AD-A124 168 OPERATIONAL TEST DIRECTOR GUIDE CHANGE 4(U) OPERATIONAL TEST AND EVALUATION FORCE NORFOLK VA 20 SEP 82 COMOPTEVFOR-INST-3960.1B 1/4

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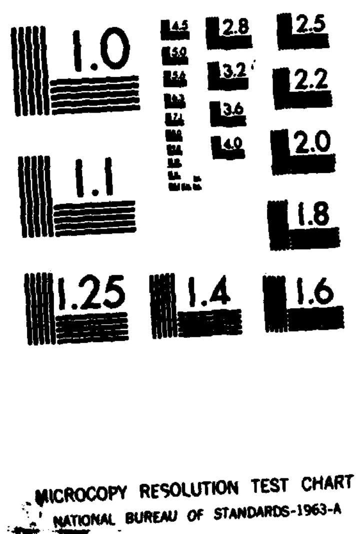
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OPERATIONAL TEST DIRECTOR GUIDE

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO. AD-A124 168	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Operational Test Director Guide		5. TYPE OF REPORT & PERIOD COVERED Handbook
		6. PERFORMING ORG. REPORT NUMBER COMOPTEVFORINST 3960.1B
7. AUTHOR(s) Commander Operational Test and Evaluation Force		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS Department of the Navy Commander Operational Test and Evaluation Force Norfolk, VA 23511		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS		12. REPORT DATE 5 July 1979
		13. NUMBER OF PAGES 200
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

This document has been approved for public release and sale; its distribution is unlimited.

17. DISTRIBUTION STATEMENT (of the abstract enter-- in Block 20, if different from Report)

Unlimited Distribution

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Test and Evaluation, Development Test and Evaluation, Operational Test and Evaluation, Test Design, Test Analysis, Test Planning, Test Operations, Program Structure

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This document is designed primarily for the Operational Test Director (OTD). It provides guidance on several facets of operational test and evaluation (OT&E) such as test design, planning, conduct, and reporting.

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

DEPARTMENT OF THE NAVY
Commander Operational Test and Evaluation Force
Norfolk, Virginia 23511

COMOPTEVFORINST 3960.1B
02:taw

5 JUL 1979

COMOPTEVFOR INSTRUCTION 3960.1B

Subj: OTD Guide

1. Purpose. This document provides guidance for various facets of OT&E. It is designed primarily for OTDs and OTCs of COMOPTEVFOR Staff. Subordinate commands may supplement it as necessary according to their needs.

2. Future Changes

a. OT&E is a dynamic evolving process; suggested changes to this Guide are encouraged. Address them to Code 02.

b. ACOSs and subordinate commands will be asked to comment on the Guide's contents annually, in an effort to ensure continuing Guide utility.

3. Cancellation. This document cancels and supersedes COMOPTEVFORINST 3960.1A dated 6 April 1978.

W. A. French

W. A. FRENCH
Deputy Chief of Staff

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RECORD OF CHANGES

Change Number	Date of Change	Date Entered	Entered By
CH-1	21 FEB 1980	21 FEB 80	
CH-2	18 JUN 1980	19 SEP 80	
CH-3	28 APR 1981	09 NOV 81	
CH-4	20 SEP 1982	12 OCT 82	

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Sample Documents and Checklists Contained in this Guide

Section 1

Introduction

101. Purpose. This guide is designed to help you, the OTD (Operational Test Director), perform your functions in OT&E (operational test and evaluation). It presupposes you have attended the basic course for OTDs, and that you have familiarized yourself with the basic source material listed in the next paragraph.

102. Basic Source Material. It is essential that you be familiar with the following in their latest editions:

a. OPNAVINST 5440.47, Mission and Functions of OPTEVFOR.

b. COMOPTEVFORINST 5400.1, COMOPTEVFOR Staff Manual. Among other things, discusses OPTEVFOR's mission and organization, and identifies staff agencies who can help you.

c. SECNAVINST 5000.1 (w/DOD Directive 5000.1 and DOD Instruction 5000.2), System Acquisition in the Department of the Navy. Promulgates basic DOD policies for weapon system acquisition, including the formats specified for the MENS (Mission Element Need Statement), DCP (Decision Coordinating Paper), and IPS (Integrated Program Summary) and the organization and functions of the DSARC (Defense Systems Acquisition Review Council).

d. OPNAVINST 5000.42, Weapons Systems Selection and Planning. Amplifies SECNAVINST 5000.1 and specifies the format and content of ORs (Operational Requirements).

e. OPNAVINST 3960.10 (w/DOD Directive 5000.3), Test and Evaluation. The fundamental document in U.S. Navy OT&E.

f. OPNAVINST 4720.9, Approval of Systems and Equipment for Service Use. Gives the criteria for ASU (approval for service use) and PASU (provisional approval for service use), and discusses the relationship between ASU and the production decision.

g. OPNAVINST 5000.46, Decision Coordinating Papers (DCPs), Program Memoranda (PMs) and Navy Decision Coordinating Papers (NDCPs), preparation and processing of. Discusses each of these documents (format and content) in detail.

h. OPNAVINST 5401.6, Navy-Wide Tactical Development and Evaluation Program. Established the Navy's TAC D&E (tactical development and evaluation) program. Specifies COMOPTEVFOR's involvement.

i. NAVSO P-2457, RDT&E Management Guide. A good orientation in the Navy's system for managing RDT&E. Provides general information and leads to directives containing detailed guidance. Explains the many standard forms associated with RDT&E (e.g., DD Form 1498, DD Form 1634).

103. Additional References. The Headquarters' Tech Library maintains classified and unclassified documents in a variety of technical fields and on a variety of weapons systems. Some of the more general references maintained by the library which are particularly useful to OTDs are listed below. The listing is without order; additional titles will be added as recommended by you, the OTD.

a. Jane's. An unofficial but thorough series, well illustrated and quantified. (Note: If a number is critical to your evaluation, check what Jane's says with Intelligence.) The Jane's series includes:

(1) Fighting Ships.

(2) All the World's Aircraft.

(3) Weapon Systems.

(4) Ocean Technology.

(5) Surface Skimmers.

b. NAVMATINST 3960.6, Test and Evaluation. Implements OPNAVINST 3960.10 within NAVMAT, and establishes procedures for ACAT IV programs. In your dealings with the DA (Developing Agency), your knowledge of his own rules may help you.

c. DICNAVAB and CAAL (COMOPTEVFOR Acronym and Abbreviation List). Unofficial but useful lists of acronyms.

d. ASTM E 380-74, Metric Practice Guide. Describes the metric system directed by DOD Directive 4120.18. Provides conversion factors for most non-metric units of measure.

e. Roget's Thesaurus or Webster's New Dictionary of Synonyms. Can help you avoid using the same word over and over.

f. OPNAVINST 5200.6, Procedures for Maintaining Navy Backup Files and Preparation of Point Papers. Gives the standard Navy format for point papers, and hints for preparing them.

g. JCS Pub 1, Dictionary of Military and Associated Terms. Provides standardized (and sometimes surprising) definitions for use throughout DOD.

h. O'Hayre, John, Gobbledygook Has Gotta Go. Useful writing tips, with emphasis on writing in the Federal government.

i. DOD Telephone Directory. Who's where in the Washington DOD complex, organizational structure, etc. Handy for figuring out "copy to's."

j. Payne, Stanley L., The Art of Asking Questions. Particularly useful to OTDs who have to develop questionnaires --- helps avoid "loaded" questions, etc.

k. Ship Acquisition Reef Points. A useful supplement to NAVSO P-2457 for OTDs involved with ship acquisition programs.

l. Project Analysis Methodology. The text for 02B's course in analysis. Covers what the OTD generally needs to know about analysis, and discusses the support provided by Division Analysts.

m. M.G. Natrella, Experimental Statistics. An excellent cookbook for the OTD stuck without an analyst.

n. S. Siegel, Nonparametric Statistics for the Behavioral Sciences. An excellent cookbook for analysis of count type data (hits/misses, yes/no). Each technique is illustrated with a worked-out example.

o. Naval Institute's Fundamentals of Naval Operations Analysis. Not a cookbook, but an interesting discussion of the application of operations analysis methods to naval operations problems.

p. SEMCIP's The Commanding Officer's Guide to the Shipboard Electromagnetic Environment. Good summary of shipboard EMI (electromagnetic interference) problems.

q. FPMR 101-11.2, Plain Letters. Tips on writing clearly and briefly. Includes an excellent "Watchlist" of overworked and incorrectly used words and phrases.

r. McGraw-Hill Encyclopedia of Science and Technology. These 15 volumes cover many topics and can save you time in researching.

s. WPC (Word Processing Center) Procedures Manual. Tells you how to get the most out of the WPC --- including instructions for two types of dictation inputs to the WPC. These include portable recorders available on a loan basis from the WPC for use on trips and at meetings.

t. Reliability Computer. Not a document, but a circular slide rule for calculating reliability of continuously operated and one-shot devices. This gadget is available from Code 02B (free).

u. Duane, J.T., Learning Curve Approach to Reliability Monitoring. "Duane Growth Curves" are being mentioned more and more frequently in NAVMAT test documents. This is Duane's IEEE paper on the subject.

Section 2

DT&E and OT&E

201. Introduction. T&E (test and evaluation) comes in three varieties: DT&E (development T&E), OT&E (operational T&E), and PAT&E (production acceptance T&E). Each variety is discussed in detail in the fundamental Navy T&E document, OPNAVINST 3960.10. PAT&E, testing on production items to demonstrate that requirements of the production contract have been met, is largely independent of DT&E and OT&E, and simply determines if the Navy got what it signed a contract for. DT&E and OT&E, on the other hand, are closely related because they both influence what the Navy thinks it wants, and how it goes about specifying this in a contract. This relationship is discussed below.

202. Definitions

a. According to DOD Directive 5000.3, DT&E is conducted to assist the engineering design and development process and verify attainment of technical performance specifications and objectives. DT&E is planned and conducted by the DA (usually a SYSCOM).

b. According to DOD Directive 5000.3, OT&E is conducted to estimate a system's operational effectiveness and operational suitability, identify needed modifications, and provide information on organization, personnel requirements, doctrine, and tactics. In the Navy, OT&E is planned and conducted by OPTEVFOR. (R

203. Apparent Overlap of DT&E and OT&E. It is a fact that DT&E and OT&E necessarily examine the same features of a system -- performance features. Why is it necessary that DT&E and OT&E both look at the same features of a system? Because their viewpoints are completely different. This fundamental difference (viewpoint) means that DT&E and OT&E are completely different; there is no overlap or duplication between the two. (If there is, T&E is not being planned properly.) DT&E and OT&E differ in:

a. The way tests are conducted.

b. What is being tested.

c. The evaluation criteria.

d. The test measurements and the data base.

204. How Are Tests Conducted?

a. DT&E, whose viewpoint is technical, is properly conducted:

(1) In a controlled environment that minimizes the chance that unknown (or unmeasured) variables will affect system performance.

(2) By technical personnel skilled at "tweaking" to maximize performance.

b. OT&E is properly conducted:

R) (1) In an operationally realistic environment; e.g., high seas, temperature extremes, high-density electromagnetic environments, etc.

(2) With fleet-type operators and maintenance personnel.

(3) Against a simulated enemy who fights back.

205. What Is Being Tested?

a. DT&E tests a weapon, or a "black box," whatever the development program involves. (Seldom does a development program involve a complete weapon system.)

b. OT&E tests total weapons systems. If a missile is being developed, OT&E does not test the missile itself, but rather the missile system, which includes the firing platform, that platform's acquisition system, the targeting systems, the people who man it, logistics support, interfacing equipment, and so forth. Thus, the missile under development is hazarded by the fact that it may fail OT&E through no fault of its own, but because interfacing systems aren't well enough adapted to it, etc. But there's no point in deploying a "good" missile that can't work in the fleet.

206. What Are The Evaluation Criteria? DT&E employs technical criteria for evaluating system performance. These criteria are usually parameters that can be measured during controlled DT&E tests, that are important to the DA (and to the contractor, who gets paid to meet them). They are usually of little direct use in OT&E. Signal strength, rate of climb, mean time between failures, etc. are important in determining how well the sytem was engineered, but frequently are of no interest (per se) to OT&E, which is structured to demonstrate target acquisition at useful ranges, superiority in air combat, and the probability of accomplishing a mission. So DT&E and OT&E criteria are different.

207. What's Measured And How Often?

a. In DT&E, the DA generally knows what he wants to measure (e.g., some particular parameter: launch velocity, the number of G's pulled as the missile acquires, time-to-climb, etc.). DT&E tests are structured to hold many things constant, isolate others, and allow measurement of the one or two quantities of interest. In OT&E, it often is not possible to specify measurements. The objective is often simply to create combat conditions as closely as possible and watch what happens.

b. In DT&E it is generally possible to verify data statistically through replications of tests. In OT&E this is often not possible, because interactions during testing are as unique as a combat experience is unique. (R

208. Combined DT&E and OT&E. DOD Directive 5000.3 requires that planning for DT&E and OT&E be coordinated at the test design stages so that each test phase uses resources efficiently to yield the data necessary to satisfy common needs of the DA and the OT&E agency. With regard to combined testing, DOD Directive 5000.3 states that: (R

a. Development and operational tests may be combined when clearly identified and significant cost and time benefits will result, provided that the necessary resources, test conditions, and test data required by both the DA and the OT&E agency can be obtained.

b. Participation by the OT&E agency in the planning and execution of tests must be sufficient to ensure that the testing conducted and data collected are sufficient and credible to meet the OT&E agency's requirements.

c. When a combined testing program is chosen, it will normally include dedicated operational test events, and the final period of testing prior to the Milestone III decision will emphasize appropriate separate operational testing by the OT&E agency.

d. In all cases, the OT&E agency shall provide a separate and independent evaluation of the test results.

Section 3

Concept of OT&E

301. Characteristics of OT&E. In general, OT&E is

a. Planned by COMOPTEVFOR.

b. Conducted by fleet-type personnel.

c. Carried out in a realistically simulated combat environment.

d. Reported by COMOPTEVFOR.

The two distinct parts of OT&E (i.e., testing and evaluation) are discussed below. As will be obvious to the thoughtful reader, OT&E is more an art than a science, and differs considerably from the more widely understood DT&E (See Section 2).

302. Operational Testing

a. Operational testing consists of the following elements:

(1) Exercising a system or equipment under conditions which simulate, as closely as is possible, the expected operational, combat environment, and

(2) Recording sufficient data during the exercise to document all operationally significant system or equipment characteristics.

b. The first element of operational testing means that the test article is exercised:

(1) In operational scenarios in which both forces (ours and theirs) employ realistic tactics.

(2) Against targets that fight back.

Furthermore, the test article itself:

(1) Is representative (insofar as possible, considering the stage of development) of the intended production equipment.

(2) Is installed (insofar as possible) as it is expected to be installed in the fleet.

(3) Is operated and (usually) maintained by fleet-type personnel.

c. A few words of explanation. Operation by fleet-type personnel is always required for operational testing. Regardless of the OT&E phase, contractor operation voids operational testing. The same is not true of maintenance. During early IOT&E (OT-0/I), maintenance by fleet-type personnel is usually not possible. Only the maintainability portion of operational testing is voided by contactor maintenance. (Note that even when there is no operational testing, an operational evaluation of technical data is always possible.)

d. The second element of operational testing, the data element, is just as important as the first. Unless the correct data are recorded accurately during the exercise, some (at least) of the effort was wasted.

e. A final word on operational testing. Operational testing seeks to provide data on system performance (where performance includes all the elements of operational effectiveness and operational suitability) in the operational environment. This environment includes many things. Among these are the people (operators, maintainers, etc.); the other systems which will also be consuming power, radiating, etc., in the same ship or aircraft; ships or aircraft in the vicinity, employing their own systems; established constraints or rules of engagement; weather factors (visibility, sea state, etc.); the simulated enemy, and the tactics, countermeasures, etc. he employs; and so on. This large number of variables, and the fact that their effects may change as a function of their combinations with other variables dictates that each operation or run include as many elements of the whole as is possible. Technically oriented tests with highly restricted objectives (e.g., point-to-point navigation runs which include nothing else) are wasting operational test resources (particularly, they are wasting scarce fleet services). The way to avoid this waste is to structure the tests around mission-oriented scenarios -- and do the whole thing in an exercise. Investigate point-to-point navigation as a part of the ASW aircraft's mission to locate and destroy submarines. If the system will be employed in the fleet in a variety of scenarios -- investigate all of them before repeating any. This will insure the most complete data coverage if unforeseen circumstances cut testing short. Always strive to maximize test variables while acquiring data in areas not yet explored. And because not all variables are identifiable before testing, be alert for the unexpected, and ready to record its results.

303. Operational Evaluation

a. Operational evaluation is the analysis and interpretation of data from an operational viewpoint, for the purpose of predicting the operational effectiveness and operational suitability of a system.

b. Of a System! There is really no such thing as operational effectiveness (or operational suitability) of a component or a black box. Consider a new fuze in an old bomb. If the A-6 aircraft consistently drops bombs which fuze properly and destroy the target, the new fuze is part of an operationally effective weapons system. If, on the other hand, the bombs consistently fail to damage the target (for whatever reason), the new fuze is not part of an operationally effective weapons system. (For more on this, see paragraph 205.) It is crucial that the OTD understand this -- lest he end up asking the wrong questions about the thing he's evaluating.

c. A proper operational evaluation proceeds as follows:

(1) The objectives identify all the proper elements of operational effectiveness and operational suitability. (If they don't, you're probably sunk because you didn't acquire the right data.)

(2) Data are in hand. These data include results of operational testing, and whatever other data are operationally pertinent.

(3) These data are examined to determine if the system, when it's operating the way it's supposed to, has the capability to perform the necessary missions -- i.e., to determine if the objectives and evaluation criteria associated with operational effectiveness have been met. In this process, test results and other data are interpreted in an operational framework -- passed through an operational filter in the OTD's head -- to arrive at their operational meaning.

(4) Other data are examined to determine (basically) what the odds are that the system will operate the way it's supposed to -- i.e., reliability, maintainability, and the other elements of operational suitability. Again, the OTD's operational knowledge and experience provide a filter for the data.

d. Reminders:

(1) Don't lose sight of the objectives.

(2) Think systems and operational missions.

(3) Present results in meaningful operational terms -- shun the purely technical.

(4) Concentrate on what it will do as it is -- it's the DA's responsibility to figure out why it did that bad thing, and how to fix it.

304. OT-I Versus OT-II

a. The reason for OT-I is to provide CNO a recommendation regarding the Milestone II decision. Because the equipment to be tested in OT-I is probably far from the eventual production configuration, it is not usually possible to estimate reliability, maintainability, or availability quantitatively (MTBF, MTTR, A_o, etc.). A quantitative estimate of operational effectiveness can be made in OT-I, however, because (in order for OT-I to have meaning) the equipment is functionally like the proposed production version. So it is possible to estimate its capability numerically. *OT-I is extremely important* -- it is usually required, and it usually requires hands-on operation (not hands-on maintenance) by fleet personnel.

b. OT-II -- specifically OPEVAL -- always requires hands-on operation and maintenance. It's our last chance to insure quality equipment in the fleet, and the only way to do that is to use it the way the fleet will. (Note that in the case of phased OT-II, the early pre-OPEVAL phases are treated essentially as in OT-I, except that the equipment becomes progressively more like the production configuration, and operational suitability becomes more quantifiable.)

c. Don't underrate OT-I. Although OT-II may appear more glamorous, many other considerations (e.g., dollars already invested) may override COMOPTEVFOR's OT-II recommendations. The greatest opportunity for COMOPTEVFOR to influence future fleet equipment (design, performance, and survivability) is as a result of thorough, thoughtful OT-I.

305. The Philosophy of OT&E

a. The following extract from a COMOPTEVFOR document is a statement of COMOPTEVFOR philosophy of operational evaluation:

Prior to OPEVAL, a new weapons system should have thoroughly proven its capability to meet technical specifications, through DT&E culminating in TECHEVAL. It is then COMOPTEVFOR's responsibility to structure and conduct an OPEVAL (at minimum cost in dollars and time, commensurate with risk reduction) that will prove the weapons system's capability in a realistic operational environment, when maintained and operated by sailors, subjected to routine wear-and-tear, and employed in typical combat conditions against a simulated enemy who fights back. The purpose of OPEVAL is to allow an accurate assessment to be made of the true operational effectiveness and operational suitability of the weapons system in actual fleet use and combat employment. While TECHEVAL deals principally with instrumented tests and statistically valid data, OPEVAL should deal with operational realism and the uncertainties of combat. Efforts should be made to expose the weapons system to as many real-world operational circumstances and scenarios as possible. The objective is not always to acquire statistically significant data, or a box score of successes and failures (since replications are seldom possible), but rather to gain the most complete understanding possible of the weapons system's capabilities under stress. In technical testing, it is generally possible to state the purpose of the test with certainty. In operational testing, the principal value derived is often unplanned, resulting not from the basic purpose of the test, but from realistic aspects that were injected simply because they are likely to exist in actual fleet/combat employment. Thus operational testing is more an art than a science, and reasonable opportunity should be provided in test planning for the unexpected to occur (as it usually does in combat).

b. The philosophy of OT&E was also discussed in a COMOPTEVFOR message on the GP (Guided Projectile) program. This discussion was as follows:

To the maximum degree possible, COMOPTEVFOR desires to minimize both the time and cost of GP T&E. The soundness of the acquisition program must not be compromised, however, and a sound program requires both DT&E and OT&E. Funds could be saved if some GP test firings could satisfy both DT&E and OT&E. While this may be possible in some cases, the widely differing objectives of GP DT&E and OT&E make it unlikely that much can be done here. Subparagraphs (1) and (2) below discuss the rationale for this:

(1) During DT&E, firing is properly conducted on a round-by-round basis, with each shot designed to test some individual specification or parameter (e.g., the number of "G's" pulled by the projectile) with other parameters held constant. The test is designed to measure technical performance of the system.

(2) In OT&E, proper technical performance as regards individual specifications/parameters is assumed. The mission of COMOPTEVFOR is to assess whether, given this technical performance, the weapons system can be operationally effective and operationally suitable when employed under typical combat and environmental conditions, by fleet-type personnel, against an enemy who fights back. Thus OT&E is conducted on a mission-by-mission basis, varying such factors as sea state, visibility, own ship speed and maneuvers, the method of illumination, range, firing doctrine, target maneuvers, enemy countermeasures, etc.

Section 4

Role of the OTD

401. Function. As the Navy's independent agent for OT&E, COMOPTEVFOR is charged (OPNAVINST 5440.47) with:

a. Estimating the projected operational effectiveness and operational suitability of weapons systems.

b. Developing tactics associated with new weapons systems. (See Glossary for definitions of future, new, and existing weapons systems.)

c. Advising CNO on the adequacy of planned T&E to support development and acquisition decisions.

In his assigned area(s) of responsibility, the OTD functions for COMOPTEVFOR in the detailed planning, the supervision of testing, and the analysis and evaluation of test results. These functions are highlighted in more detail below, not necessarily in the order in which the OTD will perform them, but more or less in their order within a given project. They are discussed in detail in later sections of this Guide.

402. Planning. The OTD plays a role in two fundamental categories of planning: long-range, management oriented; and short-range, test oriented.

a. Long-range planning involves providing the COMOPTEVFOR inputs to management-level program documents (ORs, DCPs, TEMPs, etc.). In order to provide these inputs, the OTD should be able to answer the following questions as they relate to his project:

(1) From an operational viewpoint, why develop it?

