get clarification before carrying out the order.

2. Use approved abbreviations and acronyms. Ships normally delineate the terminology allowed for use in the engineering plants because, when all watch standers are using the same language, the chance for a misunderstood communication is greatly reduced.

3. Use the appropriate watch stander designator when addressing a watch stander. Address off-watch personnel by their rank and last name. Do not allow informal communications such as first names when addressing personnel.

4. Wire-free communications (WIFCOM) formality is no different than that expected over sound powered phones.

5. Good, formal communications require a two-way exchange of information. Ensure that you report completion of an assigned task to the supervisor who ordered it.

Point, Read, Think, Then Operate

Point to the valve/switch and to the direction/position of operation. Read the actual nomenclature associated with the equipment. Think before operating the valve/switch to ensure it is indeed the correct valve/switch you intend to operate. If it is the correct valve/switch, then operate it. Numerous mishaps have been caused by operation of the wrong switch or valve. Do not let this happen on your watch. Supervisors and fellow operators should use the pause injected by the “think” step to provide forceful backup. Use a short command (e. g. Stop or hands off) to prevent improper operation.

Training Tips for Conducting an Evolution

1. Use the correct procedure (EOP, PMS, Ship's Local Procedure).

2. IAW the EOSS User's Guide, "at the highest level of proficiency, the watch stander will utilize the procedure as a checkoff sheet, ensuring that all required actions are completed in the correct sequence. The EOP should be reviewed prior to accomplishing the required procedure and it should be re-read again after the procedure is accomplished to ensure all required actions have been completed."

a. Use of a grease pencil is recommended to ensure all steps are completed and no steps are skipped.

3. "Steps in the procedure must be accomplished, as written and in the stated sequence, without deviation" IAW EOSS User's Guide (applies to EOP and EOCC procedures).

4. Make sure you demonstrate to the evaluator that you are accomplishing the steps (i.e. checking valve position, pointing to a parameter on a gage, writing down temperatures/pressures in grease pencil, pointing to switch position, lights illuminated/extinguished, etc).

5. If valve labels are missing and the watchstander knows the proper valve label by the EOP diagram and system knowledge, the watchstander should apply a temporary label and report the discrepancy to EOOW after completion of the procedure. If the watchstander is unsure of the valve number, report discrepancy to EOOW immediately.

6. After each evolution the watchstander should do one of the following:

a. Report discrepancies to the EOOW (submit written list for numerous discrepancies) **OR**

b. Report to the EOOW "no discrepancies noted".

7. System Alignments (Align for operation or verifying online system alignment)

a. Aligning a system for operation prior to placing it in operation:

(1) Place all valves, switches, etc. in the proper position IAW EOP.

b. Verifying alignment of a system in operation:

(1) Normally conducted when a system alignment problem is suspected.

(2) Do not change the position of any valve, switch, etc., verify it is in the correct position IAW EOP. If a watchstander finds a valve in the wrong position, notify the EOOW immediately and request permission to place it in the correct position.

c. Verifying valve position:

(1) Open valves - turn slightly in the closed direction and then back off.

(2) Closed valves - attempt to turn the valve in the closed direction IAW Tagout User's Manual (TUM).

(3) Rising stem, butterfly valves and any other valves that have local position indicators can be verified visually.

8. Ensure equipment is within operating parameters IAW procedure. If equipment is out of parameters, stop and report to EOOW and request permission to continue.

9. Adhere to all **WARNINGS** and **CAUTIONS**.

Watch Team Backup

1. Recognize that no one knows everything about the engineering plants. Realize that there are several people on watch with you who may have the answer you need. Conversely, you may be the only person on watch that has the right answers.

2. Watch team backup is all about OWNERSHIP. Take ownership of your watch station and plant. Act as if every success depends upon your personal attention.

3. Attributes of an organization with good watch team backup are as follows.

a. Create a culture that nurtures those who provide backup, accept backup, and take ownership of their plant. Publicly praise instances of good watch team backup.

b. Communicate your observations to others in the watch team. Communicate your intentions aloud so that the rest of the watch team knows the plan of attack and can synchronize their actions with yours.

c. Participate in decision-making processes. Keep yourself intellectually engaged in all events/procedures/casualties and offer suggestions as necessary to assist in resolving issues.

d. Remediate improper orders by speaking up.

e. Never ignore watch team backup, even if you choose an opposing course of action. Incorporate watch team backup into routine propulsion plant evolutions. Ensure a second appropriately qualified operator is on station.

f. Educate yourself by studying plant systems and operations. Your ability to recognize the need for and to provide watch team backup is only as good as your level of knowledge.

Log Keeping Principles [7]

1. Engineering plant logs are legal documents. The importance of neat, legible, correct, and complete logs cannot be over emphasized.