(2) How will it be used? In what installations? In what environments (natural and manmade)?

(3) What defines its operational effectiveness? What must it do?

(4) How well must it do it? When?

(5) What must DT&E and OT&E do to prove it does it? When?

(6) What are the appropriate measures of operational suitability?

(7) What numbers are required for these measures? When?

(8) What must DT&E and OT&E do to demonstrate them? When?

(9) What resources are required for OT&E?

The hardest part of this process is figuring out the essential elements of operational effectiveness and operational suitability. A contributing factor to the difficulty in defining these elements is the fact that a number of sources or agencies may appear to be helping (and they think they are), when they're not, simply because they don't think the way we have to. If a DA provides a tentative list of "Required Operational Characteristics" in a first-draft TEMP, invariably these turn out to be "Required Technical Characteristics" -- because he thinks technically, not operationally. And if you're not constantly alert to the danger, you can make the same error. Don't let your technical background smother your operational background. Confronted with a new weapons system or equipment, and having understood why it's being developed, ask yourself (and ask your analyst):

(1) What must it do from an operational viewpoint?

(2) What must it not do from an operational viewpoint?

For example, consider a buoy carried externally on a submarine, designed to release automatically if test depth is exceeded, surface, and transmit at regular intervals over the life of its battery an emergency message identifying the submarine, reporting its location at buoy release, etc. There are two fundamental characteristics associated with operational effectiveness of the buoy (viewed as part of an overall system -- this viewpoint is crucial to the process):

(1) If test depth is exceeded, there must be a high probability that an accurate distress message will be received and acted upon at the ground-station.

(2) The buoy must not release when it's not supposed to (e.g., during high-speed transits, maneuvers, etc.).

Note that parameters such as output power, battery endurance, etc., while related to the first operational characteristic, are in fact technical characteristics.

If the elements of operational effectiveness and operational suitability are defined correctly, then the rest of the job becomes almost bookkeeping. If the definition is wrong, the error may remain through test planning and test operations, only to be recognized in the reporting process -- and lead to a limitation to scope which says we didn't ask the right questions.

b. Short-range planning involves, primarily, developing the Test Plan, and the usually undocumented contingency plans to cover unusual circumstances. These last, which frequently exist only in the OTD's head, can make the difference between successful and unsuccessful test operations. They are created by an OTD who asks himself, "What if," and thinks it through.

403. Supervising the Test

a. Make sure all hands know what they're supposed to do, and when.

b. Make sure data are collected and turned in.

c. Be prepared to alter operations if unusual circumstances warrant.

d. Keep COMOPTEVFOR advised.

e. Prevent unauthorized tampering with equipment (this might invalidate test data).

404. Analysis and Evaluation of Test Results

a. There are two basic functions here. Analysis involves reconstruction of the operational situation during testing, and deriving the various measures of equipment performance in that situation. Evaluation involves the thought process of relating these measures to the objectives in order to:

(1) Convince decision-makers regarding operational effectiveness and operational suitability (at CEB and DSARC briefings (see Glossary for definitions) and in Evaluation Reports).

(2) Provide useful information to potential users of the equipment (through Tactics Guides).

(Note: The Evaluation Report and the Tactics Guide are the two products of OT&E.)

b. Analysis techniques come in many varieties that are individually applicable depending on the type of data, type of equipment, etc. Selection of appropriate techniques is the forte of the Project Analyst. Interpretation is the OTD's forte. It is the process by which he applies his filter of operational experience to test data, to determine what they really mean from an operational viewpoint.

405. Other Duties As Directed. The OTD is the primary source of information on all aspects of his project. He briefs at high (Flag) levels, he answers questions, he drafts responses to incoming messages, letters, etc. relating to his project. The more he knows about his project, the easier his job is. If he knows everything about it, it's still not easy. Keep the Commander informed (through memos, trip reports, requests to brief, etc.). Don't let him be surprised!

406. Lessons Learned. When you have made a mistake, or when things have gotten fouled up for some other reason, tell your Section Head or ACOS. There is a possibility that someone else may make the same mistake, etc., and perhaps that can be avoided. Your Section Head and ACOS can insure wide distribution of lessons learned through your experience, and maybe others can profit from them. The same thinking applies to good things--if you learn that a particular center or Laboratory has a new, proven capability (for example), describe it to your Section Head or ACOS and let them decide if other Sections/Divisions ought to know about it.

A) 407. Overseeing Preparation and Staffing of Test Plans, Evaluation Reports, and Tactics Guides

a. General. In the Headquarters, the OTD (or OTC, when the OTD is not assigned to the Headquarters) is responsible for:

(1) Getting draft Test Plans, Evaluation Reports, and Tactics Guides prepared for staffing and introducing these drafts into the staffing chain (typically Section Head, ACOS, 02, 01, 00).

(2) Getting smooth Test Plans, Evaluation Reports, and Tactics Guides prepared for signature and printing.

b. Draft Documents

(1) Draft Test Plans, Evaluation Reports, and Tactics Guides are prepared (usually by WPC (Word Processing Center)) in double-space format.

(2) For staffing purposes, draft Test Plans and Evaluation Reports are routed in specially printed manila envelopes obtainable from the Division Admin Office. Draft Tactics Guides are routed in Division routing folders.

(3) Draft Test Plans are routed with the associated TEMPs; draft formal Evaluation Reports are routed with any Quick-look Reports that preceded them. OTDs/OTCs may include such other background material that they consider necessary.

(4) Original art work and other irreplaceable material (e.g., original reports from Commanding Officers of project ships) are not routed with drafts -- use the Xerox machine.

c. Documents for Signature

(1) Smooth, for-signature documents are routed to the signer (in the case of 00, via 02) in ready-for-printing form.

(2) "Ready-for-printing" means:

(a) Original (or original quality) drawings and typed material.

(b) Glossy prints of photos.

If in doubt about printability, ask the Print Shop Manager -- early.

Section 5

Role of the OTC

501. Function

a. For projects with an OTD assigned from within the Headquarters, the OTD and OTC may be the same person, or the OTC may act in a normal section head capacity (as the OTD's day-to-day supervisor, who acts for him in his absence). For some large projects (e.g., ship evaluation), the OTC may be from one Warfare Division, with a team of OTDs from other Divisions.

b. For projects with an OTD assigned from Deputy, a Squadron, or a Detachment, the OTC's functions are different.

(1) He provides guidance on the project through the OTD's organizational structure. Guidance -- not direction. Disagreements are resolved at parallel higher levels.

(2) He provides the interface with Washington (including negotiations on project matters).

(3) He is the Headquarters focal point on project matters, and initiates all project-related staffing within the Headquarters.

502. Project Assignment and Reassignment

a. To assist in tracking T&E and RDT&E support, CNO (OP-098) assigns a T&E number to each acquisition program. This number continues for the life of the program, and, for ACAT-I, II, and III programs, is the TEMP number.

b. Before a new T&E number is assigned, OP-983 alerts the DCOS, who alerts the appropriate Warfare Division. The ACOS names an OTC (and an OTD if the project will be prosecuted by the Headquarters). This information is relayed by the DCOS to OP-983, who prepares the formal letter assigning the new T&E number. This letter directs preparation of TEMP (ACAT-I, II, and III programs), and lists the OPNAV, NAVMAT, and OPTEVFOR points of contact.

c. Projects are either prosecuted by the Headquarters or are reassigned, usually to Deputy or an AIRTEVRON, with the Commander's approval. The decision on prosecution (and hence location of the OTD) is based on considerations such as:

(1) Availability of a qualified OTD.

(2) Test platform requirements (e.g., type aircraft).

(3) Requirements to use specific test facilities (e.g., ranges).

Usually if a project is reassigned initially, it remains so until it is terminated. Occasionally, however, considerations such as those just mentioned dictate that specific phases of a project (e.g., OPEVAL) be prosecuted by different agencies.

d. When the Commander has approved a reassignment, the cognizant OTC prepares the formal COMOPTEVFOR reassignment letter. This letter provides details on:

(1) Program documentation that is available.

(2) Coordination and liaison authority.

(3) Signature authority for test plans.

(4) Reports (including partial and quick-look) that will be required.

(5) Program structure -- i.e., T&E versus milestones.

e. Subsequent to project reassignment, all project correspondence is provided the OTD, either automatically by COMOPTEVFOR Admin or by message readdressal (OTC's responsibility). The OTC also ensures that all information/decision memos to the Commander are forwarded to the OTD.

Section 6

Program Structure

601. Definition. Program structure is the relationship between the RDT&E profile and the production profile (see Figure 6-1). Proper program structure insures that both DT&E and OT&E inputs will be available to decision makers at program milestones. This requires a properly phased T&E program, supported by adequate test articles (with defined performance thresholds).

602. OTD/OTC Guidelines Regarding Program Structure

a. If OPTEVFOR's position will be that OT&E is required, make sure a new program is designated ACAT-III or higher (see OPNAVINST 3960.10 for ACAT definitions and criteria). ACAT-III or higher means a TEMP is required

b. Concentrate on the TEMP -- do everything you can to make it brief, factual, and clear.

c. Lay out the RDT&E profile. Identify the major milestones.

d. Focus on testing that supports Milestone II (FSD (full-scale development)). This may be the last time OPTEVFOR can influence major system charateristics.

e. Identify key development risk areas (technical and operational). Insure that the proposed DT-I/OT-I phases will demonstrate that engineering is reasonably complete; that all significant design problems (including reliability, maintainability, compatibility, interoperability, and logistical considerations) have been identified; and that solutions to the above problems are in hand.

f. Decide on the need for at-sea OT-I. It may be expensive and time-consuming, and may be resisted by the DA. But if the development requires it -- if, for instance, performance in a Task Force environment is a critical issue -- early at-sea testing can save both development costs and time in the long run.

g. Identify test articles clearly (by nomenclature (production prototypes, etc.), number, availability date, and usage (OT phase)).

PROGRAM STRUCTURE

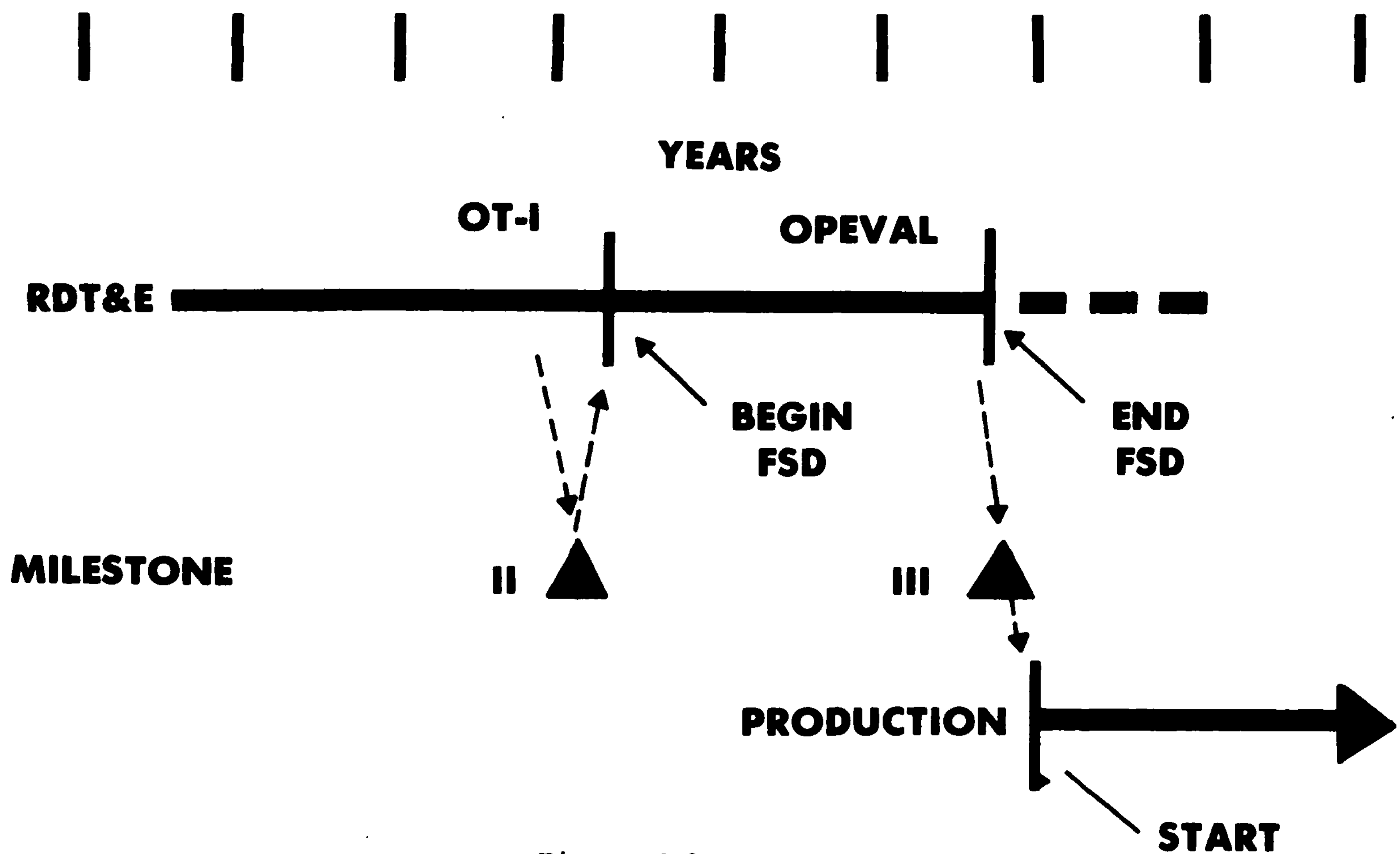

Figure 6-1

h. Clearly define the production profile -- in terms of nomenclature by lots, numbers to be produced, long-lead requirements, and funding requirements.

i. Insure that production lots are released only at Milestone III points -- and that these points are preceded by phases of OT-II.

j. Structure OT-II carefully and insure that OPEVAL:

(1) Is a realistic simulation of combat.

(2) Is long enough -- particularly, to demonstrate reliability.

(3) Uses production-representative test articles.

(4) Uses operational thresholds adequate for fleet useage. (Specify simple, dominant thresholds.)

k. Specify projected FOT&E (OT-III and OT-IV).

603. Do's and Don't's Regarding Program Structure

a. Don't wait until the program has been established. Get together with the DA early and help him shape program structure. The earlier the better.

b. Don't tell the DA to develop a rough draft (of DCP, TEMP, etc.) for our comment. Help him draft it (see Section 7). If he's got a Navy lab or a consulting contractor working on it, volunteer to help them.

c. Do draft a "program structure" letter or message as early as possible -- a brief (one page of text, one chart like Figure 6-1) outline of program structure fundamentals.

d. Do spend extensive effort on test thresholds. Work with the sponsor and the DA. Specify operational thresholds for OT&E. (Note that COMOPTEVFOR establishes the measures -- the actual threshold values amount to recommendations to CNO; he must ultimately approve.) Don't ignore technical thresholds -- make sure thay're consistent with operational thresholds.

e. Do define projected FOT&E early, and in detail, since FOT&E will always be required, unless no unresolved issues remain from IOT&E. Clarify the funding at the outset (don't let legitimate OT-III be moved into OT-IV).

f. Do attend design reviews, and do review system specs from an operational viewpoint.

604. COMOPTEVFOR's Involvement in the ASU Process

a. Policy and procedures for ASU/PASU are contained in OPNAVINST 4720.9. Each OTD/OTC should be familiar with the current issue of this instruction.

b. COMOPTEVFOR's recommendation, based on OT&E, is considered in every ASU/PASU decision for ACAT-I, II, or III systems. This recommendation may be briefed at a program review (as outlined in OPNAVINST 3960.10), and is provided in each evaluation report of OPEVAL. In addition, CNM (MAT 04), as a matter of routine, requests COMOPTEVFOR's recommendation on each ASU/PASU decision being considered in NAVMAT (including ACAT-IV decisions). Note that a MAT 04 request may be dated a day or a week after he has received our OPEVAL report containing an ASU/PASU recommendation. He isn't asking because he didn't read his mail; he's asking because by CHNAVMAT/COMOPTEVFOR agreement, we will always be asked specifically when a decision is being made, to obtain our best judgment, current at the time of the decision. This allows for the rare case when our recommendation regarding a system changes after the OPEVAL report has been published, or when the ASU request includes configurations or components that were not tested during OPEVAL.

c. COMOPTEVFOR responses to MAT 04 requests for comments on proposed ASU are:

(1) Prepared in message format, as shown in the following pages, under the direction of the cognizant ACOS.

(2) Reviewed by the DCOS and the Chief of Staff prior to submission to the Commander.

(3) Approved by the Commander.

(4) Released within 2 working days of receipt of the MAT 04 request, unless unusual circumstances prohibit.

GUIDE FOR MESSAGES COMMENTING ON

PROPOSED APPROVAL FOR SERVICE USE

1. The message is usually in three paragraphs, as shown in the accompanying incomplete sample.

2. Paragraph 1 is the reason for the message. Use the term "provisional" (in the subject and in this paragraph) if provisional approval is under consideration.

3. Paragraph 2 is the COMOPTEVFOR recommendation on the issue in question.

4. Paragraph 3 is a brief summary of the rationale for the COMOPTEVFOR recommendation, citing appropriate COMOPTEVFOR tests, reports, etc. The major results of any OT&E conducted but not yet formally reported should be included. If the COMOPTEVFOR recommendation is for approval, this paragraph should state that approval was recommended in the appropriate COMOPTEVFOR report, or that approval is recommended based on the system's having met the criteria of OPNAVINST 4720.9. If the COMOPTEVFOR recommendation is to not approve the item for service use, this paragraph should identify specifically the criteria of OPNAVINST 4720.9 that have not been satisfied. Furthermore, this paragraph should specify the steps (additional testing, etc.) necessary to support a COMOPTEVFOR recommendation for approval.

JOINT MESSAGEFORM

SECURITY CLASSIFICATION

PAGE	DTG RELEASER TIME			PRECEDENCE		CLASS	SPECAT	LMF	CIC	ORIG MSG IDENT
	DATE TIME	MONTH	YR	ACT	INFO					
OF										

BOOK | MESSAGE HANDLING INSTRUCTIONS

FROM: COMOPTEVFOR NORFOLK VA

TO: CHNAVMAT WASHINGTON DC

INFO CNO WASHINGTON DC

COMNAV.....SYSCOM WASHINGTON DC

R} CLASSIFICATION//N03960//

SUBJ: {PROVISIONAL} APPROVAL FOR SERVICE USE OF................

A. CHNAVMAT WASHINGTON DC DATE/TIME GROUP

B. COMOPTEVFOR LTR SER..... OF.....

C. OPNAVINST 4720.9D

1. {*} REF A REQUESTED COMOPTEVFOR COMMENT ON FORTHCOMING DECISION ON {PROVISIONAL} APPROVAL FOR SERVICE USE FOR.............

2. {*} COMOPTEVFOR RECOMMENDS........ NOT BE GRANTED {PROVISIONAL} APPROVAL FOR SERVICE USE.

3. {*} .... WAS EVALUATED BY COMOPTEVFOR IN PROJECT XXX-OT-III. RESULTS OF THAT EVALUATION, REPORTED IN REF B, HAVE NOT DEMONSTRATED RELIABLE PERFORMANCE, IAW SPECS, IN EXISTING OPERATIONAL ENVIRONMENT, AS REQUIRED REF C. RECOMMEND {PROVISIONAL} APPROVAL FOR SERVICE USE

DISTR

DRAFTER TYPED NAME TITLE OFFICE SYMBOL PHONE

SPECIAL INSTRUCTIONS

*WHEN REQUIRED CLASSIFICATION

RELEASER: TYPED NAME TITLE OFFICE SYMBOL AND PHONE

SIGNATURE

SECURITY CLASSIFICATION

DATE TIME GROUP

JOINT MESSAGEFORM							SECURITY CLASSIFICATION			
PAGE	DRAFTER OR RELEASER TIME	PRECEDENCE		LMF	CLASS	CIC	FOR MESSAGE CENTER/COMMUNICATIONS CENTER ONLY			
		ACT	INFO					DATE - TIME	MONTH	YR
OF										

BOOK	MESSAGE HANDLING INSTRUCTIONS

FROM:

TO:

ONLY AFTER FOLLOWING DEFICIENCIES HAVE BEEN CORRECTED AND CORRECTIONS VERIFIED BY COMOPTEVFOR:

A..............

B..............

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DRAFTER TYPED NAME, TITLE, OFFICE SYMBOL, PHONE & DATE	SPECIAL INSTRUCTIONS	
RELEASER: TYPED NAME, TITLE, OFFICE SYMBOL AND PHONE		
SIGNATURE	SECURITY CLASSIFICATION	DATE TIME GROUP

DD FORM 1 JUL 73 173 (OCR)

S/N 0102-LF 001-6000

PS 7494 US (8601)

* U.S.G.P.O 245-765

Section 7

COMOPTEVFOR Contributions to Program Documents

701. Introduction

a. COMOPTEVFOR is required by his charter, both explicitly and implicitly, to advise CNO not only on the capability of new weapons systems, but also on the adequacy of performance specifications and the adequacy of all planned T&E to support development and acquisition decisions. Notice that "all planned T&E" doesn't mean just OT&E, and that "adequacy of all planned T&E" means adequacy of opportunity for T&E at proper times and in adequate amounts to provide CNO with information pertinent to decision-making. So, when you help make a program document more nearly perfect, you're responding to a primary task of COMOPTEVFOR. The task is important; it deserves your best shot. Your influence on the entire development and deployment of a new weapons system can never again be as great after the first NDCP is signed with a faulty development and acquisition strategy (program structure, as discussed in Section 6) embedded in it.

b. COMOPTEVFOR contributes to program documents in two basic ways: informally, at the working level, when the OTD/OTC assists in preparation of early drafts; and formally, in comment letters. While COMOPTEVFOR is interested in the entire content of each program document, some areas of these documents are of more interest than others. These are discussed below.

702. ORs (Operational Requirements). The format and content of an OR is described in OPNAVINST 5000.42. Be familiar with this instruction before reviewing an OR. Concentrate your review on Section I, Operational Need (emphasis on the operational problem); Section II, Operational Concept; and Section III, Capabilities Required (emphasis on operational parameters/criteria and operational development). Although your comments will usually be confined to Section III, you may recommend changes to any section so long as you provide operational rationale for the changes.

703. DPs (Development Proposals). These documents are also addressed in OPNAVINST 5000.42. Concentrate this review on Section IV, Program Alternatives; Section V, Effectiveness and Cost Comparison of Alternatives (emphasis on T&E aspects of proposed development/production schedules); Section VI, Risks (emphasis on uncertainties to be resolved); Section VII, Test and Evaluation; Section VIII, Other Factors; and Section XI, The Development Plan(s), Achievement Milestones and Thresholds. Your comment will usually address the adequacy of planned T&E to support scheduled program milestones.

704. TLRs (Top-Level Requirements) and TLSs (Top-Level Specifications). For ship development and ship acquisition programs, TLRs and TLSs are prepared after the OR or DP. This additional set of documents, discussed in OPNAVINST 9010.300, is necessary because of the length and complexity of the ship design process. Your review and comments will follow the guidelines discussed above for ORs and DPs.

R) 705. DCPs (Decision Coordinating Papers) and NDCPs (Navy DCPs). These documents are discussed in DODINST 5000.2 and OPNAVINST 5000.46. Review the entire document, but pay particular attention to Annex A (Goals and Thresholds) to ensure that the performance parameters and supportability and manpower parameters are complete and unambiguous, and that the values associated with them are accurate and consistent.

706. TEMPs. TEMPs are discussed in detail in OPNAVINST 3960.10, and are the subject of Section 8 of this Guide. Draft TEMPs may be reviewed in their entirety twice; once when the DA gives us a completed draft, and again during CNO (OP-098) review. Before the first review, you should have provided the DA with Required Operational Characteristics of Part I, OT&E schedule inputs for Part II, a complete Part IV, and resource requirements for Part VI. Your reviews of the complete TEMP should address all parts, even including your own draft Part IV. Inadequacies in DT&E are important, both to you, in that they might inhibit good operational testing, and to OP-983, who must advise on all T&E. In this regard, OP-983 is you. You should be especially sensitive to resource and schedule inadequacies in the final draft TEMP, and ensure that COMOPTEVFOR points them out to CNO.

707. PEDS (Program Elements Descriptive Summaries)/CDSs (Congressional Data Sheets). These documents are described in the DOD Budget Guidance Manual (NAVCOMPTINST 7102.1), and are prepared annually by the DA. COMOPTEVFOR reviews drafts of these documents, and provides the OT&E write-ups in their T&E sections. Guidance is promulgated by the DCOS as each annual cycle begins.

708. MENS (Mission Element Need Statement). This document is required by DODINST 5000.2 to justify initiation of a new major system acquisition. It is prepared by the individual Service and submitted to SECDEF to support a Milestone 0 decision. We review the entire MENS, and provide suggested improvements where possible.

709. Mini-NDCP. By OP-098 memo ser 987/239830 of 2 Jul 1979, a revised NDCP format was specified for ACAT III and IV programs--the Mini-NDCP. This four-page document should be reviewed in its entirety, with particular attention to page 2 (goals and thresholds). (Note that COMOPTEVFOR ltr ser 1446 of 26 Oc 1979 forwarded OPNAV guidance for Mini-NDCP preparation.)

710. IPSs (Integrated Program Summaries). These documents are required by DODINST 5000.2, which specifies their format and content. Concentrate your review on the following topics: System Vulnerability, Organizational and Operational Concept, Test and Evaluation, Reliability and Maintainability, and Computer Resources. (A

711. Preparation of Comment Letters. This paragraph provides guidance for preparing comment letters, and comment letter format. Use this format for all COMOPTEVFOR comment letters unless a different one is prescribed by higher authority (e.g., DOD Directive 7650.2 for commenting on GAO reports).

a. Comment letters usually consist of a letter and an enclosure (illustrated in the next few pages). The enclosure to a comment letter provides specific recommended changes to the document being commented on, ordered front-to-back, plus the rationale for each recommended change Prepare the enclosure first. The comment letter emphasizes the key point(s) of the enclosure.

b. Before commencing your comment letter draft, study the correspondence thoroughly, making notes.

c. Don't comment on typographical or other minor errors that don't affect meaning. Don't comment on technical parameters that have no operational significance.

DEPARTMENT OF THE NAVY
COMMANDER OPERATIONAL TEST AND EVALUATION FORCE
NORFOLK, VIRGINIA 23511

644:skd
3930
Ser

From: Commander Operational Test and Evaluation Force
To: Chief of Naval Operations

Subj: Navy Decision Coordinating Paper for Development of the Combined UHF/VHF AM/FM Radio System (NDCP WCC 94)

Ref: (a) CNO ltr ser 943/C607274 dtd 22 July 1976

Encl: (1) Detailed Comments on NDCP WCC 94

1. Enclosure (1) to reference (a) has been reviewed. The major comment is provided below. Detailed comments are contained in enclosure (1).

2. As the draft is written, a full-scale development decision (Milestone II) could be made without any hardware and T&E (test and evaluation). While the radio itself is considered low risk, the antenna is not. Adequate T&E is require prior to Milestone II, and the NDCP should be modified to include it.

R. E. CRISPIN
Chief of Staff

Copy to:
CNO (OP-986)
(OP-943)

Detailed Comments on NDCP WCC 94

1. Page 13, par. E., Program Structure, Milestones, and Threshold Events. The Milestone/Event Chart contained in this paragraph needs to be changed/updated to reflect the program structure. The recommended structure is:

Milestone/Event	Date
Approve NDCP	AUG 76
Specifications, requirements, RFP	SEP 76
TEMP	OCT 76
Release FY 77 RDT&E Funds	OCT 76
Contract Award for Advanced Development Model (Milestone I)	JAN 77
DT/OT-I Testing	MAR-JUN 77
Preliminary Design/Program Review	AUG 77
Contract Award for Engineering Development Model (Milestone II)	SEP 77
Start Contractor Tests	DEC 77
Critical Design/Program Review	DEC 77
TECHEVAL	JAN-MAR 78
OPEVAL	MAY-AUG 78
Critical Design/Program Review	SEP 78
Approval for Service Use	OCT 78
Milestone III	OCT 78
IOC	AUG 79

Rationale: This schedule would allow for more developmental testing prior to Milestone II to increase confidence prior to TECHEVAL/OPEVAL.

2. Page 13 and 14, par. IX, Test and Evaluation. This section should be rewritten to allow for testing (DT/OT-I) prior to Milestone II and further testing/milestoning throughout the program.

Rationale: To allow for sufficient testing to increase confidence at each Milestone.

3. Page 15, par. 2.b., OPEVAL, "Scope". Change the first sentence to read as follows:

"Determine operational effectiveness and operational suitability for service use."

Rationale: COMOPTEVFOR does not limit assessment to suitability alone; assessment must be made of operational effectiveness and operational suitability.

4. Page 15, par. 2.b., OPEVAL, "Location". Change to read as follows:

"To be determined as services become available. Present plans call for evaluation to be conducted on both the East and West Coasts."

Rationale: Present planning requires use of VX-4 and VX-5 on the West Coast for two phases of the evaluation, Marine Corps assets on the East Coast for the third phase, and fleet assets on the East Coast for the final phase.

5. Page 15, par. 2.b., OPEVAL, "Duration". Change to read as follows:

"Approximately 3 months from MAY 78 through AUG 78."

Rationale: Planning meetings have indicated that TECHEVAL/OPEVAL may be moved forward.

6. Page 15, par. C., Table of DT&E Performance Objectives. This paragraph should be changed to the format contained in OPNAVINST 5000.46.

Rationale: Standard format should be used.

7. Page 15, par. D., Table of OT&E Performance Objectives. The below table is recommended:

"Parameter	Milestone II Threshold Demonst.	Milestone III Threshold Demonst.	Post Milestone III Goal Demonst.
1. RF Power	10W (AM/FM)	Same	Same
2. FM Cap	30-88 MHz/ 225-400 MHz	Same	Same
3. AM Cap	116-156 MHz/ 225-400 MHz	Same	Same
4. MTBF	500 hours	1000 hours	1000 hours
5. MTTR	2 hours	1 hour	1 hour
6. A_o	0.996	0.998	0.998"

Rationale: This table sets thresholds to assess both operational effectiveness and operational suitability.

Section 8

The TEMP, and Scheduling RDT&E Support

801. Importance of the TEMP. To COMOPTEVFOR, the TEMP is the most important single document associated with an acquisition program. It summarizes all the significant aspects of the program (including costs, schedules, and planned installations), and relates the three types of T&E (OT&E, DT&E, and PAT&E) that will provide the measures of program progress. Approval constitutes CNO direction to fund and execute the T&E, and is a contract between the DA and COMOPTEVFOR on this T&E. The format and content of a TEMP is described in OPNAVINST 3960.10. Each OTD and OTC must be familiar with OPNAVINST 3960.10 in detail.

802. TEMP Preparation

a. A TEMP is prepared by the DA in cooperation with COMOPTEVFOR (and PRESINSURV when appropriate). "In cooperation with" means "With active participation by." COMOPTEVFOR contributes to all parts of the TEMP (in working sessions, through comment letters, etc.). COMOPTEVFOR provides some parts of the TEMP. These parts, discussed later, are drafted by the OTD (not the DA, Program Sponsor, or anyone else).

b. According to OPNAVINST 3960.10, a TEMP is prepared early in each new acquisition program, and is approved prior to Milestone I. This requires that the OTD/OTC know what's going on. Pay attention to program documentation (ORs, NDCPs, MIPs, etc.), and arrange to talk with the DA when you spot a new development starting. Volunteer to help with TEMP preparation.

c. If you don't think TEMP development is moving fast enough get your OTC, Section Head, and ACOS involved as necessary. Don't let it slide until it's too late!

d. Handle as much as you can at informal working sessions, and through informal inputs. But always make sure the DA understands that a formal COMOPTEVFOR chop will take place, and that if the thing isn't the way we want it, we'll say so officially.

803. COMOPTEVFOR Inputs To TEMPs

a. COMOPTEVFOR double-checks the entire TEMP with particular attention to the following: (R

(1) Mission (paragraph 1, Part I). Check for accuracy and completeness from an operational viewpoint -- particularly with respect to the planned operational environment.

(2) Key Functions (paragraph 2a, Part I). Ensure that the mission/function matrix (if one is included) is complete.

(3) Interfaces (paragraph 2b, Part I). Ensure completeness.

(4) Required Technical Characteristics (paragraph 4, Part I). Ensure that performance goals and thresholds are consistent with Required Operational Characteristics. For example, a threshold MTBF of 150 hours is not consistent with a threshold 24-hour mission reliability of 0.90 -- it would have to be nearly 230 hours.

(5) Management (paragraph 1, Part II). Ensure that COMOPTEVFOR's responsibilities are stated clearly and accurately -- particularly with respect to any planned combined development and operational testing.

(6) DT&E Outline (Part III). Check for completeness (including survivability/vulnerability), and relevance to the issues.

b. COMOPTEVFOR prepares the Required Operational Characteristics section (paragraph 3, Part I) of the TEMP. The first set of characteristics (for operational effectiveness) state plainly, with numbers where possible, what the equipment is expected to do (what missions or essential functions it must accomplish) when it's working the way it's supposed to. The second set of characteristics (for operational suitability) state the reliability, maintainability, etc. characteristics required to insure that it will work the way it's supposed to. If CNO has not specified numbers for these, suggest them in the draft. TEMP approval constitutes CNO direction regarding the numbers in the approved TEMP.

c. COMOPTEVFOR prepares the Operational Issues (paragraph 5b, Part I).

d. COMOPTEVFOR prepares the OT&E-related portions of the Integrated Schedule (paragraph 2, Part II), and Part VI (Special Resource Summary). <u>Use Section 6 of this Guide when preparing inputs to paragraph 2, Part II</u>.

e. COMOPTEVFOR prepares Part IV (OT&E Outline). In Part IV, a number of OT&E phases (OT-IIA, OT-IIB, OT-IIIA, etc.) are defined. Each is created for a specific reason, usually to provide information necessary to an important development or production decision. For example, early phases of IOT&E often are designed to assist in deciding between competing system designs. Later phases can be designed to support ASU decisions. FOT&E is intended to influence decisions on production rates, and decisions to use a system against a new threat or to begin development of advanced systems. The reason for each phase of OT&E should be obvious to the reader of Part IV of a TEMP. That is, it should be obvious to the reader what successful accomplishment of each phase will lead to. This information should appear under the "OT&E Objectives" paragraph associated with each phase, and it should be the first information in that paragraph, as illustrated below:

"(2) OT&E Objectives. Successful accomplishment of OT-II will allow a recommendation on ASU. Specific objectives are:"

"(2) OT&E Objectives. Successful accomplishment of OT-III will provide confidence in the design, to support a decision for full-rate production. Specific objectives are:"

804. <u>Required Operational Characteristics</u>

a. Among the various tasks performed by an OTD/OTC, that of defining a system's required operational characteristics has the greatest potential for long-range significance (good and bad). For these characteristics will ultimately define the <u>objectives</u> (and associated evaluation criteria) of the various phases of OT&E. If these characteristics are wrong, then the objectives/criteria of OT&E will be wrong, and we will evaluate the wrong things--we will answer the wrong questions. For this reason, derivation of required operational characteristics deserves careful thought. Do not attempt to do <u>all</u> the careful thinking <u>yourself</u>--discuss the subject with <u>as</u> many intelligent people as you can find. And don't restrict them to experts in the particular warfare area--other intelligent people may have a better view of <u>fundamentals</u>.

b. Don't use as a required operational characteristic a statement such as "The system must perform better than its predecessor,....." Whether or not System X is "better than" System Y requires a judgement that may (and probably will) differ from one person to another. If one sonar has a longer detection range than another, but provides a less accurate bearing to the target--which one is better? Depends on what you're using it for. This is not to say that we cannot use one system's performance for criteria for another. We can--so long as we specify the parameters we're talking about. Thus "The system must detect...... at ranges beyond the capability of.........(X meters)" is OK. No judgement required--only analysis of data.

c. For a more detailed discussion on this subject, see Section 9 of this Guide.

R) 805. Checklists. The attached sheets are designed to help the OTD avoid some of the more frequent errors in COMOPTEV-FOR TEMP inputs.

TEMP CHECKLIST

PART I -- Description

1. Mission

The operational mission description really addresses mission(s), and not capabilities. ( )

The operational environment that is described is consistent with the threat. ( )

2a. Key Functions

The list of primary functional capabilities is complete. ( )

Primary functional capabilities will be demonstrated adequately in DT&E and/or OT&E. ( )

2b. Interfaces

The list is complete. ( )

2c. Unique Characteristics

Survivability/vulnerability aspects are adequately addressed. ( )

3. Required Operational Characteristics

They are operational system characteristics--they describe (and quantify) the fundamental things we require of the system--and they are not technical characteristics. ( )

They are categorized properly into operational effectiveness and operational suitability. ( )

They describe things we can get a handle on in OT&E. ( )

They use numbers as much as possible. (If you have to suggest a number, because CNO has not provided one, get with your Project Analyst and work out what you think it ought to be.) ( )

The numbers do not have confidence limits associated with them. (A required operational characteristic is a mission reliability of X; that's what the system should have. Confidence limits apply to our estimates of what the system will do, not to what it's supposed to have.) ( )

4. <u>Required Technical Characteristics</u>

They are complete and sufficient to demonstrate the requirements of OPNAVINST 3960.10 for DT&E. ( )

They are sufficiently defined so as to allow only one interpretation of test results. ( )

5. <u>Critical T&E Issues</u>

All key areas of risk that can be resolved in T&E are addressed. ( )

All discussions are pertinent to the issues. ( )

PART II -- <u>Program Summary</u>

1. <u>Management</u>

Responsibilities of participating agencies are clearly and properly defined. ( )

Discussions are pertinent and deal in specifics rather than in generalities. ( )

2. <u>Integrated Schedule</u>

All phases of OT&E are shown. ( )

Phases reflect actual test operations, not periods when we're not doing anything. ( )

Program structure is proper (see Section 6). ( )

Each phase of OT&E has a scheduled Test Plan and Evaluation Report, and (when applicable) a Tactics Guide. ( )

When Quick-look Reports are required, they are scheduled for release no later than 14 working days after completion of project operations. ( )

Formal Evaluation Reports are scheduled for publication no later than 90 calendar days (60 calendar days is desired) after completion of project operations. (Note: in special cases involving extensive, time-consuming analysis phases, later publication dates may be specified.) ( )

Test articles will support T&E. ( )

ASU is scheduled, PASU is <u>not</u>. (Do not preplan PASU--if OT&E is properly laid out, PASU is rarely required, and then only because of circumstances that could not be preplanned.) ( )

PART III -- <u>DT&E Outline</u>

All phases of DT&E are shown. ( )

The DT&E plan of action is sufficient to demonstrate the required technical characteristics and to support OT&E (including S/V). ( )

For systems with embedded software, provision is made for compliance with TADSTAND 9. ( )

PART IV -- <u>OT&E Outline</u>

Each phase of OT&E has a defined purpose identified in the first sentence of OT&E Objectives--"Successful completion of OT-X will........" ( )

OT&E Objectives repeat or make reference to Required Operational Characteristics, as appropriate to the individual phase. ( )

OT&E Events, etc., describes what will be done during testing--operationally, scenario-oriented, keyed to the threat. ( )

OT-I will support a full-scale development decision. ( )

OT-II (OPEVAL) will support an ASU decision. ( )

Projected OT-III and OT-IV are included. ( )

Things critical to successful OT&E (e.g., availability of a new threat simulator) are shown as Critical Items. ( )

PART VI -- <u>Special Resource Summary</u>

Target requirements are included and have been defined in light of accurate threat information. ( )

Fleet RDT&E Support is specified in detail (hours, etc.) and Code 23 is aware. ( )

Special instrumentation/simulations are identified and are being procured/provided. ( )

Requirements for data processing, analysis, etc. are specified. ( )

806. Resource Scheduling

a. RDT&E support includes operating and nonoperating support provided by operational naval forces having a primary mission other than R&D; to the DA, COMOPTEVFOR, PRESINSURV, or an R&D Agency; for the accomplishment of acquisition program T&E, or research and development not related to specific acquisition programs.

b. Theoretically, RDT&E support requirements are compiled from two inputs:

(1) Approved TEMPs for ACAT-I, II, and III programs (Note: by definition, ACAT-IV programs do not require RDT&E support).

(2) Requests for RDT&E support for R&D not related to specific acquisition programs, submitted to CNO by the R&D agency. (See OPNAVINST 3960.10, enclosure (4)).

In actuality, TEMPs themselves are not yet being used for this purpose. So prepare a separate letter, restating TEMP requirements. Your counterpart from the 23-shop will help you with this -- get with him/her early on, and coordinate with him/her frequently.

c. From these inputs OP-098 publishes annually "CNO Long-Range RDT&E Support Requirements" for the budget- and out-years. Fleet commanders and others use this report for guidance in planning, programming, and budgeting for RDT&E Support.

d. Using these same inputs, updated by confirmation procedures, OP-098 publishes quarterly "CNO Quarterly RDT&E Support Requirements" for the forthcoming quarter. This is used at quarterly fleet scheduling conferences to establish requirements for RDT&E Support.

e. OP-098 assigns a priority (applying to fleet support only) to each task in the CNO Quarterly RDT&E Support Requirements. These priorities are discussed in OPNAVINST 3960.10.

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Section 9

How to Design a Phase of OT&E

901. Introduction

a. While this section is designed to be as self-sufficient as possible, some aspects of it may become clearer if you read Sections 10 and 11 -- all three sections are closely related.

b. There are many ways to design a phase of OT&E (OT-IIB, OT-IIIA, etc.). Regardless of the approach taken, it should include the following essential elements:

(1) Determine the reason for the phase.

(2) Decide upon the objectives and the evaluation criteria.

(3) Decide if testing will be scenario-oriented or operation-oriented.

(4) Specify the E-tests (effectiveness tests) and S-tests (suitability tests).

(5) Determine the data requirements, and how they will be met.

(6) Decide how many times scenarios must be run, or how long the equipment must be operated.

(7) Determine the resource requirements.

(8) Determine conditions under which project operations would be terminated early.

902. The Reason for a Phase of OT&E

a. There is a reason for each phase of OT&E -- the reason is usually associated with a program-level decision regarding the system being tested. If there is a properly prepared TEMP, the reason for each phase of future OT&E will be stated in the first sentence of the appropriate "OT&E Objectives" paragraph of Part IV -- e.g., "Successful completion of OT-I will allow a recommendation on full-scale development." Note that the phase's reason determines the subject of the major recommendation of the phase's Evaluation Report --

e.g., "Proceed into full-scale development of the ..." If there is not a properly prepared TEMP, then you, the OTD, must determine the reason -- if you have trouble making this determination, chances are the phase is unnecessary. The reasons most frequently associated with phases of OT&E are as follows:

(1) OT-0. To allow a recommendation on advanced development.

(2) OT-IA. To allow a recommendation between competing approaches.

(3) OT-I. To allow a recommendation on full-scale development.

(4) OT-IIA. To allow a recommendation on prototyping for TECHEVAL/OPEVAL.

(5) OT-II(OPEVAL). To allow a recommendation on ASU and production.

(6) OT-III. To allow a recommendation on ASU and full-rate production.

(7) OT-IV. To determine the need for modification.

b. A common mistake in planning phases of OT&E is to assign an OT phase to every DT phase -- automatically, without thinking about it. The fact that the DA finds it necessary to run DT-IIA before DT-IIB(TECHEVAL) does not automatically require OT-IIA before OT-IIB(OPEVAL). If a program-level decision is to be made after DT-IIA, then we should schedule an OT-IIA concurrent with or after DT-IIA so that COMOPTEVFOR is on record as having an input to the decision. If, on the other hand, DT-IIA is scheduled solely to provide necessary technical data to the DA, there is no <u>reason</u> for the OT-IIA. Remember two things:

(1) We can always observe DT testing if we want to, and if we elect to write a report to CNO based on our observation, we're free to do so.

(2) Each phase of OT&E that you identify as such <u>requires</u> that you write a Test Plan and an Evaluation Report.

903. Objectives and Evaluation Criteria

a. The lead-in paragraph of a typical OT-I Evaluation Report says "The purpose of the evaluation was to assess the potential operational effectiveness and operational suitability of the ..., and its readiness for full-scale development." A typical OPEVAL report reads "The purpose of the evaluation was to determine the operational effectiveness and operational suitability of the ..., and its readiness for approval for service use and production." Both these statements address the reason for the phase being reported and associate with it investigations of operational effectiveness and operational suitability. This is because COMOPTEVFOR's investigation of operational effectiveness and operational suitability is the basis for his evaluation -- in the Evaluation Report he arrives at conclusions about operational effectiveness and operational suitability in order to recommend action regarding the pending program-level decision (i.e., the reason). Thus each phase of OT&E is basically an investigation of operational effectiveness and operational suitability (actual or potential).

b. According to DOD Directive 5000.3, operational effec- (R tiveness is "the overall degree of mission accomplishment of a system used by representative personnel in the context of the organization, doctrine, tactics, threat (including countermeasures and nuclear threats) and environment in the planned operational employment of the system." (Note that this statement implies that survivability/vulnerability is an integral part of operational effectiveness.) The essential elements of operational effectiveness -- the things the system must do (and must not do) in order for mission accomplishment -- vary from one system to the next. Some typical examples of elements of operational effectiveness are provided in Table 9-1.

Table 9-1

Typical Elements of Operational Effectiveness

Test Item	Must Do	Must Not Do
Sub-launched bathythermograph	(1) Be capable of launch in realistic operational conditions. (2) Provide required data.	(1) Restrict submarine maneuverability. (2) Increase submarine detectability.
Surface ship sonar	(1) Detect. (2) Classify. (3) Track. (4) Localize.	(1) Generate false alarms. (2) Be easily defeated by acoustic countermeasures.
Breathing apparatus for damage control	(1) Provide life support.	(1) Require excessive time to don and actuate. (2) Degrade wearer's ability to do useful work.
Airborne deception device	(1) Degrade SAM tracking.	(1) Increase detectability by search radars. (2) Require restrictive maneuvers, flight attitudes, etc.

c. According to DOD Directive 5000.3, operational suitability is "the degree to which a system can be satisfactorily placed in field use, with consideration being given availability, compatibility, transportability, interoperability, reliability, wartime usage rates, maintainability, safety, human factors, manpower supportability, logistic supportability, and training requirements." (R

d. For a given system, the essential elements of operational effectiveness and operational suitability form the framework for the objectives of OT&E. That is, the objectives define operational effectiveness and operational suitability for a given phase of OT&E. For example, the objectives for OPEVAL of a surface ship sonar, derived from Table 9-1 and the definition in the previous paragraph, would be:

(1) To determine the sonar's capability to detect, classify, and track..... in the natural acoustic environment.