2. Logs should be taken as close to the hour as practical. Compare trends from hour to hour, and look for signs of abnormal machinery operation.

3. Each log should indicate the maximum and minimum readings for each parameter to be recorded, as applicable. Where a single log is used during differing plant conditions (e.g., operating, shutdown, wet lay-up, etc.), the printed limits should be for the more frequent condition and a note on the log sheet should reference the appropriate limits for the less frequent conditions.

4. When a reading falls outside of the maximum or minimum readings, circle it in red ink. The remarks section of the log shall indicate the action taken in connection with each red-circled reading and the EOOW or EDO should be notified as well. The EOOW or EDO should take appropriate corrective action and make an entry in his/her logs as to the action taken.

5. Watch standers shall sign the remarks section of each log when relieved.

[7] "Engineering Log", NSTM, Chapter 079, Section 49.3.4

6. When in overhaul or other long shutdown periods, it may be necessary to change required readings or maximum and minimum values frequently. Each ship should have instructions that provide for changing logs as necessary. If your logs do not suit your plant condition, notify your supervisor.

7. When equipment is started, readings should be recorded and a note added to indicate the time taken.

8. Readings should be taken on all operating equipment and on all non-operating equipment where meaningful information is obtained. A valid reason must be presented for logs not taken. The reason should be noted in the space where the reading would normally have been placed.

9. If equipment has been secured for several hours, the word ‘secured’ with arrows indicating the time limits may be used.

10. The officer responsible for a particular piece of equipment or log should review related logs each working day.

11. Watch standers should analyze each parameter recorded. If a parameter changes in <u>any way</u> from the previous value, you are required to know the reason why. If you do not know the reason, find out. Don’t accept a reading that falls within the maximum/minimum range if you know it is abnormal for the given plant conditions. Notify the EOOW and take action to determine the reason.

12. It is the responsibility of supervisory personnel to review logs. It is the responsibility of the watch stander to seek these log reviews and ensure that they occur (forceful backup).

13. As part of the mid-watch entry, each watch stander shall list: all existing alarms and warning lights; any indications and actions being taken to clear indications that are not normal, and any alarms and warning lights that are out of commission or otherwise disabled.

14. The occurrence and clearing of alarms and warning lights should be logged as red-circled entries during the course of the watch.

15. To be maintained as a comprehensive, factual accounting of occurrences and observations, a properly taken log must be:

a. Historical, chronological, and current.

b. Formal and objective.

c. Complete, accurate, and informative.

Out of Specification Log Reading Actions

1. Circle in red

   a. Inform operational and administrative chains-of-command

2. Make a complete, concise narrative log entry:

   a. What the reading is and the time it was discovered

   b. Suspected cause

   c. Course of action to be taken

   d. Person(s) notified

3. The out-of-specification reading must be pursued to resolution, and must be carried forward in the mid-status if still present.

4. Make a complete, concise narrative log entry when resolved:

   a. Course of action taken

   b. Current, normal reading of parameter

   c. Operational and administrative chains-of-command informed

Abnormal/Noticeable Trends in Log Readings

1. Inform complete chain-of-command

2. Make a complete, concise narrative log entry when discovered:

   a. What the trend is

   b. Suspected cause

   c. Course of action to be taken

   d. Person notified

3. The trend reading must be pursued and be must carried forward in the mid-status if still present.

4. Make a complete, concise narrative log entry when resolved:

a. Course of action taken

b. Current, normal reading of parameter

c. Operational and administrative chains-of-command informed

Alarms and Warning Lights

1. Acknowledge all alarms and take action to correct the alarming condition.

2. Report receipt of alarms to supervisory watch standers.

3. Log the alarm, the alarming condition, who was informed, what action was taken to clear the alarming condition, and the time the alarm cleared. Consider this to be an out-of-specification condition and log it accordingly.

4. Avoid complacency on frequently received alarms, investigate each alarm.

Placing Alarms in Cutout

1. Engineering plant alarms and warning lights provide watch standers with audible and/or visual indications of abnormal conditions. Inadequate or untimely response to such indications can result in degraded propulsion capability, equipment damage, or personnel injury.

2. Placing an alarm or warning in cutout is only authorized:

a. When the EOOW has permission from the Commanding Officer via the Chief Engineer.

b. If an alarm is out of commission (OOC) and this fact is recorded in the Instrument log, an OOC sticker has been placed on the alarm, the condition has been entered in the Trouble Call Log, and the Commanding Officer has been informed via the CO’s Daily Report.