(2) To determine the sonar's capability to detect, classify, and track..... in the presence of acoustic countermeasures.

(3) To determine the sonar's capability to localize targets.

(4) To determine the sonar's false alarm rate.

(5) To determine the sonar's reliability, maintainability, and availability in the shipboard environment.

(6) To determine the sonar's logistics supportability in a deployed status.

(7) To determine the sonar's compatibility with all elements of the operational environment.

(8) To determine the sonar's interoperability with the Underwater Fire Control System, and the adequacy of the sonar/operator interfaces (displays, controls, etc.).

(9) To determine the adequacy of training planned for sonar operators and maintenance personnel.

e. These illustrative objectives deserve some explanatory comments. (R

(1) They're all "to determine." In an OPEVAL that's not unusual. In earlier OT&E when the equipment doesn't closely approximate the planned production configuration (e.g., in OT-I with an advanced development model), our objectives couldn't be "to determine" in all cases. For example, we would probably "estimate the potential reliability," and would not mention interoperability with the Underwater Fire Control System if that interface had not been mechanized.

(2) There is no mention of transportability. Because the sonar is permanently installed, the OTD did not consider this element essential.

(3) There is no mention of wartime usage rates because the system is not expendable.

(4) There is no mention of safety. The OTD decided that safety deficiencies, if they exist, could be addressed under other objectives (primarily under maintainability and interoperability). (This is discussed more fully in a later paragraph.)

(5) There is no mention of human factors or manpower supportability. As with safety, the OTD chose to consider these under maintainability and interoperability.

f. None of the elements of operational effectiveness and operational suitability, nor any of the illustrative objectives, is quantified -- a very common situation. Obviously -- from an evaluation viewpoint -- it is not sufficient to say that the sonar must detect, and that it must have reliability. It is also necessary to say things about:

(1) What probabilities of detection are acceptable.

(2) The ranges at which detection should occur.

(3) How reliability is measured (e.g., mission reliability versus mean time between failures), and what is acceptable.

(4) And so forth.

These statements are the evaluation criteria -- their primary function is to quantify objectives that need it. (Occasionally an evaluation criterion won't quantify -- it will specify -- e.g., "The pod must be compatible with A-7, F-4, and F-14 aircraft.")

g. The objectives of a phase of OT&E and the associated evaluation criteria are documented in the TEMP -- in the appropriate "OT&E Objectives" paragraph of Part IV, which will usually make reference to paragraph 3 of Part I, "Required Operational Characteristics." When you are working from a TEMP and are designing a phase of OT&E, view the TEMP critically -- don't assume that the OT&E objectives are complete -- examine them carefully to make sure. If they're not complete, make them so in your Test Plan -- the TEMP can be fixed later. (But be sure the DA and OPNAV Sponsor are aware of changes in objectives, so differences of opinion can be resolved before -- not after -- testing.) If you're not working from a TEMP, then you must define the objectives and evaluation criteria from scratch. Again, make sure the DA and OPNAV Sponsor get an early chance to comment on them. Probably the most critical task you have in planning a phase of OT&E is to make sure that the objectives and associated evaluation criteria define and quantify the elements of operational effectiveness and operational suitability essential to the phase. (R

904. Scenario-Oriented or Operation-Oriented Testing. Having determined that there is a valid reason for a phase of OT&E, and having defined and quantified the elements of operational effectiveness and operational suitability that are essential to the phase -- in terms of objectives and evaluation criteria -- you are ready to decide how the objectives will be met -- how the equipment will be tested. The two methods most common in OT&E are scenario-oriented testing and operation-oriented testing.

a. Scenario-oriented testing is commonly used for systems whose modes of operation or functions change according to a changing operational situation. For example, a shipboard antiair fire control system that is mostly in search mode until an attack is a prime candidate for scenario-oriented testing. So is an OBA (Oxygen Breathing Apparatus) for damage control personnel that is only used in emergencies (barring training exercises and the like). In scenario-oriented testing, the system under evaluation is introduced into a realistic simulation of a developing operational situation -- a scenario -- and is put through its paces pursuant to its mission/function while being observed by data recorders (human and machine).

(1) For a shipboard fire control system, a scenario could simulate open-ocean transit of a Task Force. The test ship with the fire control system is assigned to search a sector and engage penetrating air targets. At a preplanned time not announced to ship's company, a raid consisting of

electronic warfare and strike aircraft attempts to penetrate the test ship's sector. Some strike aircraft target the test ship, others target other elements of the Task Force. The test ship acquires the penetrating aircraft, prioritizes them, and engages them -- kills are "called" by the OTD.

(2) For the OBA, a scenario could simulate damage (with fire) in a compartment distant from the damage control personnel. Their job would be to don their gear; pick up their tools, firefighting equipment, etc.; proceed to the scene of the damage; extinguish the fire and perform necessary damage control tasks; and stow their gear.

(3) Multipurpose systems may require several scenarios to exercise their various capabilities.

The data recorded during the scenarios are used for reconstruction and analysis in the various E-tests and S-tests discussed below. Often, scenario-oriented testing is dedicated testing (in terms of fleet RDT&E support) -- although it can be accomplished on a not-to-interfere basis during fleet exercises.

b. Operation-oriented testing is commonly used for equipment whose mode of operation or function remains constant. Torpedo tubes, communications receivers, and sewage disposal systems are essentially either "in use" or "not in use" and can be tested by just operating them -- making sure, of course, that the operating conditions reflect the anticipated environment. The latter may require scheduling of services -- targets, jammers, etc. -- otherwise, operation-oriented testing can frequently be accomplished on a not-to-interfere basis.

c. If you, the OTD, have difficulty deciding between scenario-oriented and operation-oriented testing for a phase of OT&E, then choose scenario-oriented testing. That way you'll have some assurance that test results are reasonable indicators of performance that can be expected in the fleet -- and there will be a greater chance that the unexpected will happen. (See paragraph 302.e for more words on this subject.)

d. If you have decided on scenario-oriented testing, your next task is to design the scenario(s) -- to describe the exercise(s) that will stress the system in a realistic manner. Describe the tactical situation at the start of the exercise (e.g., open-ocean steaming with a Task Force expecting to be engaged by the enemy). Then describe the situation that develops (incoming aircraft spotted, etc.) and the actions required of the system under test (e.g., test system is to acquire and engage attacking aircraft). When you are finished, you should have a narrative that describes the exercise, start to finish; supplement this narrative as necessary with diagrams or tables specifying the movements of exercise participants as a function of time, and their actions (e.g., aircraft commence jamming at...). This narrative, supplemented as necessary, is a scenario; make as many as the system demands, in your judgement.

e. If you have decided on operation-oriented testing, your next task is to specify the events and conditions necessary during system operation -- for instance the targets, the environments (natural and man-made), etc. Make sure your events and conditions provide an operationally realistic test of the system.

f. A properly prepared TEMP will already have specified the type of testing, and will have provided a skeletal outline of it in the appropriate "OT&E Events/Scope of Testing/ Basic Scenarios" paragraph in Part IV. (R

g. When you are designing a scenario, or when you are making plans for equipment operation, keep the following in mind:

(1) Testing should involve simulations of enemy counteractions -- maneuvers he might make, electronic warfare techniques he might employ, etc. -- in order that the system's vulnerability to these actions may be assessed. For example, in tests of a surface ship sonar, include a target submarine employing acoustic countermeasures. (This does <u>not</u> mean that <u>all</u> the sonar tests should include acoustic countermeasures; during the system's projected operational life, the most frequent targets may be submarines not employing countermeasures. Therefore, operational testing should employ <u>both</u> types of targets.) See Annex D for specifics on how to get guidance on enemy capabilities and tactics.

(2) The environment in which the system is tested should approximate, as closely as possible, the anticipated operational environment. As necessary, depending on the type of system being tested, you should provide for:

(a) The anticipated "noise" background caused by other ships, aircraft, etc. in the area, to allow evaluation of effects such as EMI.

(b) Operation of other equipment that might be expected to be used simultaneously with the system under test, to allow evaluation of effects of changes in electrical power loads, effects of gunfire-induced shock and vibration, etc.

905. Specifying the E-Tests and S-Tests

a. E-tests and S-tests are usually conducted at your desk, after scenarios have been run or operation-oriented testing is complete. During E- and S-tests, data are analyzed to find out how the test system performed during the scenario(s)/operation, what its reliability was, etc. Each E- and S-test addresses an objective of the phase of OT&E, an aspect (piece) of an objective, or an aspect of several objectives. Their function is to determine the things we need to know about the system -- quantitative things (the various MOEs (measures of effectiveness) and MOSs (measures of suitability)) and qualitative things (the adequacy of technical manuals, the Integrated Logistics Support Plan, the Navy Training Plan, etc.).

b. To determine what E-tests are necessary, the OTD must examine each operational effectiveness objective and decide what needs to be known to meet each objective. For example, consider the first objective of paragraph 903.d -- "to determine the sonar's capability to detect, classify, and track... in the natural acoustic environment." What does the evaluator need to know to meet this objective? The following come to mind:

(1) How often does detection occur against targets that should be detected? (The conditions that define "should be detected" should have been specified in the evaluation criteria.)

(2) At what ranges does detection occur? (Operationally useful ranges must be defined in the evaluation criteria.)

(3) Given detection, how often does classification occur?

(4) Of the classifications, how many are correct?

(5) Of the incorrect classifications, how many are critical (i.e., threat classified as non-threat)?

(6) How long after detection does classification occur?

(7) At what ranges do classifications occur?

(8) Given detection, how often can a track be established on targets that should be tracked? ("Should be tracked" conditions should be specified in the evaluation criteria.)

(9) How long after detection are tracks established?

(10) At what ranges are tracks established?

(11) Given established tracks, how well are tracks held that should be held? ("Should be held" conditions should be specified in the evaluation criteria.)

These 11 questions suggest the following E-tests and associated MOEs:

(1) Test E-1, Detection.

(a) MOE 1 -- Probability of detection.

(b) MOE 2 -- Detection range.

(2) Test E-2, Classification.

(a) MOE 3 -- Probability of correct classification, given detection.

(b) MOE 4 -- Probability of classifying a threat as a non-threat.

(c) MOE 5 -- Time between detection and classification.

(d) MOE 6 -- Classification range.

(3) Test E-3, Tracking.

(a) MOE 7 -- Probability of establishing a track, given detection.

(b) MOE 8 -- Time between detection and track establishment.

(c) MOE 9 -- Range at track establishment.

(d) MOE 10 -- Percent of time tracks are held.

(Note that in this example, you need to know quantitative things in order to meet the objective -- things that can be expressed as MOEs. There will often be qualitative things you must know in addition to the MOEs.)

Having defined the E-tests and MOEs for the first objective, the OTD examines the second -- "to determine the sonar's capability to detect, classify, and track .... in the presence of acoustic countermeasures." He notes that it is the same as the first objective -- except that acoustic countermeasures have been added -- and elects to treat the acoustic environment as a variable is Tests E-1 through E-3. That is, he decides to calculate MOEs 1 through 10 twice -- with and without acoustic countermeasures. Had he desired to do so, he might have specified (for example) a Test E-1, Detection (Natural Environment), a Test E-2, Detection (Countermeasures), and so on. After having taken care of the second objective, the OTD proceeds to the remaining two effectiveness objectives.

c. The process of selecting S-tests consists first of chosing the applicable tests from the list of standardized suitability tests (in paragraph 1002), and then adding others as necessary. Which tests are selected will vary according to the system under test, and the phase of OT&E. The following general guidelines apply:

(1) Reliability. A test of reliability is appropriate when the test system's design, construction, and installation approximate those of the proposed production system -- e.g., in OPEVAL and OT-III. In these phases of OT&E, it is possible to estimate the reliability of the operational system based on performance of the test system. In earlier phases of OT&E, when the test system is functionally equivalent to the production system, but is much different physically (for example, a brassboard), extrapolation of MTBFs, etc., to the production configuration is not possible. In some systems it is possible, even early in the design phase, to identify potential reliability problem areas -- based, for example, on the system's use of components known to have high failure rates in similar equipment. Whether or not to include a reliability test in early IOT&E is a matter of judgement.

(2) Maintainability. The conditions under which a maintainability test is appropriate are very similar to those for a reliability test. Keep in mind, however, that maintainability parameters such as mean times to fault-locate and to repair have little meaning from an operational viewpoint unless maintenance is accomplished by fleet-type personnel -- whereas this is not necessarily the case for reliability parameters. In addition, there are occasions when maintainability is not an issue. For example, a target

drone that is maintained under a maintenance agreement (contract) has reliability and availability parameters in its required operational characteristics, but not maintainability parameters.

(3) Availability. Usually, when mission reliability is an issue, operational availability (the probability the system will be ready to begin its mission) is also.

(4) Logistics Supportability. This test is usually required in OPEVAL and OT-III. Some systems that are production-prototyped early -- systems used in explosive ordnance disposal frequently are -- can be examined from a logistics supportability viewpoint earlier in IOT&E. Systems that have unusual servicing requirements (e.g., pressurizing with an uncommon gas) or that use short-lived or extremely delicate parts should also be examined early, to identify potential support problems in the fleet.

(5) Compatibility. This test is also usually required in OPEVAL and OT-III. Furthermore, even though the test system is an advanced development model in a temporary installation, compatibility tests during early IOT&E may reveal problems not anticipated by the designer -- need for an air conditioned space, a susceptibility to degradation from input power variations, an unanticipated EMI source, etc. Early identification of potential compatibility problems may allow simple changes (e.g., installation in a different location) that later prevent the system from failing in OPEVAL.

(6) Interoperability. Checks on the man/machine interface usually begin in the first phase of IOT&E. Interfaces between the test system and associated systems are tested whenever they have been mechanized. Interoperability testing usually continues through OT-III.

(7) Training Requirements. This test is conducted as soon as a proposed training plan has been defined, and is repeated as necessary through OPEVAL.

(8) Transportability. This test is conducted if it is appropriate to the system under test, and when the configuration of the test item allows a meaningful test. Items designed to be man-portable are frequently in near-production configurations early in their development, and transportability testing can begin correspondingly early.

(9) Safety. As was mentioned earlier in this section, procedures for checking safety aspects of a system are

frequently included as part of maintainability and interoperability tests. When safety is a primary reason for developing a system -- e.g., a life support system -- safety is usually addressed in the system's operational effectiveness objectives (e.g., the capability of the system to support life). The same is true of systems developed to perform hazardous tasks (e.g., explosive ordnance disposal equipment -- to determine the system's capability to contain the effects of bomb detonation, for example). Systems not developed for safety reasons that involve potentially hazardous operations usually require a safety test. For example, OPEVAL of a swimmer-delivered remotely controlled limpet mine should include a safety test that addresses the possibility of premature or inadvertent actuation.

(10) Human Factors. As with safety, whether or not to include a specific human factors test frequently depends on the way the OTD wants to structure the suitability evaluation. Including human factors aspects in maintainability and interoperability tests frequently obviates the need for a specific human factors test. Specific human factors tests are usually used in evaluations in which human factors is a major issue -- e.g., evaluation of a new flight suit.

(11) Wartime Usage Rates. Systems that contain elements that will be expended (e.g., gun systems (ammunition), missile systems (missiles), countermeasures systems (chaff, expendable decoys), need to be examined for assurance that storage, resupply, etc. facilities will be adequate in wartime. This element of operational suitability is frequently addressed in logistics supportability. (R

(12) Manpower Supportability. This test may be conducted as a subset of maintainability and interoperability tests, or as a separate test. It is conducted as a separate test when manning is a critical development issue. (R

d. The process of selecting MOSs is the same as the process of selecting MOEs -- determining what the evaluator needs to know to meet the suitability objectives. Using the thought process described for effectiveness tests, but recognizing that qualitative things usually have to be known to meet the suitability objectives, the OTD will generate something like the following:

(1) Test S-1, Reliability.

(a) MOS 1 -- Mean time between critical/major failures.

(b) Factors that appear to affect reliability.

(2) Test S-2, Maintainability.

(a) MOS 2 -- Mean time to fault-locate.

(b) MOS 3 -- Mean time to repair.

(c) Aspects of maintenance that are excessively difficult, time-consuming, or unsafe.

(d) The adequacy of technical documentation used in maintenance.

(e) The adequacy of the proposed preventive maintenance schedule.

(3) And so on.

e. Having specified the tests and the things to be determined in each, the OTD can construct something like Table 9-2. A table like this becomes especially useful in complicated OT&E -- for example, a whole-ship OPEVAL -- where there may be many objectives and sub-objectives.

Note: Effectiveness and suitability analysts are experts at designating tests and in selecting MOEs, MOSs, etc. -- be sure to get them involved in your planning early.

Table 9-2

Objectives versus Tests

Objective*	Applicable Tests	Major Elements
1	E-1 through E-3	MOEs 1 - 6
2	E-1 through E-3	MOEs 1 - 6
3	E-4	MOEs 7 & 8
4	E-5	MOE 9
5	S-1 through S-3	MOSs 1 - 4
		Factors affecting reliability.
		Difficult, time-consuming, unsafe aspects of maintenance.
		Technical documentation.
		Preventive maintenance schedule.
6	S-4	---------------
7	S-5	---------------
8	S-6	---------------
9	S-7	---------------

* Numbers refer to objectives of paragraph 903.d.

81$\frac{7}{6}$

f. In the preceding discussion, it was implied that the testing would consist either of scenario run-throughs or operation of the equipment under simulated operational conditions. While these exercises will usually satisfy most of the requirements of the evaluation, additional test procedures to be performed in addition to the exercises are often required. For example:

(1) Survivability/vulnerability frequently requires an assessment of the physical installation -- to determine if a system is vulnerable to a "cheap kill." An example of the special procedures involved is contained in Section 10.

(2) Maintainability frequently requires a maintainability demonstration -- inserting prefaulted components in the equipment and observing fault-location and repair. In evaluations where MTFL, MTTR, etc. are issues, always make provisions for a maintainability demonstration -- so that the maintainability of a highly reliable system can be assessed.

(3) Compatibility requires that equipment not associated with the test system be energized and deenergized and that power variations be induced -- when the scenarios/ equipment operation do not provide a complete set of compatibility data, special turn-on/turn-off tests and the like must be planned.

906. Data Requirements

a. MOEs, MOSs, and qualitative things you need to know to meet the objectives are determined during post-test analysis -- after scenarios have been run and the equipment under test has been secured. This post-test analysis uses data recorded during or shortly after equipment operation -- in your planning, you must decide what data you need and how they will be acquired. These decisions should involve thoughtful consideration of data sources that can be used, and what data are actually required (including measurements, with their inherent degrees of accuracy). These decisions may affect earlier elements of your evolving Test Plan -- e.g., the way the scenarios were to be run. (Planning usually involves iteration between various elements of the plan.) To illustrate this -- suppose the OTD had tentatively decided on open-ocean freeplay between a surface ship and a submarine. Later he determines that the relative positions of the two vessels must be reconstructed with precision in order to determine a set of MOEs. This forces him to use a range, and "open-ocean freeplay" is modified accordingly.

b. The major sources of data available to the OTD include:

(1) The system under test. Data are best obtained from the system under test by observing displays on the system while it is in operation -- scopes, meters, indicator lamps, etc. -- and recording display data manually or by instruments (e.g., cameras) not connected to the system. This requires no alteration to the test system -- a definite plus. Data sources that require alterations -- hanging scopes and meters on the back of the console, etc. -- should be used only with caution. If they were successfully used in earlier DT&E (e.g., during TECHEVAL prior to OPEVAL), any installation problems -- impedance mismatches, ground loops, etc. -- that may have affected overall system performance have probably been discovered and corrected. If they were not used before, use them in OT&E only as a last resort -- and allow sufficient pre-scenario or pre-operation time for debugging. External data sources connected to the equipment under test -- whether used in earlier DT&E or not -- should be examined critically from the viewpoint of their effect on operational realism. Data sources should not provide the operator with useful information not available to him in the proposed production configuration, and so forth.

(2) Equipment already in service use. Navigation systems, radars, sonars, communications systems, etc. available in the fleet are potential data sources that may, in fact, determine the class or type of ships or aircraft to be used in OT&E. For example, absolute position requirements for reconstruction may dictate that the test ship have an inertial system on board; relative position requirements may dictate that a participating ship have a certain type of search radar. Use of equipment already installed in fleet units can help reduce the costs of OT&E, by reducing the need for special instrumentation for test purposes.

(3) Test support activity/range equipment. Track plots, bomb impact data, electronic warfare simulator logs, etc. that are normally produced by ranges and other test support activities require no unusual tasking to obtain them, and their production (per se) does not detract from operational realism.

(4) Special purpose instrumentation. Under this heading fall the instruments not available in the fleet or through test support activities that are used to monitor elements of the scenario external to the system under test. In this group are on-board cameras aimed at incoming targets that record the effects of gunfire, and portable voice recorders used by observers of a simulated combat engagement.

(5) Personnel operating or maintaining the equipment. In addition to recording data in operating logs and mainenance records as required by the Test Plan, these personnel are sources of qualitative data -- in questionnaires and through interviews. In this way, for example, the adequacy of technical manuals is usually determined.

(6) The OTD Journal. See Section 15.

(7) DT&E and fleet data.

(a) COMOPTEVFOR's evaluation of any system should be based on a review of all pertinent data, regardless of the source. But the data must be pertinent -- that is, if data were acquired during non-OT&E, there must be every reason to assume that the same data would have resulted from OT&E. In determining whether or not data are pertinent for operational evaluation, ask the following questions regarding the conditions under which the data were collected:

1. Who operated the system? If contractors did, most results are useless for OT&E.

2. Who maintained the system? If fleet sailors operated it, but contractors maintained it, there may be some useful effectiveness and interoperability data; reliability and maintainability data may be used with caution.

3. What was the test environment? Aboard ship, at sea? Sea state? ECM? In other words, how closely did the test environment simulate the operational realism associated with OT&E? Having established this, you may decide to use some data and disregard some others.

4. Was the system altered or modified in any way during or since the testing? If hardware or software changes were made, be very selective in your use of pre-change data. Make sure the change didn't nullify earlier data.

(b) The two major potential data sources outside OPTEVFOR are:

1. DT&E for IOT&E (including OPEVAL).

2. Fleet data for FOT&E.

During FOT&E, it sometimes happens that COMOPTEVFOR is evaluating systems that have already been deployed in significant numbers. In these cases, it is necessary that the Test Plan make provisions for obtaining data on systems deployed in non-project-ships. Actual fleet experience can provide essential information to an evaluation of operational effectiveness, and 3-M data can be very useful in expanding the overall operational suitability data base.