Casualty Control Principles

1. The EOSS User’s Guide (EUG) provides definitive guidance on EOSS/EOP/EOCC usage. Watch standers should know immediate actions for casualties, and be able to perform them without referencing the procedure. The principles of casualty control are:

a. Analyze and Identify. Use plant indications, and attempt to identify the casualty. Use crucial plant indicators first, and back them up with other indications.

b. Communicate with watch standers. Inform the other plant watch standers so casualty response can begin at all watch stations.

c. Take immediate actions. Take immediate actions to safeguard the plant and personnel. If in Central Control Station (CCS), take these actions first. Initiate them before making announcements.

d. Inform others of limitations. Make sure that the EOOW knows of the plant casualty so that he/she can inform the Bridge of the shaft limitations imposed.

e. Open the procedure. Verify the immediate actions taken were correct. Complete any immediate actions that were missed.

f. Ask for help! Request any required supervision and casualty response teams from Central Control.

g. Normalize the plant. Using the procedure, complete the supplementary actions. Return the plant to a stable line-up and commence recovery, if possible.

Emergency Communications

1. Preface emergency reports with “Silence on the line, silence on the line.”

2. Stay on line for clarification and to ensure the message was understood.

3. Make reports precisely and with enough detail so that there is no question what the casualty is and what is affected.

4. Report “Who, What, Where!” The formal report should leave no doubt as to who is calling, what is happening, and where it is happening.

Watch Bills and Authorized Modifications

1. All watch standers must be on signed List of Qualified Watch standers and must be proficient at that watch station.

2. The watch bill is authorized and signed by the Commanding Officer/Chief Engineer or their designated representative.

3. The Commanding Officer/Chief Engineer or their designated representative must authorize any modifications to the watch bill.

Special Evolutions and Evolution Briefings [11]

1. The briefing should occur immediately prior to any unusual or complex evolution.

2. Evolution briefings, at a minimum, should include:

    a. Personnel involved, specific duties, previous experience

    b. Procedure covered

    c. Problems (past and expected)

    d. Expected alarms, indications

    e. Communication method (i.e., what phone circuit/radio channel will be used)

3. The briefing should be led by a person who is an expert in the evolution to be conducted.

4. The briefing should be interactive. Personnel attending the briefing should already be versed in the procedure, and should be able to participate in discussions.

Training Watches

1. EOOW permission should be obtained prior to the start of a training watch.

2. The EOOW should exercise judgment when allowing a training watch. Among the questions that should be asked before authorizing the watch are:

[11] "Advance Planning", NSTM, Chapter 079, Section 49.1.3.2.2

a. Is the over instruction watch stander experienced enough to handle an under instruction watch?

b. Does the drill/evolution period support under instruction watches?

3. Each U/I should assume the duties of the watch but should not take any actions unless directly observed by the qualified watch stander supervising him/her. He/she must ensure the point, read, think, then operate method is utilized when operating equipment.

4. Watch sharing must not occur because:

a. It undermines the supervisory ability of the on-watch watch stander.

b. It “robs” the under instruction watch of an opportunity to learn and perform.

Roles, Responsibilities, and the Watch Standing Organization

There are two distinct watch standing chains of command: operational (watch team) and administrative (divisional).

1. Problems with the operation and material condition of the plant must first be reported to the operational chain of command, via the EOOW or EDO. This operational chain of command has the immediate responsibility for safe operation of the engineering plant, and must be kept informed.

2. The administrative chain of command must also be kept aware of plant status and other issues so that they can provide backup and develop a plan for permanent corrective actions.

Chapter 2. Watch Standing Awareness

Know Your Space/Watch Station

As a watch stander, you should know everything there is to know about the space and/or watch station you are qualifying or have qualified on. TAKE OWNERSHIP OF YOUR SPACE AND/OR WATCH STATION! Knowing your space is most critical when a casualty occurs, specifically when there is a fire. Know the locations of permanently installed and portable damage control equipment, EEBDs, primary and alternate escape routes. You should be able find that equipment in times of reduced visibility.

Ownership [13]

1. **Conduct a thorough pre-watch tour**

(a) When you assume the watch, you become responsible for all personnel and equipment on that watch station, including anything the previous watch may have left undone.

(b) The off-going watch should brief his/her relief on watch station status and ensure that the plant is in a stable condition.

(c) Do not leave with equipment problems. Note these in the watch station log, in the Trouble Call Log, and verbally inform your senior space watch stander, EOOW and/or EDO.

(d) Each watch must be preceded by a thorough pre-watch tour of all spaces associated with the watch station.