(A Note on the Form in Which Data Are Obtained. Not only data sources vary, but the form in which data can be obtained varies also. Thus in FOT&E, operating times, system status, and maintenance information can be obtained from special OT&E forms completed by operators and maintenance personnel. At the same time, it may be possible to obtain the same data from standard Navy operational forms that are already being completed on the system -- standard Equipment Logs and Maintenance Action Forms. When you can obtain OT&E data from logs, charts, forms, etc. being completed routinely, do so because:

1. The record already exists - no special tasking is required other than making sure OPTEVFOR gets a copy.

2. Recording the data will not affect operational realism, because recording is part of the operational routine.)

c. Deciding what data are actually required is similar to deciding what needs to be known to meet each objective (paragraph 905). Consider each MOE, MOS, and qualitative element within the framework of potential data sources, and double-check for impact on earlier phases of planning (scenarios, etc.). Some examples:

(1) MOE 1 -- Probability of Detection. The thing we're after here is the ratio of the number of detections to the number of targets that should have been detected. Assume the scenario is being run on AUTEC and that AUTEC is tracking both the surface ship and the submarine. Assume also that the OTD is observing the sonar operator and has radio communication with AUTEC's plotting center. The OTD relays "DETECTION" to AUTEC when the sonar operator calls it -- and records the operator's initial estimate of range and bearing, together with the time of the call. The required pieces of data are:

(a) A time-annotated plot of the two tracks, with ship and submarine positions marked at "DETECTION." (Provided by AUTEC.)

(b) Sonar operator's range and bearing estimates at detection -- to confirm that the detection was not a false detection. (OTD Journal.)

(c) Acoustic conditions on the range, to establish the conditions under which a submarine "should be detected." (Provided by AUTEC.)

> Note: In the process described above, the OTD considered the data he needed and how they would be obtained -- to the extent of considering actions and responsibilities during the exercise on AUTEC. Test planning requires that the OTD consider both past events (e.g., selection of a scenario) and future events (e.g., assigning responsibilities during project operations) when he is addressing a particular phase of planning.

(2) MOS 1 -- Mean Time Between Critical/Major Failures. Here we're after total sonar operating time divided by the number of critical and major failures. The required pieces of data are:

(a) A chronological record of system status -- for operating time, failure times, and the operator's assessment of the type of failures. (From sonar operator's log, Data Form S-1.)

(b) Confirmation of the type of failures. (From maintenance log, Data Form S-2.)

d. Having determined the data requirements for the various MOEs, etc., the OTD can construct something like Table 9-3 (which, for illustrative purposes, is based on Table 9-2). Notice that the title of Table 9-3 is "Primary Data Sources." Back-up data sources are very important too; they can make the difference between objective accomplishment and non-accomplishment. In the surface ship/submarine exercise on AUTEC, loss of communications to AUTEC (for the "J ETECTION" transmission) or loss of AUTEC's plotting capability could be offset by correlating navigation information from both vessels -- equipment already in service use and the OTD Journal could constitute a back-up data source for MOE 1 (and others). Notes expanded and transcribed into the OTD Journal could be a back-up for a portable voice recorder with a bad battery.

Table 9-3

Primary Data Sources

Element	Data Requirement	Source
MOE 1	1. Time-annotated plot of positions.	AUTEC
	2. Range and bearing estimates at detection.	OTD Journal
	3. Acoustic conditions.	AUTEC
MOE 2	1. -------------------------	-----------
⋮	⋮	⋮
MOS 1	1. System status record.	Form S-1
	2. Failures (number and type).	Forms S-1 and S-2
Reliability factors	1. ----------------------------	----------
⋮	⋮	⋮

83%

f. One final consideration in this phase of planning -- it is advisable that you identify any data items that, if not obtainable during an exercise in which they were supposed to be obtained, should cause testing to be suspended. For example, if AUTEC were the <u>only</u> source of time-position information, and if shortly after COMEX (commence exercise) AUTEC's plotter crapped out, the prepared OTD would suspend the operation -- realizing that the exercise would not contribute any useful data to most MOEs.

907. <u>How Many or How Long</u>?

a. If you haven't gotten your analysts involved yet, you better do so now.

b. Determining how many times to run a scenario, or how long to operate the equipment, is a matter of judgement that involves the following interrelated and sometimes conflicting considerations:

(1) The variables that are involved. If, for example, we're interested in a craft's capability to deploy and retrieve UDT personnel, we need runs that at least sample various combinations of environmental conditions (day/night, sea state, etc.) in order to arrive at an evaluation.

(2) The degree of statistical confidence we want in our results. If, for example, we want to be sure that a system's MTBF is at least 300 hours with 80% confidence, then we must operate the system for:

(a) 900 hours if it breaks once.

(b) 1300 hours if it breaks twice.

(c) 1650 hours if it breaks three times.

If we demand 90% confidence, we must operate the system for:

(a) 1160 hours if it breaks once.

(b) 1600 hours if it breaks twice.

(c) 2000 hours if it breaks three times.

(3) The cost of testing. It costs money to expend weapons and targets, to operate ships and aircraft, to operate a range, and so on. This money has to be budgeted -- and is usually in short supply.

(4) The availability of fleet services and range support. These usually boil down to matters of priority among competing requirements.

(5) The time available. Although COMOPTEVFOR's input is important in milestone decisions, it is not the only input. Furthermore, budgetary considerations often require that decisions be made, if at all possible, by certain dates. For these reasons, it is often desirable that testing be conducted so as to provide only those data absolutely essential to a COMOPTEVFOR evaluation.

c. There are, then, no quantitative rules or guidelines for determining how many or how long.

d. A properly prepared TEMP will contain an estimate of how many or how long.

908. Resource Requirements. This step is fairly simple. You know the participants for each scenario (or operation), and you know how many times (or how long) you'll be running them. Determining total requirements is a matter of careful addition -- and double-checking to make sure you haven't left anything out. A matrix of scenarios versus requirements (e.g., Table 9-4) may prove useful during testing if an asset is cancelled unexpectedly. Similar lists have been helpful in justifying requirements. Note that if the list identifies requirements that exceed those planned in the TEMP (Part VI), you may have a problem, depending on cost, lead-time requirements, etc. (If you think about this, you will realize that the process of identifying resource requirements in the TEMP is a critical process for OT&E not far down the pike. If these resource requirements were hip-pocket estimates, there is a good chance that by the time you are ready to plan a phase of OT&E in detail, the budgeting system has got you boxed in -- your flexibility is gone. Remember this when you work on TEMPs.)

909. Early Termination

a. Occasionally, some aspect of the system proves to be so poor during OT&E that completion of all the testing called for in the Test Plan would be wasetful. Consider, for example, a system with an OPEVAL MTBF threshold of 300

Table 9-4

Resource Requirements

Scenario	Requirement						
	E-2 A/C	NTDS Surface Unit	EB-47 w/SOJ, chaff	ASW Helo	SSN	BGM-34 (*)	AUTEC
A	1 hr	5 hr	0.5 hr	2(3 hr)	3 hr	2 P	Yes
B	--	1(3 hr) 1(5 hr)	1 hr	1 hr	1 hr	2 P 1 E	--
C	1 hr	2(2 hr)	--	1(1 hr) 1(2 hr)	2 hr	3 P	Yes

Note: * -- P(presentation), E(expenditure) hours that breaks in eight different ways during the first 16 hours of OT&E operation. In all likelihood the system is not operationally suitable, and further testing will prove nothing different. Consider a detection system that detects once in the first 20 valid opportunities -- odds are it's not operationally effective and never will be in its present configuration. In each of these examples, we are able to reach a negative conclusion on operational effectiveness or operational suitability with much less data than would be required for a positive conclusion (an upcheck). Each of these examples would probably result in a Deficiency Report (see Section 11 of this Guide) and a COMOPTEVFOR decision to terminate project operations early.

b. As an OTD, you should know in advance of testing under what conditions a recommendation for early termination should be made to COMOPTEVFOR. Your analysts can help you derive conditions.

A) 910. Review of Life Cycle Cost Studies During OT-II (OPEVAL)

a. Background. On occasion, CNO has directed preparation of an LCC (Life Cycle Cost) Study as a prerequisite to ASU. As the name implies, an LCC Study identifies the life costs to develop and deploy a system, including procurement, maintenance, repair, training, and manning costs. When they are required, LCC Studies will be prepared during full scale development, and should be available prior to OPEVAL.

b. COMOPTEVFOR Responsibilities/Required Actions

(1) OTCs will ascertain if LCC Studies are required on their projects.

(2) When LCC Studies are required, OTCs will insure that:

(a) Appropriate TEMPs (Parts IV) include LCC Study evaluation in OPEVAL objectives.

(b) OPEVAL Test Plans include a requirement to review the LCC Study in a manner similar to review of the ILSP (Integrated Logistics Support Plan) as OPEVAL progresses. This requirement will be documented in an S-Test, "Analysis of Life Cycle Cost Study." The object of this test will be to confirm the adequacy of the assumptions and analysis, as results of Tests S-1 through S-7 warrant.

(c) A copy of the LCC Study is available prior to OT-II (OPEVAL) project operations.

(3) When appropriate, Evaluation Reports will include assessments of the adequacy of the LCC Study. This assessment will focus on the adequacy of the scope of the study and its assumptions regarding failure rates, parts availability, training, shipboard manning, etc. No attempt will be made to provide a comparative cost analysis, or to address the adequacy of costs.

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(Change 1)

Section 10

Test Plan Writing

1001. Requirement for a Test Plan. Test Plans are required as shown in Part II of the TEMP, generally before each identified phase of OT&E (e.g., OT-IIIA). This requirement exists even though OPTEVFOR is not doing any hands-on testing--e.g., when OPTEVFOR is monitoring technical testing and performing an independent evaluation of the data. In this case, the OT&E Test Plan would concentrate on: (R

a. Identifying the technical test data to be provided COMOPTEVFOR by the DA.

b. Describing the way these data will be analyzed to meet the objectives of this phase of OT&E (described in Part IV of the TEMP).

1002. Standardized Suitability Tests

a. Seven S-tests are standardized in OPTEVFOR Test Plans. They are:

(1) Test S-1, Reliability.

(2) Test S-2, Maintainability.

(3) Test S-3, Availability.

(4) Test S-4, Logistics Supportability.

(5) Test S-5, Compatibility.

(6) Test S-6, Interoperability.

(7) Test S-7, Training Requirements.

b. As discussed in Section 9, all of these standard tests will usually be applicable to OPEVALs. Some may not be appropriate to very early IOT&E (e.g., Test S-1) or to late FOT&E (e.g., Test S-7). In these cases, do not use the inappropriate test(s), but do not change the test numbers of those which are used (i.e., Maintainability is always Test S-2 even if Test S-1 is not used). Additional tests (S-8, etc.) may be used as required.

c. Note that tests are designed to address projected characteristics of new weapons systems. For example, Test S-4 is supposed to assess the logistics supportability of the weapons system when it is deployed. It is not to assess the adequacy of pre-positioned OPEVAL spares, or any other factors peculiar to the testing. Similarly, Test S-7 addresses the training requirements for operation and maintenance of the weapons system, not the adequacy of factory training for OPEVAL personnel.

d. The standardized list by no means exhausts the possibilities of proper suitability tests. These are only the ones that have permanent numbers assigned. In your test plan you might have 20 S-tests. That's OK.

1003. Privacy Act Requirements

a. SECNAVINST 5211.5A implements the Privacy Act of 1974 within the Navy. Among other things, it defines "personal information", and specifies how this information may be obtained and maintained.

b. OPTEVFOR Test Plans routinely ask operators/maintenance personnel to provide the following kinds of information on forms or questionnaires:

(1) Name of person completing the form.

(2) Military experience and/or experience with the equipment under test (e.g., rank/rate, time in service, formal schooling on the equipment).

(3) Opinions regarding aspects of the equipment (e.g., were trouble-shooting procedures adequate?).

c. According to SECNAVINST 5211.5A, operators/maintenance personnel are not providing "personal information" when they fill in their names, information about their experience, and opinions about the equipment under test. This information may be requested on OT&E forms and questionnaires without the necessity for special procedures or "Privacy Act" statements.

d. Social Security Numbers are considered "personal information" and should not normally be requested on OT&E forms/questionnaires. If special circumstances should make them necessary, contact the Administrative Officer (Code 11) for specific guidance on SECNAVINST 5211.5A procedures.

1004. Release of Information to the Press During OT&E (A

a. Background. From time to time, OTCs/OTDs receive requests from the press (newspapers, magazines, television, etc.) for information on planned or ongoing OT&E. These requests occasionally include requests to observe and/or film aspects of test operations. The Commander desires that requests from the press be processed in a pre-planned manner that ensures prompt attention while avoiding release of inappropriate material or interference with test operations.

b. Organizational Authorities and Responsibilities

(1) All organizations/activities involved in release of OT&E information to the press are responsible for ensuring that security is maintained -- including special provisions of OPSEC (operations security). (See paragraph 1007.)

(2) The authority to specify the type of information relating to planned or ongoing OT&E that may be released to the press resides in Washington -- with the appropriate SYSCOM, Program Manager, CNM, or OPNAV.

(3) After release is authorized, the responsibility for providing actual OT&E details (e.g., test scenarios, test results) is COMOPTEVFOR's.

(4) Visit requests to view operational testing require the approval of the operational commander after:

(a) The appropriate Washington office has approved the release of OT&E information that will be available during the visit.

(b) COMOPTEVFOR has determined that the visit will not affect the conduct of the testing.

c. OTC/OTD Responsibilities. Cognizant OTCs/OTDs should assume that the press will request information on each phase of OT&E. They should then act on this assumption during the planning stage preceding test operations, to ensure that press requests, when received, are processed promptly and properly. OTCs/OTDs should:

(1) Determine, from the DA, what office has the authority to specify information that may be released to the press.

(2) Determine, from the office of authority, what type of information might be released to the press if it were requested. From this same office, determine the likelihood that press requests to view test operations will be considered favorably.

(3) Ensure, through informal liaison if possible but through official correspondence if necessary, that the DA and the office with approval authority for press releases understand and agree that actual OT&E details require COMOPTEVFOR approval prior to release. (Show them paragraph 205, Disclosure Policy Regarding Test Information, on page 10-18.) Ensure that the DA understands that this restriction applies to raw OT&E test data provided to the DA. (See paragraph 1104.)

(4) Determine if any aspects of OT&E test operations can be given automatic COMOPTEVFOR approval for release. These aspects might include:

(a) Details of test objectives, test procedures, scenarios, and methods of analysis documented in approved COMOPTEVFOR Test Plans.

(b) Major test events that would normally be of interest to the press (e.g., major missile launches, serious aiecraft accidents). (Note that this refers only to the event (e.g., TOMAHAWK launch), not to an evaluation of the event (e.g., successful flight).

(5) If there are aspects of OT&E test operations that can be given automatic COMOPTEVFOR approval for release, document them in memos for the record.

(6) Include in the Test Plan a "Press Release" point-of-contact -- the designated individual from the office of authority, as determined above. (See paragraph 207 of the sample Test Plan on page 10-19.)

1005. <u>Format of OPTEVFOR Test Plans</u>. Because of the enormous differences in the systems undergoing OT&E (e.g., an LHA on the one hand, an angle-rate bombing system on the other) and the ways in which they are tested (e.g., a highly instrumented evaluation of an airborne countermeasures system versus a questionnaire-based evaluation of a new flight suit), Test Plans may vary significantly in layout. The best layout is the one most usable by the people involved; the testers, the data collectors, and the evaluators. Sample formats are available to the OTD in

a. Recently published Test Plans (particularly those on similar systems in the same phase of OT).

b. The sample Test Plan used in the OTD Qualification Course.

c. The following pages. In these pages, samples of text are provided in regular typeface; explanatory remarks and comments are provided in italic type.

DEPARTMENT OF THE NAVY
COMMANDER OPERATIONAL TEST AND EVALUATION FORCE
NORFOLK, VIRGINIA 23511

XX:pmg
3960 (999-OT-IB)
Ser

CLASSIFICATION (Unclassified upon removal of enclosure (1))*

From: Commander Operational Test and Evaluation Force
To: Distribution List

Subj: Test Plan for CNO Project 999-OT-IB, Initial Operational Evaluation of the ....*(See Note 1)*

Encl: (1) (Classification) COMOPTEVFOR Test Plan for Project 999-OT-IB(*)

1. The Test Plan for CNO Project 999-OT-IB is promulgated as enclosure (1).

2. COMSUB___ concurrence in submarine safety aspects of this Test Plan is requested as soon as possible. *(See Note 2)*

3. All addressees are requested to review this Test Plan. Comments are requested prior to the planned commencement of project operations, 1 June 1978.

4. Aspects of Project 999-OT-IB are classified and subject to hostile exploitation. Consult enclosure (1), Section 7, Security, before discussing this project or participating in project operations. *(See Note 3)*

Distribution:
Type Commander
Operational Commander
Unit Commander
Range
Target Units

Copy to:
CNO (OP-983)
(OP-981/2)
CHNAVMAT
COMNAVSYSCOM (DA)
Other Interested Agencies

CLASSIFICATION*

**If Applicable. Do not use on UNCLASSIFIED Test Plans.*

CLASSIFICATION*

NOTE 1: The sample title is applicable to all pre-OPEVAL phases of OT&E. For OPEVALs, use "CNO Project 999-OT-IIB (OPEVAL), Operational Evaluation of the ...." For OT-III & IV, use "CNO Project 999-OT-III or IV, Follow-on Operational Evaluation of the ......"

NOTE 2: This paragraph is required for any Test Plan involving a U.S. submarine in any capacity (project ship, acoustic target, etc.). Specify either or both COMSUBLANT and COMSUBPAC, depending on the submarine(s) involved.

A) *NOTE 3: Omit for entirely unclassified projects.*

<u>COMOPTEVFOR TEST PLAN</u>

<u>FOR</u>

<u>PROJECT 999-OT-IB</u> (*)

DOWNGRADING STATEMENT*

Enclosure (1)
CLASSIFICATION*

Contents (*)

Acronyms and Abbreviations (*)

A_o	Operational Availability
MTBF	Mean Time Between Failures
PRF	Pulse Repetition Frequency

All acronyms or abbreviations that are used in the Test Plan should be defined here, except

(1) Acronyms for naval activities included in the Standard Naval Distribution List (which includes almost every activity) need not be listed.

(2) It is not necessary to define standard metric symbols or U.S. customary unit abbreviations unless clarity requires it.

References (*)

(a) (Classification) CNO ltr 3960 ser C9811 of 23 Mar 1971 (R

(b) (Classification) NWC CHINA LAKE CA 272301Z DEC 73

(c) (Classification) COMOPTEVFOR ltr 3960 ser C47 of 3 Apr 1973

If there are references in the letter of promulgation, they also appear here. Reference (a) of the letter is always reference (a) here (and so forth), even though it is used only in the letter.

Section 1

Introduction to the Project (*)

101. (*) Purpose. The purpose of CNO Project 999-OT-IB is to assess the potential operational effectiveness and operational suitability of the ...., and its readiness for full-scale development.

This paragraph contains a brief statement of the reason for this phase of OT&E.

This paragraph is the basis for paragraph 1 of the Evaluation Report.

102. (*) Equipment (or System) Description. The ...... is a one-way acoustic signaling system for recall of UDT/SEAL (Underwater Demolition Team/Sea, Air, and Land) swimmers in training operations. It consists of an underwater transmitter carried in the recovery boat, and individual receivers carried by the swimmers. The version to be tested is an ADM (advanced development model) functionally identical to the proposed design, but not representative of that design in size, weight, reliability, or maintainability characteristics. Physical characteristics of the ADM are shown in Table 1-1.

R) *This paragraph provides a brief statement of the functional characteristics of the end item. For OT-I projects, this should be followed by comments on any significant differences between the test item and the end item. For OT-II, III,* *and IV projects, there should be no* ***significant*** *differences between the test item and end item. If there are, list them briefly in Limitations to Scope (Section 3).*

The information presented is not intended to substitute for or duplicate information provided operators or maintenance personnel in technical documentation (switchology, etc.). Write the tests first, then include only that detail necessary to an understanding of the tests.

This paragraph is the basis for paragraph 2 of the Evaluation Report, and for paragraph 101, Description of Equipment, of enclosure (1) to that report.

When appropriate, include subheadings such as "Maintenance and Support Concepts" and "Personnel and Training." List the technical manuals to be evaluated.

103. (*) Background

a. (*) The ...... was developed to satisfy a requirement of Specific Operational Requirement 38-01 for a safe, reliable recall system for use in training operations. Existing recall systems use explosive devices. Because explosive devices are a hazard to swimmers in the water, development of the ...... concentrated on electronically generated acoustic signals.

b. (*) IOT&E (initial operational test and evaluation) of the ...... began under Project 999-OT-IA, conducted from ...... to ...... The purpose of OT-IA was to assess the

potential operational effectiveness and operational suita-bility of three competing designs of the ......, in order to assist the Developing Agency in selecting between them. As a result of OT-IA, COMOPTEVFOR found the system manufactured by ...... to have the most potential, and recommended certain changes to his functional design. These, and other changes, have been incorporated into the ADM to be tested in OT-1B.

This paragraph concisely summarizes the major events (emphasizing previous OT&E) that led to this testing. The TEMP is the source of the information summarized herein.

This paragraph is the basis for paragraph 3 of the Evaluation Report and for Section 2 of enclosure (1) to that report.

Section 2

Administrative Information (*)

201. (*) General. General responsibilities of activities involved in this testing are provided in this section, as well as appropriate points of contact. Continuing close liaison is essential to timely and successful prosecution of this project.

202. (*) Responsibilities

a. (*) COMOPTEVFOR

(1) (*) Promulgate major changes to this Test Plan.

(2) (*) Coordinate arrangements for fleet services.

(3) (*) Conduct briefings for all participating units, including OPSEC (operations security) requirements and procedures.

(4) (*) Issue appropriate OPORDs (Operation Orders).

(5) (*) Provide failure and failed part data to the Developing Agency as soon as possible.

(6) (*) Analyze test results and publish appropriate reports.

(7) (*) *Others as necessary.*

If the project is reassigned for prosecution, provide separate subparagraphs outlining the responsibilities of the Headquarters and of the prosecuting agency.

b. (*) Developing Agency

(1) (*) Furnish required material and technical support.

(2) (*) Provide required plans and funding for installation/removal of project equipment.

(3) (*) Provide TYCOM and Unit commanders with data on the impact of the test installation on operational capabilities of the unit providing services.

(4) (*) Provide for required training of fleet and OPTEVFOR personnel in operation and maintenance of the equipment.

(5) (*) Provide copies of Failure Analysis Reports to OPTEVFOR.

(6) (*) Provide funding for *(identify any other support required, i.e., data reduction, reconstruction, simulation, etc.)*.

(7) (*) Provide for appropriate safety certifications.

(8) (*) Certify equipment ready for OPEVAL in accordance with OPNAVINST 3960.10. *(OPEVAL only)*

(9) (*) *Others as necessary.*

c. (*) *Type Commander* is requested to direct the assigned project submarine to:

(1) (*) Make personnel available for required training.

(2) (*) Operate in accordance with this Test Plan and COMOPTEVFOR OPORDs.

(3) (*) Maintain installed equipment and ensure availability of trained personnel to operate and maintain the equipment.

(4) (*) Support the data recording requirements of this Test Plan.

(5) (*) Keep COMOPTEVFOR informed of any condition which may affect prosecution of this project.

(6) (*) Prepare and submit reports in accordance with Section 6.