(e) The pre-watch tour should include, but is not limited to, the following items:

(1) Material condition

(2) Operating equipment

(3) System lineups

(4) OOC equipment

(5) DANGER/CAUTION tagged items

(6) Bilge levels

[13] "Station of Watch Officers", "General Duties of Watch Officers and Watch Standers", SORM, Articles 402.c, 403.c

(7) Heat stress conditions

(8) Maintenance planned or in progress

(9) Evolutions planned or in progress

(10) Watch stander interview

2. **Conduct a thorough pre-watch log review** [14]

a. Watch relief must be preceded by a thorough pre-watch log review of the previous 24 hours or since you last stood the watch, whichever is shorter. The person on watch at any time should be able to explain any entry on the log, whether it occurred on the current watch or not.

b. The pre-watch log review should include, but is not limited to, the following items:

(1) Any out-of-specification reading

(2) Completeness of entries

(3) A careful review of the narrative to ensure that all entries are understood

(4) Ensuring supervisory log reviews are up to date

3. **Carefully monitor operating machinery**. Use your senses. Look. Listen. Touch. Smell. Observations from all these senses can catch a small problem before it becomes a larger one.

4. **Give full attention to your watch station**. Do not perform activities that divert your attention from standing your watch.

a. Reading and studying should be limited to watch station specific items (those required for watch standing). Non-engineering related reading material should not be taken into the plant.

b. Do not perform maintenance (preventive or corrective) that diverts attention from your watch station. Simple upkeep (small valve maintenance, packing adjustments, etc.) is allowed.

c. Cleaning should be kept on a level to not distract the watch stander from his/her primary duty. Sweeping and wiping up oil is appropriate, while scrubbing bilges is not.

[14] "EOOW Guidelines", NSTM, Chapter 079, Section 49.1.3

Watch Stander Emergency Egress

1. All personnel shall complete emergency egress training within 96 hours of reporting onboard and every six months thereafter. This training will consist of blindfolded escape from working, berthing, and watch standing spaces. Training will include actual activation and donning of a training EEBD.

2. This training becomes essential during watch stander evacuation from a space due to possibility of heavy black smoke and/or reduced lighting, thereby disorienting the watch stander and impeding his/her safe evacuation.

3. Watch standers should ensure egress routes remain clear of obstructions and take prompt action to correct any noted deficiencies.

Emergency Escape Breathing Devices (EEBDs) [15]

1. All watch standers need to ensure the required quantities of EEBDs are on station.

2. When inspecting the pressure gauge on the EEBD, the needle may indicate in the red zone (to the right of the green bar) in high temperature locations. This is acceptable. The needle indicating in the red zone to the left of the green bar is unacceptable.

3. Shoulder an EEBD immediately if a fire, major lube oil leak, or a major fuel oil leak occurs in your plant.

Cleanliness, Preservation, and Stowage [16] [17]

1. **Cleanliness**

a. Do not accept poor cleanliness, preservation, and stowage. Take OWNERSHIP of your spaces, equipment, and watch station.

2. **Preservation**

a. Preservation of lagging is critical to personnel safety and plant efficiency.

[15] "Emergency Escape Breathing Device (EEBD)", NSTM, Chapter 077, Section 3.4

[16] "Zone Inspection Criteria", NSTM, Chapter 079, Section 23.1.4
[17] "Corrective Actions", NSTM, Chapter 635, Section 2.9.1

(1) Piping insulation that is damaged will contribute to heat stress concerns in the propulsion plant. Damaged lagging will allow water to penetrate to the piping surface accelerating piping corrosion.

(2) Watch standers should take care to prevent lagging from becoming wetted.

(3) Instances of wetted lagging should be immediately brought to the attention of the chain of command, documented, and corrected. The lagging should be repaired or replaced as necessary, and the piping cleaned to prevent corrosion.

b. Proper small valve maintenance (SVM) will improve equipment operability and reduce packing leakage.

c. Maintaining dry bilges improves the working conditions in propulsion plant spaces by reducing heat stress while minimizing corrosion.

d. Reach rods must be kept in good working order. The condition of reach rods can directly affect your ability to take damage control actions from remote spaces.

e. Every mechanical and supervisory watch stander should monitor pump and valve packing leakage. Watch standers should be knowledgeable about minimum packing leakage specifications and aggressively take steps to reduce packing leakage to acceptable rates.

3. **Stowage**. Proper stowage is vitally important.

a. We cannot forget that we serve in warships. The possibility of an underwater explosion or explosion adjacent to the hull is real. Any materials that are not properly stowed become missile hazards in a combat environment or in the event of a terrorist attack.

b. Loose rags and other debris can foul eductors, making space dewatering ineffective.

c. Lockers should be well stowed, containing only necessary materials. Improperly stowed flammable materials can accelerate fires and endanger firefighting personnel by placing explosive hazards where they are not expected.

d. The only hazardous material (HAZMAT) or flammable material allowed in the propulsion plant is that which is necessary for the operation and/or maintenance of the propulsion plant.

e. Oily rags will allow a small fire to spread rapidly. Oily rags should be kept in an approved metal oily rag container that should be emptied daily. When you clean up oil, dispose of the waste properly. (More importantly, document and fix the oil leaks!)

f. Rags and sponges used with HAZMAT must be disposed of as HAZMAT (returned to the ship's HAZMAT issue center).

g. Empty trash cans regularly. This prevents large amounts of flammable material from accumulating.