(7) (*) *Others as necessary.*

203. (*) Points of Contact *(This information is often tabulated)*

a. (*) COMOPTEVFOR

LCDR Charles BROWN
Operational Test Coordinator
Staff, COMOPTEVFOR (Code 46)
Norfolk, VA. 23511
Autovon 690-4051
Telephone 804-444-4051

LT James A. KING
Operational Test Director
Staff, COMOPTEVFOR (Code 462)
Norfolk, VA. 23511
Autovon 690-4051
Telephone 804-444-4051

b. (*) NAVSYSCOM *(Developing Agency)*

CDR T.B. SUTHERLAND
Acquisition Manager
NAVSYSCOM (PM-303)
Washington, D.C. 20360
Autovon 222-8590
Telephone 202-692-8590

c. (*) *Others as required*

R) 204. (*) Visitor Control. Approvals for visitors/ship riders associated with this testing will be kept to a minimum because of limited space available. Visit/rider authorization will be granted for valid requirements, for technical assistance requested by the OTD (Operational Test Director), or on a genuine need-to-know basis. Requests for visits/riders during project operations will be addressed to COMOPTEVFOR, info (*unit commanding officer*). COMOPTEVFOR will coordinate the requests with (*unit administrative commander and unit commanding officer*). Affirmative response by COMOPTEVFOR must be received before visits are authorized.

R) 205. (*) Disclosure Policy

a. (*) Test Information. No test data, message, correspondence, briefing, or statement stating conjecture, opinion, conclusions, or recommendations regarding this testing will be directed outside OPTEVFOR without prior COMOPTEVFOR approval. Messages involving immediate safety are excluded from this restriction.

b. Proprietary Information. Proprietary information will not be disclosed by COMOPTEVFOR. Requests for access to such information will be referred to the proprietor agency for disposition.

206. (*) Deviations from the Test Plan. The OTD is authorized to deviate from this Test Plan as the operational

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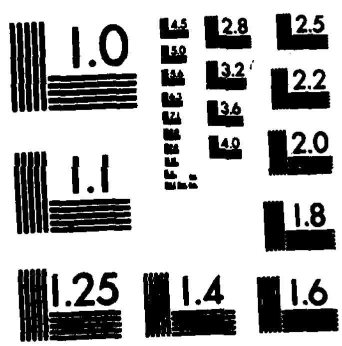

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

situation and good judgement dictate, keeping COMOPTEVFOR advised.

207. <u>Release of Information to the Press</u> (R

a. Any requests from the press (newspapers, television, etc.) for information about this testing (including requests to observe or film aspects of testing) will be referred to *(insert the "Press Release" point-of-contact's code, as discussed in paragraph 1004 of this Guide)*, who will specify what information may be released or what aspects of testing may be observed or filmed.

b. Information to be provided to the press will be prepared under the direction of the OTC (Operational Test Coordinator), who will ensure that it:

(1) Is within the framework of approval specified by *(insert the "Press Release" point-of-contact's code)*.

(2) Conforms to the security guidelines of Section 7 of this Test Plan (including OPSEC requirements).

(3) Is approved for release by COMOPTEVFOR.

c. Requests to observe or film aspects of testing that are approved by *(insert the "Press Release" point-of-contact's code)* will be considered visit requests on a genuine need-to-know basis, for the purpose of visitor control (paragraph 204 above). COMOPTEVFOR will approve such visit requests if they do not:

(1) Interfere in any way with test operations.

(2) Jeopardize security (including OPSEC).

Section 3

Scope of the Evaluation (*)

301. (*) Objectives. The objectives of Project 999-OT-IB are to determine:

a. ....

b. ....

These are the objectives of this phase of OT&E. They are the appropriate "OT&E Objectives" of Part IV of the TEMP.

Objectives that address operational effectiveness are listed first, followed by objectives that address operational suitability. "Operational effectiveness" and "operational suitability" may be used as subheadings, but should not appear in the actual wording of objectives.

This paragraph is the basis for paragraph 4a of the Evaluation Report.

R) 302. (*) Evaluation Criteria. CNO provided the following criteria in reference (a):

List the thresholds established for this phase of OT&E in Part I of the TEMP (Required Operational Characteristics), or from the OR, NDCP, or related program document. In any case, identify the source of the criteria. Do not include criteria that only repeat objectives.

This paragraph is the basis for paragraph 4b of the Evaluation Report, and for paragraph 301 of enclosure (1) to that report.

303. (*) Testing. Test operations will exercise the...... in realistic scenarios, in representive operational environments. These operations will provide the data for evaluation in individual

tests of operational effectiveness (E-tests) and operational suitability (S-tests) discussed in Sections 4 and 5.

This section summarizes the testing that will generate data for evaluation, and general procedures to be used. When the DA is in charge of the testing, including factory tests or demonstrations, reference to his test plan with a brief description of the testing is appropriate. Define the data to be collected by the DA and furnished to OPTEVFOR. When COMOPTEVFOR is in charge of testing, the following paragraphs provide general guidance to test participants.

a. (*) Safety. In the conduct of all operations associated with this project, SAFETY IS PARAMOUNT. No operations will be conducted that, in the opinion of the Commanding Officer concerned or the OTD, will endanger personnel or equipment. In an unsafe situation should develop, appropriate corrective action will be taken immediately. COMOPTEVFOR will be notified as soon as possible of the circumstances, including rectifying procedures initiated and recommended further action.

b. (*) Range Procedures

This paragraph discusses special procedures, instrumentation, communications, etc., that may be required when operations are conducted (in whole or in part) on a range. Make reference to appropriate range manuals or instructions, as well as to any briefings required before range operations.

c. (*) OPORDs and Exercise Messages

The OTD may be required to prepare an OPORD before project operations. Any special instructions that will be contained in the

OPORD should be discussed in this paragraph. Also, the OTD may be required to prepare Exercise Messages for each day's operations at sea. Participating units should be advised here of any special instructions these messages will provide (how runs will be identified, OPSEC instructions, etc.).

d. (*) Data Collection

(1) (*) Data Sheets. Special data sheets for use in this testing are contained in Annex B. Copies will be distributed to test participants by the OTD. Standard Navy forms, logs, etc. that will supplement these data sheets are identified in Sections 4 and 5.

(2) (*) Automatic Data Recording. The following automatic data recording systems will be employed throughout test operations:

304. (*) Limitations to Scope

List the significant factors that will (or probably will) prevent complete accomplishment of the purpose of this phase of testing. Typical factors are target characteristics not fully representative of the threat, test area characteristics not representative of the expected operational environment, or departures from operational realism caused by test conditions. Include in the limitations statement any work-around procedures being planned to reduce the effects of the limiting factors. For example, "Available targets do not represent realistic threats. However, The accuracy data obtained will be used as inputs to computer simulations to translate test results into operational MOEs."

This paragraph, modified as a result of actual conditions that existed during testing, provides the basis for paragraph 4c of the Evaluation Report and for paragraph 304 of enclosure (1) to that report.

Section 4

Operational Effectiveness (*)

401. (*) Scenarios. Effectiveness testing will exercise ...... in realistic scenarios in typical operational environments. These scenarios are described below. Plans and geometries for specific runs to simulate these scenarios are described in Annex A. (Alternatively: Plans and geometries for specific runs to simulate these scenarios are described below in the procedures for individual tests.)

a. (*) Scenario A, Barrier Patrol ....

b. (*) Scenario B, Amphibious Assault ....

This paragraph describes the operational scenarios in which the equipment will be exercised to determine its mission effectiveness or to define tactics. One scenario may suffice for single-mission equipment; several will be required for multi-mission equipment.

In each scenario description, state the operational mission being simulated, and describe the actions of simulated friendly and threat participants, but not the actions of units merely monitoring or providing instrumentation. Support unit instructions are provided in run plans.

402. (*) Test E-1, Recall Envelope

a. (*) Object. To determine the ranges and depths at which swimmers can ....

The object of an E-test is to assess some aspect of a project objective or, on occasion, more than one project objective. For simple projects, the test object and project objective may be identical.

b. (*) Procedure. Recall signals will be transmitted to swimmers at range, depth, and sea state combinations shown in ....

Identify the scenarios and runs which provide data for this test, the test variables involved, and the necessary sample size. The information in this paragraph should complement (not repeat) information contained in run plans.

c. (*) Data Requirements. *Identify the data required for this test.*

d. (*) Data Analysis. Data Sheet E-1 will be used to construct curves defining the boundary of 90% probability of .....

Describe how the data will be analyzed and how the results are intended to be presented (e.g., chart, plot, or specific number). Identify analytic methods peculiar to this test. When appropriate, carefully define such categories as "No-Test" or "Failure."

At times, a separate annex describing general analytical methods or presenting analytical details may be appropriate *(see Annex C). In those cases, reference the annex in the appropriate test or tests, or introduce it in paragraph 401.*

403. (*) Test E-2,........... *If desired, begin on a new right-hand page.*

When computer simulations are used to extend the data base, it is necessary to describe (under Procedure) the computer model and the means by which it was (or will be) proven to reproduce the operational situation adequately.

404. (*) Test E-3, Survivability/Vulnerability

a. (*) Object. To assess the characteristics of the .... and its installation which might lead to major or total degradation in mission performance because of enemy weaponry. The objective is to avoid a "cheap kill" whereby a severed cable, a shock-damaged switchboard, or computer casualty can eliminate the ...... as an effective combat system.

b. (*) Procedure. On-scene observations will be made by the OTD using vulnerability checklists and functional block diagrams as guides. The OTD will physically trace the ...., from inputs to outputs, considering the following:

(1) (*) Primary and secondary effects of weaponry will be considered, including conventional, nuclear (including EMP), biological, chemical, and laser weapons. Effects include material damage and crew casualties.

(2) (*) Subsystems may be considered vulnerable because of:

(a) (*) Unnecessary number of components, large size, or large (vulnerable) area.

(b) (*) Basic structure not hardened, shielded, or armored to resist penetration.

(c) (*) Insufficient redundancy of critical components or cable pathways.

(d) (*) Electronics mounted external to the skin of the ship susceptible to blast, shock, or fragmentation.

(e) (*) Electronics using solid-state electronics without coupling protection, etc., against EMP.

(f) (*) Lack of manual inputs and/or manual override.

(3) (*) The on-board installation will be examined to determine that the following good survivability practices have been followed:

(a) (*) Critical components and series components are installed close together.

(b) (*) Critical areas are shielded by non-critical components and/or armor.

(c) (*) Parallel or redundant components are diffused or installed far apart (at least two damage radii).

(d) (*) Hazardous material is isolated from vulnerable subsystems and systems.

(4) (*) Results of specific target analyses, survivability models, and degraded mode effectiveness testing, will be examined to determine the degree of vulnerability of the various subsystems, taking the planned installation into account.

c. (*) Data Requirements. The OTD will record results of his observations in the OTD Journal and on checklists.

d. (*) Data Analysis. On-scene observations and checklist data will be assessed qualitatively, taking the likely threats into account. Personnel safety, damage control, and casualty mode effectiveness will be included.

(1) (*) Critical subsystems considered unnecessarily vulnerable will be pinpointed for the evaluation report. Changes to reduce the "cheap kill" potential will be suggested when possible.

(2) (*) A list will be prepared of externally mounted subsystems considered vulnerable.

Section 5

Operational Suitability (*)

501. (*) General. The suitability testing will, in most instances, use data generated by continuous operation of the equipment throughout test operations, including the E-test runs described in Section 4 and Annex A. Runs specifically designed to generate suitability data are described below under the test to which they apply.

502. (*) Test S-1, Reliability

a. (*) Object. To determine the probability of completing a mission/engagement of (specified time or cycles) without critical or major failure.

Define critical, major, and minor failures as specifically as possible. See this Guide's Glossary for general definitions.

b. (*) Procedure. This test will be conducted continuously during test operations.

c. (*) Data Requirements. Maintenance Actions Forms will be completed for:

(1) (*) Each failure or discrepancy noted during operations.

(2) (*) Each preventive maintenance action which finds a failed part.

d. (*) Data Analysis. R (mission reliability) is computed using the formula:

$$R = \exp\left(-\frac{t}{MTBF}\right)$$

where t = mission time

MTBF = mean time between failures

For equipment such as guns or torpedo tubes, cycles vice time is significant, and the formula is

$$R = \exp\left(-\frac{C}{MCBF}\right)$$

where C = nominal cycles per mission/engagement

MCBF = mean cycles between failure

For one-shot devices such as missiles or torpedoes, neither time nor cycles is appropriate, and the formula is

$$R = \frac{\text{Valid Successes}}{\text{Valid Attempts}}$$

In this case, specific definitions on validity are required. Care must be taken not to confuse success for material purposes with success for effectiveness.

Where appropriate, include the following COMOPTEVFOR approach to damage caused by handling:

(1) Definition. Handling damage is caused by human error during physical movement, transportation, or handling by authorized personnel.

(2) Categories

(a) Gross handling damage involving negligence; all actions other than normal action by competent, knowledgeable personnel following proper written/verbal instructions. (The individual's command is responsible for making the judgement regarding negligence, by considering the normality of the action, and the correctness of the instructions followed.)

(b) Normal handling damage does not involve negligence.

(3) Treatment of Handling Damage in MTBF Calculations. Failures resulting from handling damage are included in MTBF calculations unless the damage is categorized as gross handling damage.

503. (*) Test S-2, Maintainability

a. (*) Object. To determine the maintainability of the .... in the intended operational environment.

b. (*) Procedure

c. (*) Data Requirements. Maintenance Actions Forms.....

To preclude not being able to assess maintainability (e.g., MTFL, MTTR, etc) because no (or few) failures actually occur during test operations, make provision for a maintenance demonstration, after test operations, using prefaulted modules. Include the procedure here.

d. (*) Data Analysis

504. (*) Test S-3, Availability

a. (*) Object. To determine the probability that the equipment will be operationally ready, when needed, at any point in time.

b. (*) Procedure

c. (*) Data Requirements. All operator logs, maintenance action forms, and time meters will be reviewed........

Any special instructions on the handling of data forms or records should be included as well as any special definitions of terms applicable to this test.

d. (*) Data Analysis. Operational availability is computed using the formula:

$$A_o = \frac{\text{Uptime}}{\text{Uptime + Downtime}}$$

Any special considerations that may make some data invalid or be given less weight should be included.

505. (*) Test S-4, Logistic Supportability (R

a. (*) Object. To assess the logistic supportability of the ..... in a deployed operational environment. *(See Annex G of this Guide.)*

b. (*) Procedure. This test will be conducted before and continuously during project operations.

(1) (*) The adequacy of the ILSP (Integrated Logistic Support Plan) will be assessed. Special attention will be given to the planning for delivery of resources that are required to support the...but are not available during OPEVAL. *(All support resources should be available during OPEVAL. Only in extreme cases should the OTD accept partial support.)*

(2) (*) The following items related to logistic support will be evaluated:

(a) (*) Clarity, completeness, accuracy, and availability of technical manuals and PMS (Planned Maintenance System) documentation.

(b) (*) Availability and adequacy of test equipment and special tools.

(c) (*) Adequacy of the support (including spare parts, operating/maintenance procedures, and training) provided in conjunction with test equipment and special tools.

(d) (*) Effect of maintenance requirements on manning.

(e) (*) Adequacy of supply support.

1. (*) The requirements for, and availability of, spare parts during OPEVAL will be evaluated. Any requirements that indicate unexpectedly high component failure rates will be investigated.

2. (*) The schedule for submission of PTD (provisioning technical documentation) to the inventory control point *(either the Aviation Supply Office or Ships Parts Control Center)* will be evaluated.

(This step is vital with respect to the capability of the Navy Supply System to support the system after fleet introduction. PTD includes the technical drawings, manufacturer's parts lists, estimated parts failure rates, duty cycles, etc., upon which the inventory control point will base its spares allowance computations and spare parts purchases. Therefore, 100% spare parts availability during OPEVAL is meaningless if the DA has not provided for timely delivery of PTD, because fleet units will receive the system without the parts/equipage lists or the spare parts to support it. Note:

It usually is 18 months after PTD delivery before organic (Navy) supply support is available.)

(f) (*) The adequacy of the following aspects of support will also be evaluated: *(Depending on the system under evaluation.)*

1. (*) Calibration requirements.

2. (*) Provisions for packaging, handling, storage, and transportation.

3. (*) Stowage space for spare parts.

(3) (*) All support resources used during testing that are not to be provided to operational units will be noted.

In all Test Plans for systems/equipment that require (or may require) lubricants, include under Test S-4 a check to determine if the required lubricants are standard lubricants. CNO has noted that increased requirements for non-standard (i.e., special or proprietary) lubricants have caused stowage problems aboard ship and have burdened the supply system.

c. (*) <u>Data Requirements</u>

(1) (*) The data required to conduct this test are as follows:

(a) (*) The ILSP.

(b) (*) All technical manuals and PMS documentation, in preliminary or final form.

(c) (*) Preliminary APLs/AELs (allowance parts/equipage lists).

(d) (*) All related test equipment and special tools.

(e) (*) Completed NAVSUP Form 1250, with part number and APL number (or nomenclature of parent equipment), for each spare part used during testing

(2) (*) In addition, the following will be provided by the DA:

(a) (*) List of all required technical manuals.

(b) (*) List of all required test equipment and special tools.

(c) (*) List of all related preliminary or interim parts lists.

(d) (*) List of all MRCs (Maintenance Requirement Cards).

(e) (*) Certification of the submission of PTD to the inventory control point and projected dates for all future submissions of PTD.

(The series of lists will allow the OTD to determine the completeness of the on-board support package, and provides him a checklist.)

d. (*) Data Analysis. Logistic support data will be analyzed quantitatively and qualitatively.

506. (*) Test S-5, Compatibility

a. (*) Object. To assess the compatibility of the..... with its operating environment.

b. (*) Procedure

c. (*) Data Requirements

d. (*) Data Analysis

If desired, this test may be subdivided as follows:

Test S-5A, Physical Compatibility

Test S-5B, Functional Compatibility

Test S-5C, Electronic/Electrical Compatibility

Normal operations may not expose interference or incompatibility, and the OTD may have to conduct special tests, operating various equipments in various modes, to detect any potential interference.

507. (*) Test S-6, Interoperability

a. (*) Object. To determine the adequacy of the interfaces between the ..... and .....

b. (*) Procedure

c. (*) Data Requirements

d. (*) Data Analysis

508. (*) Test S-7, Training Requirements

a. (*) Object. To assess the adequacy of the training planned for operators and maintenance personnel.

b. (*) Procedure *(See Annex E to this Guide.)*

c. (*) Data Requirements

d. (*) Data Analysis

509. (*) Test S-8, Documentation

a. (*) Object. To assess the adequacy and accuracy of the documentation provided for the . . . .

b. (*) Procedure

c. (*) Data Requirements

d. (*) Data Analysis

510. (*) Test S-9, Human Factors

a. (*) Object. To assess the adequacy of human factors features of the . . . .

b. (*) Procedure

c. (*) Data Requirements

d. (*) Data Analysis

511. (*) Test S-10, Safety

a. (*) Object. To assess the adequacy of safety features of the . . . .

b. (*) Procedure

c. (*) Data Requirements

d. (*) Data Analysis

Section 6

Reports (*)

601. (*) General. Reports required in connection with this project are described in the following paragraphs. Distribution should be limited where indicated.

602. (*) CASREP/CASCOR

Units designated to conduct or support testing under this project should be directed to include COMOPTEVFOR as an addressee on any CASREP/CASCOR messages that may indicate any reduction in the ability to complete the mission required by this Test Plan.

603. (*) Readiness Reports

a. (*) DA Certification

For OPEVALs, the DA shall certify readiness in accordance with OPNAVINST 3960.10. For other OT operations, the OTD will ensure that prerequisite technical achievements have been satisfied before commencing operations.

b. (*) Unit Readiness

The Commanding Officers of participating units shall report by message to COMOPTEVFOR, copy to the operational commander, that the units are ready to commence operations. Any exceptions or reservations on the part of a Commanding Officer should be included in this report. For OPEVALs, *ship Commanding Officers will report in accordance with OPNAVINST 3960.10.*

604. (*) <u>OPEVAL Commencement Report</u>

See Section 11 of this Guide.

605. (*) <u>Status Reports</u>

a. (*) <u>SITREP</u>

See Section 11 of this Guide.

b. (*) <u>Deficiency Reports</u>

See Section 11 of this Guide.

606. (*) <u>Evaluation Reports</u>

a. (*) <u>Unit Commander's Report</u>

Unit commanders of participating and supporting units should be tasked to submit letter reports to COMOPTEVFOR, copy to their operational commander, commenting on their impressions of the operational effectiveness and operational suitability of the equipment, tactics, and areas requiring further investigation.

b. (*) <u>COMOPTEVFOR Report</u>

If tests are prosecuted by a non-Headquarters activity, specify the time allowed for this activity to submit a draft report to the Headquarters. Specify required Quick-Look and/or Partial Reports.

607. (*) <u>OPTEVFOR Tactics Guide</u>

Specify the requirement for an OPTEVFOR Tactics Guide in the same manner as for an Evaluation Report.

Section 7

Security (*)

701. (*) Assigned Classification

a. (*) SECRET

(1) (*) Effects of countermeasures.

(2) ....

b. (*) CONFIDENTIAL

(1) ....

(2) ....

c. (*) UNCLASSIFIED

(1) ....

(2) ....

702. (*) OPSEC. OPSEC requirements have been considered in developing this test plan.

a. (*) When Force test and evaluation activities are subject to monitoring by known or suspected intelligence-collection platforms, the following types of information which could be used by a potential enemy should not be passed by uncovered communications or otherwise made subject to compromise:

(1) ....

(2) ....

b. (*) Necessary changes to run schedules and plans caused by intruders will be promulgated by the OTD as follows:

(1) ....

(2) ....

Annex A

Run Plans and Geometries (*)

A101. (*) General

An Annex may be used to provide detailed guidance for executing the Test Plan, such as run geometries.

A run is an exercise involving simulated friendly and threat units, and associated monitoring and instrumentation units, conducted to acquire data pertinent to a scenario. Run plans translate scenarios into specific events and geometries, and provide the necessary direction to all test participants. They provide the required start events (e.g., COMEX), the movements of all participants (course, speed, depth (or altitude) changes, and any restrictions to them), and stop events (FINEX). They address controlled variables, as shown in Table A-1.

Table A-1 (*)

Illustration of a Test-Variable Matrix (*)

Scenario		Run Number			
		Speed			
		Slow		Fast	
		Altitude			
		Low	High	Low	High
Day	A	1	8	6	3
	B	5	2	4	-
Night	A	9	12	10	13
	B	15	11	14	7

Additional details and run geometries may be included.

Run plans are used for at-sea tests and for tests at land-based test sites. They are also used for computer simulations used to extend the data base. When computer simulations are employed, run plans for validation of the simulation should be included.

Annex B

Forms and Data Sheets (*)

Provide a copy of each non-standard form, data sheet, questionnaire, etc., to be used in the evaluation. Include instructions on how, when, and by whom these are to be filled out.

Do not include a copy of any standard Navy form being used.

Annex C

Analytical Methodology (*)

The methodology used to trace the path from data collection through reduction to arrive at numerical results for MOEs and MOSs should be specified. When possible, example calculations shall be shown.

To assist the OTD in the conduct of the evaluation, the criticality of various inputs should be addressed. That is, fall-back positions/methodologies should be explored demonstrating what conclusions may be obtained in the absence of various data points.

1006. Test Plan Approval Authority

a. Deputy, AIRTEVRON Commanding Officers, or cognizant ACOSs are authorized to approve Test Plans when:

(1) The Test Plan is fully consistent with a CNO-approved TEMP.