Hazardous Materials (HAZMAT) [18] [19]

1. Each item considered HAZMAT is supplied with a material safety data sheet from the manufacturer and can be retrieved from the HAZMAT issuing location. Do not allow the accumulation of HAZMAT in the work center.

a. HAZMAT in an engineering plant should be in an appropriate storage locker, with an up to date inventory posted inside.

b. All HAZMAT/flammable material should be stored in its original container, upright, and sealed shut. All flammable and combustible material must be stored in NAVSEA-approved storage lockers. Flammable materials with a flashpoint below 200 degrees F (Category I flammable materials) can NEVER be stowed in an engineering plant, not even in a flammable stowage locker.

c. All personnel are responsible for ensuring that applicable personnel protective equipment (PPE) is used when required. Refer to the maintenance requirements card (MRC) for specific PPE required for maintenance items or the MSDS for substance-specific PPE requirements.

d. Rule of thumb: if you get an item from HAZMAT issue and you cannot eat/drink it, some sort of PPE is likely required. Find and use the proper PPE, and ask your supervisor if you do not know what PPE is appropriate.

2. Dispose of empty HAZMAT cans, unused HAZMAT, and HAZMAT contaminated rags/equipment by returning them to the ship's HAZMAT issue center.

[18] "Hazardous Material Control and Management", OPNAVINST 5100.19D, NAVOSH Program Manual for Forces Afloat (NAVOSH Manual), Chapter B3
[19] "Stowage, Handling, and Disposal of Hazardous General Use Consumables", NSTM, Chapter 670

Hazardous Materials User's Guide (HMUG)

1. The HMUG supplements the information contained in the MSDSs. Always refer to the MSDS first. Then use the HMUG to clarify any MSDS information you do not understand. It provides the following information:

a. Compatibility. Lists example materials that are not compatible with HAZMAT and the types of reactions that could occur if incompatible materials should mix.

b. Control Measures. Identifies and prescribes personal protective equipment (PPE) for HAZMAT.

c. Safety Precautions. Provides safety guidance for using and storing HAZMAT.

d. Health Hazards. Points out common signs and effects of overexposure to the HAZMAT and provides "What to do" instructions for the HAZMAT user.

e. Spill Control. Provides information for responding to a spill.

f. Disposal Guidelines. Provides acceptable methods for disposing of HAZMAT.

Valve Operating Procedures

1. It is essential that personnel assigned to operate valves be knowledgeable about the system or component being operated before they position or check the position of valves.

2. Verifying proper valve positions in engineering plant systems is necessary to ensure proper system operation and to prevent casualties to equipment and personnel.

3. When checking the position of a valve, use all available valve position indications provided with the valve. Check valves in the shut direction regardless of the required or expected position of the valve.

4. Valves are provided with hand wheels to allow for two-handed operation. Using two hands placed 180 degrees apart prevents lateral force from being exerted on the valve stem.

5. Operators must understand that putting a valve on its backseat is inappropriate.

a. In general, all (standard navy) valves are not back seated when operated. In special circumstances, valves are back seated to form a barrier that prevents system pressure from being felt on the packing.

b. In general, secondary system (standard navy) valves are not back seated. This will prevent binding on the backseat due to thermal effects.

6. If valves and other mechanical devices become stiff and difficult to operate, this is an indication of impending failure. Keep your chain of command informed and document these problems for timely repair.

7. Use the appropriate tool for the job. The use of extensions and cheater bars can result in broken studs, making restoration of the component more difficult. If you need a cheater bar to operate the valve, there is a material problem with the valve. Inform your chain of command regarding this deficiency.

8. Operators must know the expected system response for any valve operation. If an unexpected response occurs, reposition the valve to its original position and notify the EOOW or Space Supervisor.

Valve Found Out of Position

1. Any valve found out of its expected position shall be immediately reported to the EOOW or Space Supervisor.

2. The EOOW or Space Supervisor shall evaluate system status and place the system in a safe condition.

3. After the system is placed in a safe condition, the EOOW or Space Supervisor should determine the reason for the valve being out of position.

4. If valve positioning is required to restore proper configuration, the EOOW should order a formal valve lineup and designate a qualified person to reposition the valve.

Hearing Conservation [22]

1. Engineering plants are, by their very nature, noisy when operating. Ensure that you follow the postings and wear hearing protection when required.

2. Permanent hearing loss can occur from prolonged exposure to loud noise. This is a cumulative effect.

a. Even short-term exposure to loud noise has adverse effects. Aside from the hearing loss, noise contributes significantly to fatigue.

b. Hearing protection actually allows you to better hear operating equipment and machinery, by filtering out the high frequency noises.

3. Earplugs should be readily available to you. If they are not, contact your supervisor.

Heat Stress [23]

1. Heat stress is a concern in the engineering spaces, particularly when operating in warm weather. The following guidelines apply to heat-stress surveys at all manned watch/work stations within the space whenever the temperature from a permanently mounted hanging dry-bulb (DB) thermometer reaches or exceeds the following temperature requirements:

a. PHEL I through III

(i) Watch/work length four hours or less:

DB => 100 deg F

(ii) Watch/work length greater than four hours:

DB => 90 deg F

b. PHEL IV through VI

DB = 85 deg F

2. Drink water or sports drinks to stay hydrated. Don’t drink caffeinated products.

3. Eat a nutritious meal before you go on watch.

4. Do not starch your uniforms.

[22] "Hearing Conservation", OPNAVINST 5100.19D, NAVOSH Program Manual for Forces Afloat (NAVOSH Manual), Chapter B4

[23] "Heat Stress", NAVOSH Manual, Chapter B2

5. Frequent ventilation ducts as you patrol your watch station.

6. Ensure that you know the symptoms for heat stroke and heat exhaustion and basic first aid procedures to treat these conditions.

7. Material items that can contribute to heat stress and can be repaired (missing lagging, steam leaks, etc.) should be noted in the Trouble Call Log so that they can be fixed.

Electrical Safety [24]

1. **Electrical Safety Precautions**

a. The electrical safety program ensures that portable electrical equipment meets safety standards and is in satisfactory condition for shipboard use.

b. In general, if an item has a cord with a plug, it should have a safety tag on it.

c. All watch standers should be alert for electrical hazards and report/correct any deficiencies immediately.

d. Do not store extension cords or portable electric tools in the engineering plants. These items should be checked out from the designated electrical safety shop/electrical tool issue room on a daily basis.

e. Inspect all portable electrical equipment for damage prior to use.

f. Some configurations used to shock mount electrical motors may result in that equipment losing its electrical connection to ground with the ship's hull. This equipment must be grounded to the hull with a braided metal strap. If this strap is broken or disconnected, contact your supervisor.

g. Be especially watchful of water entering electrical enclosures or wetted electrical equipment.

2. **Electrical Shock**

a. Strange as it may seem, most fatal electrical shocks happen to people who should know better.

[24] "Electrical Safety Precautions", NSTM, Chapter 300

b. It is not voltage but the current that kills. The real measure of a shock's intensity lies in the amount of current (in milliamperes) forced through the body.

c. Electrical shock occurs when a person comes in contact with two conductors of a circuit or when the body becomes part of the electrical circuit. In either case, a severe shock can cause the heart and lungs to stop functioning. Also, severe burns may occur where the current enters and exits the body.

d. The electrical shock person should be pulled free of contact quickly by applying the following:

(1) Protect yourself with dry insulating material.

(2) Use a wooden broom handle, belt, dry clothing, or other available non-conductive material to free the victim from electrical contact. Do NOT touch the victim until the source of electricity has been removed.

e. Once the victim has been removed from the electrical source, it should be determined whether the person is breathing. If the person is not breathing, initiate Cardiopulmonary Resuscitation (CPR).

f. Prevention is the best medicine for electrical shock. Respect all voltages. Have knowledge of the principles of electricity and follow safe work procedures. Do not take chances.

3. **First Aid for Electrical Shock**

a. CPR is used on victims of electrical shock who have suffered from cardiac arrest or heart stoppage as well as a loss of breathing.

b. Steps to perform CPR

(1) Stay Safe! The worst thing a rescuer can do is become another victim. Use common sense and stay away from potential hazards.

(2) Attempt to wake the victim. Briskly rub your knuckles against the victim's sternum. If the victim does not awake, call for assistance and proceed to step 3. If the victim wakes, moans, or moves, then CPR is not necessary at this time.

(3) Begin rescue breathing. Open the victim's airways using the head-tilt, chin-lift method. Put your ear to the victim's open mouth:

(a) Look for chest movement

(b) Listen for air flowing through the mouth or nose

(c) Feel for air on your cheek

If there is no breathing, pinch the victim's nose; make a seal over the victim's mouth with yours. Give the victim a breath big enough to make the chest rise. Let the chest fall, then repeat the rescue breath once more.

(4) Begin chest compressions. Place the heel of your hand in the middle of the victim's chest. Put your other hand on top of the first with your fingers interlaced. Compress the chest about 1-1/2 to 2 inches. Allow the chest to completely recoil before the next compression. Compress the chest at a rate equal to 100 per minute. Perform 30 compressions at this rate.