(2) The Commander has not indicated a desire to review the Test Plan prior to its approval.

b. Test Plans that do not meet these criteria are reviewed by the Deputy Chief of Staff (Code 02), the Chief of Staff (Code 01), or the Commander (Code 00), as appropriate.

1007. OPSEC Requirements of Test Plans

a. Background

(1) OPSEC, as it relates to COMOPTEVFOR testing, may be defined as the identification and protection of a broad spectrum of information that collectively reveals current and future U.S. Military capabilities, plans, and operational procedures. In this respect it encompasses and relates to other security programs such as SIGSEC (signal security) and OPDEC (operational deception).

(2) Basic guidance on OPSEC is contained in OPNAVINST 3120.31, CINCLANTFLTINST C3100.10, and COMOPTEVFORINST C3100.1.

b. Requirements for OPSEC in Test Planning

(1) COMOPTEVFOR testing is largely devoted to verifying the capabilities of new weapons systems and developing tactics for their use. For this reason, application of OPSEC thinking to OPTEVFOR test scenarios is extremely important, to avoid unnecessary disclosure of weapons systems capabilities and limitations.

(2) The application of OPSEC thinking to OPTEVFOR test scenarios is a two-step process:

(a) Identifying those elements of information that require protection (e. g., communications, non-communications electromagnetic emissions and tactics).

(b) Establishing means of protecting these elements during OPTEVFOR testing and during the subsequent analysis process. OPNAVINST 5510.143, which establishes policy on SIGSEC, and OPNAVINST 53490.2, which provides guidance on cover and deception planning, are useful for this purpose.

(3) OTDs developing Test Plans will analyze their test programs from the viewpoint of OPSEC, and include, in the section on security, a paragraph stating that OPSEC requirements have been considered. (If done correctly, questions involving SIGSEC and the possible need for OPDEC planning will be addressed as well.)

(4) Test scenarios, the interchange of information during project operations, and the dissemination of test data will be designed to minimize availability of useful information to unauthorized sources. Necessary instructions will be included in detailed test procedures.

(5) Prior to commencing tests, test participants will be briefed by the OTD, or his representative, on security requirements of the test.

c. Assistance in applying OPSEC requirements to individual Test Plans may be obtained from Force Operations and Plans (23).

1008. <u>Use of Photography During OT&E</u> (A

a. Whenever possible, plan to make use of photography (including videotaping) during OT&E to:

(1) Provide illustrations to clarify the text of Evaluation Reports.

(2) Furnish the command with a supply of OT&E oriented (as opposed to development- or sales-oriented) illustrations for use in briefings and presentations.

b. This photographic coverage may vary from amateur, candid-type photography by the OTD to professional coverage by Fleet Audio Visual Command Atlantic. Examples of types of photographic coverage that may be useful in Evaluation Reports or in briefings on OT&E are as follows:

(1) Photographs of test personnel using handheld equipment (e.g., metal detectors, ordnance examining/neutralization devices, on-board testers). These may reduce the amount of text in "Equipment Description," and/or may provide useful illustrative vugraphs.

(2) Photographs of equipment displays that illustrate points to be made in an Evaluation Report or briefing (e.g., "before" and "after" shots of scopes that illustrate effects of electronic countermeasures, shots of confusing or ambiguous symbology).

(3) Photographs of damage incurred during normal operations that illustrate inherent weaknesses of the equipment under test (e.g., missile fins bent during normal assembly, handling, or loading evolutions; cracks or excessive wear incurred during routine use).

(4) Photographs of the test system underway during OT&E (e.g., SEAFOX making a swimmer recovery, PEGASUS at high speed in heavy seas, the F-18 flying an OT&E mission). These may be used as general illustrations in reports or briefings, or may illustrate specific points (e.g., heavy spray obscuring a gunner's vision).

(5) Photographs of the test system as installed in the ship, aircraft, etc., for general information or to illustrate an important aspect of the installation (e.g., inaccessibility for maintenance, antenna blockage by superstructure).

(6) Motion photography (or videotapes) of the equipment in operation, for general information, for post-test analysis, or to illustrate an important aspect of the system (e.g., CIWS engaging a target, a console before and during a computer hang-up).

c. When OTDs/OTCs have obtained photographs of OT&E, they should inform the Deputy Chief of Staff of this fact in an informal memo that describes briefly what is available. The Deputy Chief of Staff maintains a consolidated file of this information for use by the command. Should the command need vugraphs or motion pictures based on material acquired by an OTD/OTC, tasking is to the appropriate Assistant Chief of Staff by the Deputy Chief of Staff.

d. Sources of Assistance to the OTD/OTC

(1) The Assistant Chief of Staff for Operations (Code 20) provides scheduling assistance for FLTAVCOMLANT in accordance with CINCLANTFLT Instruction 3150.1 (series).

(2) The Comptroller and Force Supply Officer (Code 014) advises the OTD/OTC on matters associated with funding requirements for photographic coverage, including film and processing costs.

(3) The Director of Administration (Code 10):

(a) Assists the OTD/OTC in completing forms, etc. associated with obtaining photographic services.

(b) Makes arrangements for OTDs/ OTCs to obtain temporary subcustody of cameras charged to Graphic Arts.

1009. Checklist. The attached list is designed to help the OTD avoid some of the more frequent errors in Test Plans.

Test Plan Checklist

1. If submarines are involved in any way (project ships, sonar targets, etc.) COMSUBPAC and/or COMSUBLANT approval of submarine safety aspects is requested. ( )

R) 2. Objectives and evaluation criteria adequately address all elements of operational effectiveness and operational suitability pertinent to this phase of OT&E. (Note: If the objectives contained in the TEMP are wrong or incomplete -- don't compound the problem by carrying the error over into the Test Plan! Fix them now.) ( )

3. Limitations to scope are real limitations to the evaluation and there's no way to eliminate them. ( )

4. Equipment description is as concise as possible -- doesn't repeat the switchology, etc., contained in technical documentation being provided test operators and maintenance personnel. ( )

5. Testing will enable accomplishment of objectives and verifications of criteria. ( )

6. Testing is structured to provide meaningful data for an OPTEVFOR Tactics Guide. ( )

7. Where applicable, standardized S-Tests are used. ( )

8. Data requirements and responsibilities for data collection are specified. ( )

9. Analysis methods are specified and, where necessary, definitions (e.g., critical failures, no-tests, etc.) are provided. ( )

10. OPSEC requirements have been considered (see OPTEVFORINST C3100.1) and the Test Plan so states. ( )

11. Questionnaires have been tailored for the project -- i.e., they ask only relevant questions. ( )

Section 11

Test Operations

1101. OTD Responsibilities Before Test Operations Begin

a. Draft a personal letter from COMOPTEVFOR to the commanding officer of each unit scheduled to provide key services during the OT&E. The letter should introduce the purpose and objectives of the OT&E, cite the time frame and test scenario (area, exercise, other participants, etc.), provide the names of principal OT&E project personnel (OTC, OTD, ship riders), and request the understanding and cooperation of the commanding officer. While there is no firm "cookbook" approach to such a personal letter, the sample that follows illustrates the desired approach. (R

SAMPLE LETTER TO CO, RDT&E SUPPORT UNIT (R

CAPT Raymond P. Ilg, USN　　Date
Commanding Officer
USS NIMITZ (CVN-68)
FPO New York, NY 09542

Dear Captain Ilg,

I was most pleased to learn that your fine ship has been assigned to participate in the OPEVAL of the carrier-based Antisubmarine Warfare Module (CV-ASWM). My purpose in writing to you is to pass along some information and guidance intended to make your efforts in this OPEVAL more effective.

To begin with, my command is the Navy's sole operational test and evaluation activity. I report directly to the Chief of Naval Operations, and am totally independent of the Navy's equipment development activities. Briefly, our mission is to determine - based upon operational testing and our evaluation of testing results - whether new equipments or systems should be introduced into the fleet. To accomplish this we must:

- Measure the effectiveness of the system/equipment performance in its operational environment. "How well does it do what it's supposed to do when operated by fleet personnel, across as wide a spectrum of sea and weather conditions as we can encounter, in the face of as accurate a representation of threat and workload as we can generate?" is the question which we try to answer.

- Measure the suitability of the system/equipment in its operational environment. "Is it reliable; can fleet sailors maintain it; how available is it; is it logistically supportable, is it compatible with other systems and equipments," are some of the questions which must be answered here.

- Develop Tactics Guides to employ the systems/equipment being evaluated if this is appropriate.

- Employ objective common sense and operational judgement throughout the OPEVAL.

I must emphasize that our total concern is on operational testing and evaluation. We are not really concerned with technical performance evaluation. That has already been accomplished by the Developing Agency (e.g., NAVSEA, NAVAIR). Nor are we concerned simply with black box or round performance. Our concern must be focused upon the entire system which contains or supports that black box or round. To belabor the obvious, a new missile which is potentially the best ever made is of no value if the sensor and control systems upon which it is critically dependent cannot support it.

Finally, you and your command are vital to me in this OPEVAL. I rely upon your collective competence, skill, judgement and objectivity to accomplish each of the tasks described above. Enthusiasm over new equipments is common, particularly if that equipment exhibits none of the problems associated with current exhibits. I'm counting on you to help insure that this enthusiasm does not blind your people to any flaws which may be present in the CV-ASWM.

If you have any questions, if there is any way which I can assist you in carrying out your role in this assignment, all you need to do is ask; by telephone or by personal message to me. For the more mundane matters, LCDR W. L. Mergen and LCDR J. D. Pendleton of my staff are your designated points of contact. LCDR Mergen is responsible for Project Matters, and LCDR Pendleton is responsible for Scheduling Matters.

(COMOPTEVFOR SIGNATURE)

(NOTE: Don't just copy this letter. Particularly in the first and last two paragraphs, personalize it -- for the particular testing and the particular test platform.)

b. As the date to begin test operations approaches, check to make sure that:

(1) Appropriately trained personnel will be available to operate and maintain the equipment.

(2) The equipment to be evaluated (including special support equipment) will be installed and checked out.

(3) Operator and maintenance manuals, the ILSP, and other necessary documentation will be available from the DA.

(4) Instrumentation (including range instrumentation) will be available and in working order.

(5) Targets, simulators, electronic warfare services, etc. will be available.

(6) Participants have received required test directives (the Test Plan, LOIs, etc.), and understand them.

(7) COMSUBLANT and/or COMSUBPAC has concurred with the safety aspects of Test Plans that involve use of submarines.

(8) RDT&E support services remain on track.

(9) You have contingency plans for the unexpected.

(10) Arrangements have been made for pre-test briefings (including arrangements for additional briefers, if necessary).

(11) Special data forms and questionnaires are available in sufficient quantity.

(12) If appropriate, rehearsals of test operations are scheduled. (Rehearsals are good if they increase the likelihood of obtaining meaningful data. Do rehearse data collection. Rehearsals are bad if they destroy operational realism. Don't eliminate the possibility of having unalerted operators, etc.)

(13) Pre-faulted modules (for example) will be available for a maintenance demonstration, if one becomes necessary.

c. Immediately prior to the start of test operations, make sure that:

(1) All hands know what they're supposed to do.

(2) The equipment to be evaluated is in working order.

(3) Other equipment necessary to the test scenario, and instrumentation equipment, are in working order.

(4) Personnel to activate/deactivate data recorders, and back-up data takers, are in place.

(5) As necessary, time synchronization and communications have been established.

(6) Data forms have been distributed, as necessary.

(7) Contingency plans have been discussed with appropriate personnel (e.g., with the Commanding Officer of the test ship).

1102. <u>OTD Responsibilities During Test Operations</u>. Ensure that:

a. Tests are conducted in accordance with test directives; any deviations are noted, their impact is assessed, and necessary corrective action is taken. Contingency plans are implemented, as necessary.

b. Data recorders are refilled as necessary; recorded data are stored in a safe place.

c. Unusual events during testing that may have some effect on test results are noted (e.g., in the OTD Journal).

d. Data forms are completed as specified in the Test Plan.

e. Reports are generated as specified in the Test Plan, and as discussed in paragraph 1105.

1103. <u>OTD Responsibilities After Test Operations</u>. Ensure that:

a. Questionnaires are distributed, filled in, and returned to the OTD (or as specified in the Test Plan).

b. Necessary debriefs are conducted, as are post-test interviews.

c. All other data are delivered to the OTD (or as specified in the Test Plan).

d. When necessary, a maintenance demonstration is conducted.

e. Analysis proceeds as necessary to allow the Evaluation Report deadline to be met.

1104. Release of Test Data. In general, raw OT&E test data (particularly failure data) can be made available to the DA immediately. However, release of these data must be accompanied by safeguards to ensure that:

a. Status/progress reports within the Navy on OT&E test results are made only by COMOPTEVFOR or his designated representative.

b. Information for higher authority on OT&E test results is prepared only by COMOPTEVFOR.

c. No press releases of any kind are made based on OT&E test data.

d. Contractors are enjoined from making use of OT&E test data in advertising or selling weapons systems.

1105. Reports Associated With Test Operations

a. Commencement of OPEVAL. When an OPEVAL starts the cognizant ACOS is required to transmit a message from COMOPTEVFOR to CNO stating that "CNO Project XX-OT-II (OPEVAL) on the (equipment name) commenced (DTG(local))." Comments, particularly unanticipated limitations, may be included in this message. It is an OTC/OTD responsibility to draft this message for the ACOS.

b. Deficiency Report. A deficiency report is submitted to COMOPTEVFOR by the prosecuting agency (e.g., VX Squadron, project ship) when a project is being delayed because the equipment cannot be operated, because required support is lacking, or because of prolonged delay in equipment delivery. These reports are by letter, speed letter, or message. In the case of a project ship with the OTD embarked, the OTD drafts the deficiency report and prefaces it with "OTD Sends." COMOPTEVFOR may in turn send a deficiency report to the CNO, with an information copy to the cognizant systems command, CHNAVMAT, and the prosecuting agency. Deficiency reports will contain a summary of the deficiency, action taken, and recommended action.

c. Situation Reports. If operations will extend over a long time, the OTD must arrange for periodic "SITREPs" from the prosecuting agency. The frequency, format, and desired content of these reports, and their distribution, should be specified in the Test Plan. As with Deficiency Reports, use "OTD Sends" when appropriate.

Section 12

The Evaluation Report

1201. Introduction

a. There are two products of OT&E: the Tactics Guide, in which OPTEVFOR addresses how to use a system, and the Evaluation Report. An Evaluation Report provides the CNO with COMOPTEVFOR's conclusions regarding a system's operational effectiveness and operational suitability, and his recommendations regarding the system (further development, procurement and production, additional T&E, etc.). In addition, an Evaluation Report provides the information (test results, evaluation criteria, etc.) to substantiate the conclusions and recommendations.

b. In high-interest programs, COMOPTEVFOR often provides his conclusions and recommendations to the CNO before formal Evaluation Reports are issued -- in messages, in briefings associated with CEB, DNSARC, or DSARC meetings, etc. In these cases, major milestone decisions are sometimes made before formal Evaluation Reports are issued. This circumstance does not alter the requirement for the report -- its record of OT&E is still required, and odds are that sooner or later it will be used. A few examples of how the report might be used:

(1) Problems with newer systems in the fleet can cause T&E reports to be examined for clues to the sources of the problems --installation differences, design changes incorporated since testing, etc.

(2) Evaluation Reports have been a major data source for recent GAO investigations of Navy RDT&E.

Evaluation Reports are never "OBE" because program decisions have been made prior to their publication.

1202. Types of Evaluation Reports There are two categories of Evaluation Reports: formal reports that are permanent records of OT&E, and quick-look reports that are temporary substitutes for formal reports.

a. Formal Evaluation Reports usually consist of letters signed by the Commander, accompanied by enclosures. The letters are addressed to the CNO, and are written Admiral-to-Admiral, emphasizing system operational effectiveness and operational suitability and the program decision (e.g., full-scale development, ASU) under consideration. Enclosures are written primarily for the DA, and emphasize the details of test and analysis and detailed changes/corrective actions (not in themselves of interest to the decision maker) that are recommended. There are three types of formal Evaluation Reports, as follows:

(1) A Report covers a complete phase of OT&E (e.g., OT-IIIA) in a single document.

(2) A Partial Report covers part of a phase of OT&E. It is is used when a phase takes a long time to complete -- in order to keep CNO aware of OT&E progress. Some examples of phases in which Partial Reports were used:

(a) The F-14A/PHOENIX OPEVAL was a time-consuming T&E effort that exercised the F-14A/PHOENIX sequentially in increasingly difficult mission areas. Ten Partial Reports were issued, one after completion of testing in each mission area.

(b) F-14A/PHOENIX FOT&E involved reliability tests of production AIM-54 missiles during deployments of four different aircraft carriers. Because of the long time between the beginning of the first and completion of the fourth deployment, results of earlier deployments were published in Partial Reports.

(3) A Summary Report is prepared when it is necessary to integrate information from a series of Partial Reports in order to make overall system-level conclusions and recommendations. Summary Reports that have been published (to date they have been rare) have been letters without enclosures; they made references to the Partial Reports for details, eliminating the need for enclosures.

b. A Quick-look Report is a temporary substitute for a formal Evaluation Report. Usually it covers an entire phase of OT&E, and substitutes temporarily for a Report. It is usually in message format, is addressed to the CNO, and has essentially the same emphasis as the letter portion of a Report. Differences between Quick-look Reports and Reports are as follows:

(1) A Quick-look Report is not backed up by the substantiating detail contained in the enclosure to a Report.

(2) Quick-look Report results, conclusions, and recommendations may be subject to modification because they are based on incomplete analysis.

(3) A Quick-look Report may defer non-critical aspects of the evaluation to the formal Report.

(4) A Quick-look Report may contain more detail in some areas than the Report letter. Usually, this detail is associated with recommended system changes not in themselves of interest to the decision maker, but that COMOPTEVFOR wants the DA to know about immediately.

c. As already indicated, a Report or a Partial Report is usually a letter backed up by an enclosure; a Quick-look Report is usually a message. Variations from the usual have been as follows:

(1) Letters Without Enclosures. These have included reports on IOT&E that was restricted to operational evaluation of DT&E results (i.e., no operational testing). The appropriate DT&E reports were referred to for detail, in lieu of enclosures.

(2) Formal Reports in Message Format. From time to time, COMOPTEVFOR has been asked to evaluate a piece of equipment not covered by a TEMP -- something a contractor or a Navy lab has developed that is worth checking out from an operational viewpoint. No T&E funds are involved, and simple tests during an ongoing OPEVAL are all that's required. In cases like this, formal Reports in message format have been issued, providing the DA with an evaluation as quickly as possible without the wide dissemination of information required in projects covered by TEMPs.

(3) Quick-look Reports in Letter Format. Occasionally, the CNO-approved evaluation criteria have been so detailed that the simplest way to address them (a table comparing results with criteria) is too complex for an understandable message. In these cases, Quick-look Reports have been prepared in letter format and hand-carried to CNO.

1203. <u>When Are Evaluation Reports Required</u>?

a. Evaluation Reports are required as specified in Part II of the TEMP, generally at the completion of a phase of OT&E. Reports not required by the TEMP: (R

(1) May be requested by agencies outside OPTEVFOR. Note that according to OPNAVINST 3960.10, such requests must be approved by CNO (OP-098) before you're required to honor them.

(2) May be directed by COMOPTEVFOR. (Partial Reports are often of this variety.)

b. Publication deadlines for Evaluation Reports are specified in COMOPTEVFORINST 3960.2A.

c. Quick-look Reports are temporary documents -- they are always superseded by formal Evaluation Reports.

1204. The Logical Organization of an Evaluation Report

a. According to Annex A to this Guide, the fundamental requirement for good writing is logical organization -- making the discussion proceed in logical steps from beginning to end, without irrelevancies or digressions. The standard format for the letter portion of a formal Evaluation Report (which is basically the same for a Quick-look Report) is designed to provide a logical organization in eight or nine paragraphs. The logical flow of information in these paragraphs is illustrated in Figure 12-1. In Figure 12-1, the heavy arrows that lead from box to box represent the flow of information. The three boxes on the left, representing paragraphs 1 through 4 of the letter, provide the essential background information -- the "why" and "what" of the OT&E. The box in the center (paragraph 5) is the "how" of testing. The boxes on the right (paragraphs 6 through 9) provide the meat of the evaluation -- the major results of testing, operational factors that influence interpretation of the results, and COMOPTEVFOR's conclusions and recommendations. The thin horizontal arrows between boxes on the left and boxes on the right illustrate where "questions asked" on the left are "answered" on the right. More on this below.

b. Paragraph 1, Purpose, introduces the report by stating the reason for the phase of OT&E (i.e., the program decision under consideration), and the basis for the evaluation (i.e., an investigation of operational effectiveness and operational suitability).

c. Paragraph 2, Equipment Description (or System Description -- your choice) is a short description of what was tested. It emphasizes the function of the equipment, and significant difference between what was tested and the proposed operational configuration.

d. Paragraph 3, Background, briefly summarizes the reason the equipment is being developed and the T&E conducted before the phase of OT&E being reported.

Figure 12-1

Evaluation Report (Letter)

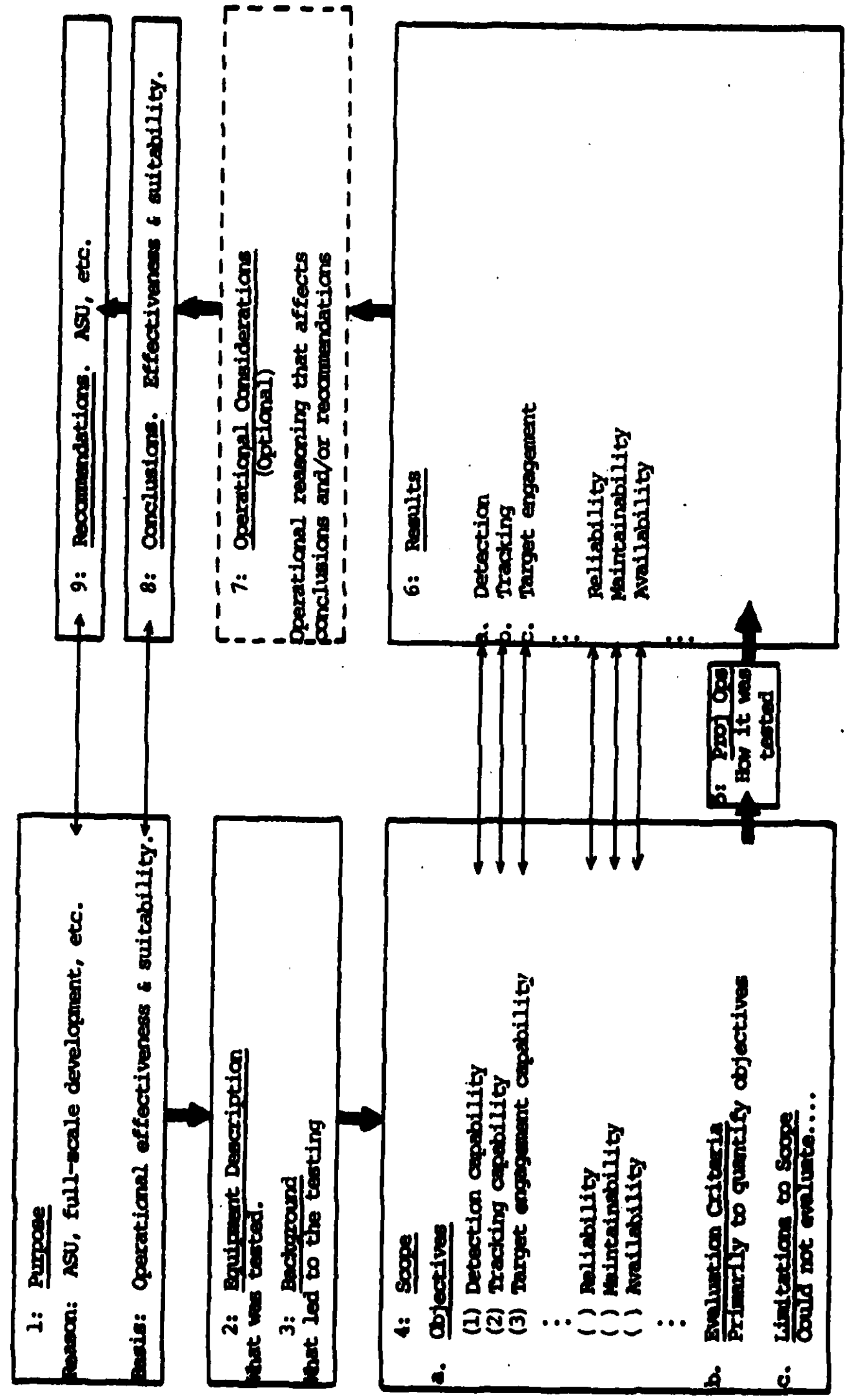

Figure 12-1

Evaluation Report (Letter)

e. Paragraph 4, Scope, has three standard subparagraphs:

(1) Objectives. These define the elements of operational effectiveness and operational suitability, as shown in Figure 12-1.