(5) Repeat rescue breaths. Open the airway with head-tilt, chin-lift again. This time, go directly to rescue breaths without checking for breathing again. Give one breath, making sure the chest rises and falls, then give another.

(6) Perform 30 more chest compressions. Repeat steps 5 and 6 for about two minutes.

(7) Stop compressions and recheck victim for breathing. If the victim is not breathing, continue chest compressions and rescue breaths.

(8) Keep going until help arrives.

Bypassing Safety Devices/Interlocks [28] [29]

Defeating or bypassing safety devices and interlocks is specifically forbidden by the Engineering Department Organizational and Regulations Manual (EDORM) due to the fact that personnel casualties and engineering plant/equipment damage could result. Only the Commanding Officer may authorize the bypassing of safety devices or interlocks. This authorization should

[28] "(Responsibilities of the) Commanding Officer", EDORM
[29] "Operating Procedures", EDORM

normally be in writing and logged in the Engineering Log. Additionally steps should be taken to ensure the equipment that was protected by the safety device or interlock is continuously monitored for unsafe conditions.

Night Orders [30]

1. The Chief Engineer will issue orders to be followed for the evening or weekend via the Night Order Book. These orders should govern performance of the engineering watches for a specific time period. While underway, that time period will be daily; inport the orders can be extended through a weekend or holiday period. When inport, the Engineering Duty Officer (EDO) is required to review the orders daily and update them as required.

2. Night orders are required to be reviewed by all watch standers. All watch standers can benefit from the information concerning their watch station (for instance, evolutions planned or in progress) and plant status and should review the night orders prior to watch relief.

Eductor Operations, Precautions, and Permissions [31] [32]

1. The ship’s position relative to the nearest coastline should be verified prior to any overboard pumping operations. Watch standers must consider the time required to dewater bilges and tanks and take precautions to ensure these evolutions are secured before the ship crosses a restricted boundary line (normally 50 nautical miles from the coastline).

2. Operators should be provided with accessible operating procedures and should be required to display knowledge of these procedures when qualifying watch stations that operate eductors. Operating the suction valve out of sequence can result in flooding.

3. Eductor operation in an enclosed space with no ventilation (such as a shaft alley) can be a personnel hazard as eductors may remove the air from the space. When entering spaces equipped with eductors, the space entrance should be left open with a warning placard placed on the entrance.

[30] "Engineer's Night Order Book", EDORM
[31] "Pollution Control", NSTM, Chapter 593
[32] "Installed Eductors", NSTM, Chapter 079

Lube Oil Quality Management (LOQM) [33]

1. Take oil samples when required. The 2000 series MIP, R-1 check specifies numerous instances when oil samples are required.

2. Oil sample pass-fail criteria are not the same for all sumps. Watch standers must know the criteria for each sump type. (Purifiable vs. Non-Purifiable sumps)

3. When sampling sumps, you may return the sample bottle contents to the sump sampled if the sample is found to be satisfactory. Ensure that you do not cross-contaminate sumps.

4. Familiarize yourself with your sampling frequencies.

[33] "Lubricating Oils, Greases, Specialty Lubricants, and Lubrication Systems", NSTM, Chapter 262

Chapter 3: Maintenance Issues

Tag-Outs [35]

1. A tag-out is used on a system or component when:

a. Operation of the equipment or component could result in damage to it, or would be a hazard to personnel (DANGER, Red Tags).

b.. When amplifying instructions are needed (CAUTION, Yellow Tags).

2. Tag-Outs should be presented for issue by the appropriate division. The EOOW or EDO may perform the adequacy and accuracy check. In either case, the EOOW must ensure plant conditions can support hanging the tag-out before authorizing.

a. Tag-Outs not meeting barrier criteria must be signed and approved by the Chief Engineer and/or Commanding Officer. Most ships note the words "single valve" in red on top and bottom of the line item sheet. A system drawing from EOSS should be attached with the single valves circled in red ink. Single valves will be locked in tagged position.

3. If you come across a component that you know is missing its danger tag, or you find a danger tag not attached to anything, or you suspect that the position of a component does not agree with the position listed on its tag:

a. Stop any work that is in progress in the immediate area.

b. Inform your chain of command (EOOW/EDO/Space Supervisor).

c. Guard the component until the tag is replaced.

Instrument Log [36]

1. The instrument log is used to document instrument problems, to include gauges, thermometers, tank level indicators, and alarms.

2. Watch standers should understand the following three categories by which an instrument may be classified:

[35] "Establishing Tag-Outs", Tag-Out Users Manual (TUM), S0400-AD-URM-010/TUM, Section 1.6
[36] "Out of Calibration/Out of Commission Labels", TUM, Section 1.10

3. Past Calibration – the calibration due date is past due but the gauge works properly and can continue to be relied upon for indication.

a. Out of Calibration – the instrument indicates values outside the range of specified instrument accuracy but tracks with changes in the parameter.

b. Out of Commission – the gauge/alarm is broken and cannot be relied on for indication.

4. When an instrument is past calibration, every effort should be made to get it calibrated. The discrepancy should be annotated in the Trouble Call Log and the EOOW/EDO and chain of command should be notified.

5. When an instrument is Out of Calibration, the chain of command is informed and the problem is logged in the Instrument Log and Trouble Call Log. The EOOW/EDO should then complete an Out of Calibration sticker (orange), which should include a correction factor, and have the sticker placed on the instrument.

6. When an instrument is Out of Commission, the EOOW/EDO completes an Out of Commission sticker (red), and has it placed on the affected instrument. The condition should be logged in the Instrument Log and the Trouble Call Log.

Temporary Standing Orders (TSO)

1. TSOs must be approved by competent authority and trained upon. They are required when operating guidance within the EOSS is not sufficient due to an abnormal condition or error in the technical manual. They should be reviewed periodically for validity. A TSO may not be in effect for more than six months past its effective date.

2. If the TSO is required past six months, the Engineer Officer is to re-submit the TSO to the Commanding Officer for approval, provided its beyond the ship’s capability to correct the problem.

3. A TSO must state a long term follow-up action, such as a pending manual change or a pending equipment repair.

Chapter 4: Security Issues

Information Security

1. It is the responsibility of each watch stander to challenge any and all visitors in the engineering plant.

2. Each visitor must meet the following criteria:

    a. Proper identification.

    b. A need to be in the engineering plant.

3. If you are not satisfied with the answer given, note the person’s name and contact your supervisor.

4. While non-cleared personnel may be allowed access to the plant as part of their official duties, they must not be allowed to loiter in the plant.

Equipment Security

1. Physical security of ship's machinery is essential to maintaining operational readiness. The ship's mission is placed at risk when vital machinery is vulnerable to negligent or malicious damage. Main reduction gears have long been subject to elaborate security measures. Similar, but less elaborate measures, are directed for other equipment, which if damaged, would severely impact primary mission area readiness. The physical security program depends on the following ingredients: teamwork; deterrence of unauthorized access by use of locks and locking devices; and vigorous and thorough inspection and watch standing procedures, which enhance vigilance against tampering. All these aspects must be fully functional for security to be maintained.

    a. Definitions:

        (1) Locked: Entry or manipulation positively prevented by a device requiring an external key or combination. Labels indicating the locked position, e.g., “Locked Open” or “Locked Closed”, shall be attached.

        (2) Locking device: Any device, such as lock wire or keeper, which serves as a positive stop to prevent inadvertent manipulation. Valves requiring locking devices and their normal position are generally shown on EOSS piping diagrams. Labels that indicate this normal position, e.g., “Open” or “Closed” shall be attached.

2. Equipment requiring locks:

a. Main shaft reduction gear access covers to include de-humidifiers and vent fog precipitators.

b. Ship Service or emergency generator reduction gear inspection covers (unless generator is contained in module/enclosure that is normally locked and a minimum of two bolts per access cover is lockwired).

c. Main/auxiliary/waste heat boiler safety valves.

d. Gas Turbine module access doors when inport and secured.

3. Equipment requiring locking devices:

a. Line shaft bearing access covers. (A minimum of two opposing bolts shall be lockwired per access cover).

b. Main Reduction Gear sight flow indicators shall be secured.

c. All main lubricating oil pump suction and discharge cutout valves (open) per applicable EOSS procedure/diagrams.

d. Systems where EOSS procedures/diagrams call for components to be “locked” in a specific position.

e. All ballast/de-ballast valves whose operation would allow interconnection of oil or oily waste with the sea or allow sea flooding of operating spaces.

f. All Potable Water and Feedwater Tank sounding tubes (closed).

g. CHT system vent valves (open).

h. Stripping pump discharge valves to the fuel transfer system (closed).

i. Stripping pump suction valves from the fuel service pump suction headers (closed).

j. Any lubricating oil drain, rundown, or isolation valve, which by its operation could starve, limit or interrupt lubrication to any main engine, reduction gear, generator or line shaft bearings shall have a device indicating the position

for normal operation. The need for locking devices for smaller valves (i.e. sampling connections less than one quarter inch in diameter) may be promulgated in the Engineer Officer Standing Orders.

k. Line shaft bearing (LSB) sampling valve piping shall have an anti-rotation device or tack weld to prevent separation from bearing housing. Also, LSB sampling valves shall have a locking device at the valve itself, regardless of whether or not the sampling pipe has a removable cap.