(2) Evaluation Criteria. These quantify the objectives. They are the MOEs and MOSs.

(3) Limitations to Scope. These are the ways in which COMOPTEVFOR's evaluation is limited. They identify objectives (or portions of objectives, MOEs, or MOSs) that could not be fully assessed.

f. Paragraph 5, Project Operations, is a brief narrative that describes how testing was conducted (the scenarios and the magnitude of testing -- how many bombs were dropped, how long the equipment was operated, etc.). It gives the reader an idea of the data base.

g. Paragraph 6, Results, presents the major results of test and analysis -- keyed to the objectives, as indicated by the thin horizontal arrows in Figure 12-1. All objectives and all the evaluation criteria associated with them are addressed in this paragraph, except those specifically excluded by Limitations to Scope.

h. In most OT&E, once the results have been presented, the complete logic for conclusions and recommendations has been established. In some cases, however, operational reasoning suggests conclusions and/or recommendations that do not derive directly from results. Paragraph 7, Operational Considerations, is an optional paragraph that is used to develop this operational reasoning. Some examples:

(1) In testing, the following results were obtained:

(a) MTBF: 120 hours (criterion: $\geq$ 150 hours).

(b) MTTR: 2 minutes (criterion: $\leq$ 60 minutes).

(c) A_o: 99.9% (criterion: $\geq$ 98%).

A direct conclusion from these results would be that the system was not operationally suitable because the system did not meet the reliability criterion. COMOPTEVFOR, however, felt that:

(a) The system was "up" most of the time, as evidenced by the fact that A_o was high.

(b) The high A_o was attributable to very short repair times, evidenced in a very low MTTR.

(c) With the very low MTTR, an MTBF of 120 hours was acceptable from an operational viewpoint.

COMOPTEVFOR's views were developed in Operational Considerations; it provided the rationale for a conclusion that the system was operationally suitable, even though it did not meet the reliability criterion.

(2) During OPEVAL of System X, repeated failures of service-approved System Y were observed. System Y was being used as a backup data collection device, and its failures had no adverse effect on the evaluation of System X. Therefore System Y's failures would not be discussed under Limitations to Scope. Nor would they be discussed under Results; determining System Y's reliability was not an objective of the System X OPEVAL. But COMOPTEVFOR desired to bring a potential System Y reliability problem to the CNO's attention. Operational Considerations was used to report the observed failures, and substantiated a recommendation to investigate System Y's reliability in the fleet.

(3) During OPEVAL of an acoustic signal processor, the system met all the evaluation criteria. During project operations, operators in the Project Ship pointed out an apparently simple change in processor logic that could provide a significant increase in capability -- allowing target localization in addition to the designed capability of providing target bearing. COMOPTEVFOR discussed this possibility in Operational Considerations, and then concluded (based on test results) that the processor was operationally effective and operationally suitable. COMOPTEVFOR's first recommendation, however, was <u>not</u> for ASU, the usual OPEVAL recommendation on an operationally effective and operationally suitable system. Instead, COMOPTEVFOR recommended that the feasibility of providing a target localization capability be considered, <u>then</u> ASU and production.

i. In paragraph 8, <u>Conclusions</u>, COMOPTEVFOR answers the fundamental questions implied in paragraph 1, as is indicated by the thin horizontal arrows toward to top of Figure 12-1; he provides his conclusions on operational effectiveness and operational suitability.

j. In paragraph 9, Recommendations, COMOPTEVFOR addresses the reason for this OT&E -- the up-coming program decision. If COMOPTEVFOR recommends against the equipment (e.g., against ASU), he recommends what should be done instead (e.g., program cancellation; fix and retest).

k. The enclosure to the letter provides substantiating detail (primarily in results) and additional recommendations of interest primarily to the DA.

1205. Fundamentals of Writing an Evaluation Report

a. Be familiar with this Guide -- particularly with paragraph 1206.

b. Read recent reports -- particularly any on similar systems -- to get a feel for how it's done.

c. Write the enclosure first. A lot of it (equipment description, background, test procedures, methods of analysis, etc.) can be lifted out of the Test Plan. The main effort is adding the results to the various E-tests and S-tests.

d. When that has been done -- sit back and think what it means. Do the results indicate operational effectiveness and operational suitability? What are you going to propose as recommendations? You must have these in your head before you go on to the next step.

e. Write the letter.

(1) Make it Admiral-to-Admiral. And assume the Admiral on the receiving end has only general familiarity with the warfare area the report covers -- if it's a report on aircraft, assume the Admiral reading it came out of destroyers. If you make this assumption -- and remember it while you're writing -- you'll avoid trade jargon and the alphabet soup of too many acronyms.

(2) Concentrate on the logic of what you're writing. Key the results to objectives, and make sure results substantiate conclusions and make recommendations obvious. Make sure results are results -- "The radar was not effective in AAW" is a conclusion; "The radar detected only two targets in 117 valid detection opportunities" is a result.

f. Let the letter sit for a day or two. Then read it for clarity. Fix what needs fixing. Then test the letter using the Letter Report Checklist of paragraph 1208. Fix what needs fixing. Then edit the letter for conciseness.

g. Go back to the enclosure. Eliminate duplication in Equipment Description, Background, etc. using "See basic letter." Test the enclosure against the Enclosure Checklist of paragraph 1208. Fix what needs fixing. Edit for conciseness.

1206. Format and Contents of Evaluation Reports. The format of Reports, Partial Reports, and Summary Reports is illustrated in the following pages, along with guidance regarding content and desired level of detail. In the example which follows, standard headings and samples of content are presented in normal type. Explanatory comments are in italics. Keep in mind that the example is a guide -- it's not holy -- but don't change format unless it improves the report.

DEPARTMENT OF THE NAVY
Commander Operational Test and Evaluation Force
Norfolk, Virginia 23511

02:cabjr
3960(999-OT-I)
Ser XXX
1 January 1978

CLASSIFICATION*

From: Commander Operational Test and Evaluation Force
To: Chief of Naval Operations

Subj: Initial Operational Evaluation of the New Weapons System (OPNAV Report Symbol 3960-12) (*)

For an OPEVAL report, delete the word "Initial." For OT-III or OT-IV, replace "Initial" with "Follow-on."

Ref: (a) (Secret) COMOPTEVFOR XXXXXXZ Mar 1977

Keep the references in the letter to an absolute minimum. References are lettered consecutively in the order in which they appear in the text.

Encl: (1) (Classification) CNO Project 999-OT-I Report Details (*)

1. (*) Purpose. This report provides COMOPTEVFOR's initial operational evaluation of the New Weapons System, performed under CNO Project 999-OT-I. The purpose of the evaluation was to assess the potential operational effectiveness and operational suitability of the New Weapons System, and its readiness for full-scale development. The evaluation was based on results of operational tests conducted under Project 999-OT-I, supplemented by results of DT-I and operational experience. This report cancels and supersedes reference (a), the Quick-look Report.

This is the form of the paragraph. The author must adjust it as necessary for accuracy.

1. For an OPEVAL report, "to assess the potential" becomes "to determine;" "full-scale development" becomes "approval for service use and production."

DOWNGRADING STATEMENT *If required and not on cover sheet.*

CLASSIFICATION*

**If applicable, insert appropriate classification. Do not use on UNCLASSIFIED reports.*

2. For FOT&E, replace the second sentence with "The purpose of the evaluation was to determine the operational effectiveness and operational suitability of the production configuration of the New Weapon System, and its readiness for full-rate production."

3. For a Summary Report, change the lead-in to read "This summary report provides...." There probably won't be a Quick-look to reference, but each Partial Report should be referenced.

4. For a Partial Report, use a Purpose paragraph with the following form:

1. (*) Purpose. This reports the fifth phase of COMOPTEVFOR's initial operational evaluation of the New Weapons System, performed under CNO Project 999-OT-I. The purpose of the overall evaluation is to assess the potential operational effectiveness and operational suitability of the New Weapons System, and its readiness for full-scale development. The fifth phase of the evaluation concentrated on New Weapons System performance in the presence of target decoys and chaff. The evaluation was based on results of operational tests conducted under Project 999-OT-I, supplemented by operational experience.

2. (*) Equipment Description. The New Weapons System is a .... designed to provide surface ships with a capability to detect, track, and destroy .... Major components include .... Details are provided in enclosure (1).

This paragraph may be titled System Description if more appropriate to the test item.

This paragraph provides a brief statement of the important functions/characteristics of the equipment or system which was tested. View this statement as a reminder to 3-star readers who have already been exposed to the equipment.

3. (*) Background. The New Weapons System is being developed to counter the projected .... threat. Development testing (DT-I) was conducted at a land-based test site and in USS .... in 1976. While DT-I results were generally satisfactory, deficiencies were identified in the system's capability to .... As a result, the system was modified to include a .... for OT-I.

This paragraph summarizes in a concise narrative the major events which led to the testing being reported. As appropriate to the particular report, this paragraph includes the requirement for the equipment, deficiencies or inadequacies identified in previous testing or in operation, and major development milestones.

4. (*) Scope

a. (*) Objectives. The objectives of Project 999-OT-I were to:

(1) (*) Determine that the ..... can detect .... at operationally useful ranges.

(2) (*) Determine the capability of the system to track .... in clear and countermeasures environments.

(3) (*) Determine the potential target kill probability of the ....

(4) (*) Assess the potential reliability, maintainability, and availability of the system.

(5) (*) Assess the potential of the .... to be supported logistically in the fleet.

(6) (*) Assess the potential compatibility and interoperability of the ....

(7) (*) Make a preliminary assessment of training planned for fleet operators and maintenance personnel.

These are the objectives as stated in the Test Plan. In a Partial Report, the objectives will be those of the particular phase being reported. In a Summary Report, or in a Report, they will be the complete objectives of the phase (e.g., OT-I).

b. (*) Evaluation Criteria. CNO specified that the New Weapons system meet the following criteria in OT-I:

(1) (*) Detection Range: XXX m (YYY yards).

(2) (*) Tracking Capability: X targets simultaneously.

(3) (*) ....

Include here the appropriate thresholds for the required operational characteristics of the TEMP.

Note that each criterion listed here is addressed either in Limitations to Scope or in Results in the letter. If the actual criteria are in such detail as to be inappropriate to report to decision-makers on (e.g., detailed environmental criteria for safe storage of ordnance), then summarize them here (e.g., adequate environmental control for ....), report results at that level, and put the details in the enclosure.

And don't include criteria which simply repeat objectives -- they should amplify objectives, usually with numbers.

c. (*) Limitations to Scope. *List here the limitations to the evaluation which tend to add qualifiers to the results, conclusions, and recommendations. These limitations include those predicted in the Test Plan, and those imposed by unpredicted circumstances encountered during testing. Limitations should be expressed so that their import is readily understood, e.g., "Since testing was limited to the tropics, system performance in cold climates could not be evaluated." Keep in mind that these represent limitations to the evaluation after it's all over. They have nothing to do with how hard it was to get services, or how long it took. If the job of evaluating got done, there are no limitations.*

5. (*) Project Operations. Project operations were conducted in USS .... from 13 November to 20 December 1977. The New Weapons System was exercised in simulated .... engagements against single and multiple .... Twenty engagements were conducted, 10 with four simultaneous targets; XX rounds of .... were expended. All targets employed ECM (electronic countermeasures).

This paragraph is a brief narrative description of what was done to accomplish the objectives. It includes such significant information as number of firings, total hours of equipment operation, etc., and identifies the major fleet service(s) provided. Details of services provided are contained in the enclosure.

6. (*) Results. Details of tests and results are contained in enclosure (1). Major test results are listed below:

Results are presented in the same order as the objectives. They address all objectives (and associated evaluation criteria) unless Limitations to Scope excludes one or more.

a. (*) Detection Capability. The capability of the New Weapons System to detect threats of interest is summarized in Table 1.

Table 1 (*)

Detection Capability (*)

b. (*) Tracking Capability................

c. (*) Target Kill Capability...............

d. (*) Reliability....................

e. (*) Maintainability..................

f. (*) Availability...................

g. (*) Logistics Supportability................

h. (*) Compatibility......................

i. (*) Interoperability......................

j. (*) Training..................

7. (*) Conclusions

a. (*) The New Weapons System has the potential to be operationally effective, based on its demonstrated ability to destroy ....

b. (*) The New Weapons System has the potential to be operationally suitable, provided that ....

Normally, in a well-written report, conclusions follow directly from test results. When this is not the case, precede the Conclusions paragraph with an Operational Considerations paragraph, as discussed in paragraph 1204.h.

8. (*) Recommendations

a. (*) Approve the New Weapons System for full-scale development.

b. (*) Incorporate the following changes into the New Weapons System:

According to DOD Directive 5000.3, one of the purposes of OT&E is to identify the need for any modifications. It is proper, therefore, to make recommendations for hardware changes that will increase operational effectiveness and/or operational suitability. However, care must be taken to avoid usurping the DA's responsibility. Avoid recommending a specific modification such as adding a 10-ohm resistor; there may be a better way to accomplish the fix. If reference to a 10-ohm resistor will help the DA understand the nature of the required modification, recommend a modification "such as a 10-ohm resistor in ...." Also avoid usurping the decision-making authority's responsibility to consider cost tradeoffs. In the case where a modification coula provide a capability not designed into the equipment, do not recommend its incorporation. Rather, recommend "Consider incorporating.............."

It is proper to make recommendations regarding the need for future testing (FOT&E, for example).

c. (*) Incorporate the additional recommendations of enclosure (1) section 6.

If there are additional detailed recommendations on deficiencies that require correction or potential improvements that warrant investigation, these are referred to here.

When making recommendations as the result of an OPEVAL, use the following order.

1. Recommendation regarding ASU.

2. Recommendation regarding production, unless the first recommendation is to grant full ASU. When full ASU is not recommended, specify COMOPTEVFOR's recommendation as to production (e.g., do not go into production, produce only long-lead items, procure under a waiver of ASU, etc.).

3. Recommended correctiv· action.

4. Recommendation regarding future OT&E.

SIGNATURE

Copy to:
SECNAV (ASN/R, E&S)
(ASN/S&L)
CNO (OP-090)
(OP-90)
(OP-96)
(OP-094) *(For C3 Systems)*
(OP-095) *(For ASW Systems)*
(OP-098)
(OP-98__) *(Cognizant RDT&E Division Director)*
(OP-983) (3)
(OP-13) *(If significant training or manpower implications)*
(OP-0__) *(Program Sponsor (DMSO or DCNO))*
(OP-___) *(Cognizant Division Director(s) under Sponsors)*
(OP-___) *(Program Coordinator (when assigned))*
(OP-04) *(Where OPN procurement is involved)*
R) CHNAVMAT (MAT-00)
(MAT-04)
(MAT-06)
(MAT-08D2)
(MAT-08D1) *(For NAVSEA programs only)*
(MAT-08D4) *(For NAVAIR programs only)*
(MAT-08D5) *(For NAVELEX programs only)*
(PM-___) *(Cognizant PM, if there is one)*
(PM-___) *(Other interested PMs, if any)*
(PM-4) *(For ASW Systems)*
COMNAV___SYSCOM (___-00) *(Cognizant Commander)*
(___-__) *(Cognizant Deputy or Assistant Commander)*
(___-__) *(Cognizant Acquisition Manager)*
(PM_-__) *(Cognizant PMS, etc., if there is one)*
( ) *(Others from standard distribution below)*
COMNAVSEASYSCOM (SEA-90E)
(SEA-93) *(For surface warfare combatant ship systems)*
(SEA-94) *(For CV, amphib, and auxiliary ship systems)*
COMNAVAIRSYSCOM (AIR-00)
(AIR-06)
R) COMNAVELEXSYSCOM (ELEX-05E)
(ELEX-832) *(OPEVAL reports)*
CINCLANTFLT
CINCPACFLT
CINCUSNAVEUR

Copy to: (Cont'd)
COM___LANT (*Cognizant type commanders*)
COM___PAC (*May be more than one in each Fleet*)
Participating Fleet units, including any Project Ships and their ISICs
DEPCOMOPTEVFORPAC
COMSURFWARDEVGRU (*For projects related to surface warfare*) (R
COMSUBDEVRON TWELVE (*For projects related to submarine warfare*)
CO, AIRTEVRON ___ (*For projects prosecuted by a VXRON*)
OIC, OPTEVFORDET SUNNYVALE (*For projects prosecuted by SUNTEVDET*)
________________ (*Developing Navy Laboratory or Center*)
CO, NAVSHIPWPNSYSENGSTA (Code 6000)
COMNAVSHIPENGCEN (Code 6179F)
OIC, NAVDET/AFEWC (*Electronic warfare OPEVAL reports*)
CO, NAVEDTRASUPPCENPAC (*For project involving acoustic sensors*)
NAVSEACENLANT DET (Code OOA) (*For ordnance and fire control system OPEVAL reports*)
PRESINSURV
PRESNAVWARCOL
CO, SWOSCOLSCOM
CNET
CNA
COMFLETRAGRU GTMO
CO, FLETRAU LCREEK
DTIC (2) (*Always last on this part of the distribution list*)

Copy to (w/o enclosure (1)): (*Eliminate entries that are repeats from first part of list*)
COMNAVAIRPAC
COMNAVAIRLANT
COMNAVSURFLANT
COMNAVSURFPAC
COMSUBLANT (*Note: This list was directed by the VCNO*)
COMSUBPAC
COMNAVFORCARIB
COMNAVFORJAPAN
COMNAVFORMARIANAS
COMNAVFORKOREA
COMMIDEASTFOR

R) Copy to (w/o enclosure (1)): (Cont'd)
COMMILSEALIFTCOM
COMSECONDFLT
COMTHIRDFLT
COMSIXTHFLT
COMSEVENTHFLT
CG FMFLANT
CG FMFPAC
COMCARGRU ONE, TWO, THREE, FOUR, FIVE, SIX, SEVEN, EIGHT
COMCRUDESGRU ONE, TWO, THREE, FIVE, EIGHT, TWELVE
COMSUBGRU TWO, FIVE, SIX, EIGHT
COMTRALANT
COMTRAPAC
COMSERVGRU TWO
COMPHIBGRU ONE, TWO
COMPHIBGRUEASTPAC
COMASWWINGSPAC
COMPATWINGSLANT
COMSEABASEDASWWINGSLANT
COMPATWINGSPAC
COMTACWINGSLANT
COMFITAEWWINGPAC
COMMATVAQWINGPAC
COMFAIRMED
COMFAIRWESTPAC
COMICEASWGRU
USCOMSOLANT
COMINEWARCOM
COMNAVSURFGRUWESTPAC
COMNAVSURFGRUMIDPAC
CNATRA
CNTECHTRA
CO, AIRTEVRON ONE, FOUR, FIVE
OIC, OPTEVFORDET SUNNYVALE

If the Evaluation Report has no enclosure, merge the two lists, with DTIC last on the combined listing.

CLASSIFICATION*

CNO PROJECT 999-OT-I REPORT DETAILS (*)

(CNO PROJECT 999-OT-I FIFTH PARTIAL REPORT DETAILS (*))

DOWNGRADING STATEMENT

Enclosure (1)
CLASSIFICATION*
REVERSE, BLANK

Contents (*)

Acronyms and Abbreviations (*)

A_O	Operational Availability
MTBF	Mean Time Between Failures
R	Reliability

Acronyms should be defined (spelled out) on the first occurrence in the text, and listed here. Two methods of spelling out are allowed by the Navy Correspondence Manual, i.e., CIC (Combat Information Center) or Combat Information Center (CIC). The former method (acronym first) is used by COMOPTEVFOR.

Acronyms for naval activities included in the Standard Naval Distribution List (which includes almost every activity) need not be spelled out or listed on the acronym page. The Operational Test Director is not precluded from spelling out and listing such acronyms, however, if readability will be improved (e.g., acronyms for obscure activities).

Acronyms which are defined (spelled out) in the letter need not be spelled out again in the enclosure, except on this page.

References (*)

(a) (Secret) COMOPTEVFOR XXXXXXZ Mar 1977, Quick-look Report on IOT&E of New Weapons System (U)

(b) ....

If references were used in the letter, list them here with the same letter designations, followed by the first new reference used in the enclosure, etc.

Section 1

<u>Description of Material</u> (*)

The purpose of this section is to provide information required for completeness, but not necessary in the body of the letter. Examples of typical subparagraph titles which may be required in this section include:

101. <u>Description of Equipment</u>. Provides details that might be useful at some later date -- e.g., details regarding the test installation, details on how the test system differed from the proposed production system, details on the threat simulators or targets that were used in the testing. View this subparagraph as a repository for equipment-related facts that might be useful to someone trying to determine the source of an equipment anomaly later on in a deployed system. Do <u>not</u> repeat the equipment description in paragraph 2 of the basic letter.

102. <u>Equipment Operation</u>. Records, for possible future use, the level of skill and general procedures used for equipment operation during testing. Specifies any differences between operating procedures used during testing and those planned for deployed systems.

103. <u>Maintenance</u>. Records the same type of information as in 102 above, only for maintenance, as opposed to operation.

104. <u>Training</u>. Summarizes the formal and on-the-job training provided to operators and maintenance personnel, and shows the relationship between this training and that planned for fleet personnel on production equipment.

105. <u>Technical Documentation</u>. Lists the various operator and maintenance manuals and tactical guidelines used during the testing.

If the basic letter says it all, include this section with the notation "(See basic letter)" directly under "Description of Material."

Section 2

Project Background (*)

Provides necessary information that supplements (but does not repeat) paragraph 3 of the basic letter. For example, in an OPEVAL report, results of TECHEVAL that are pertinent to the OPEVAL may be listed here. If it is not necessary to supplement paragraph 3 of the basic letter, include this section with the notation "(See basic letter)" directly under "Project Background."

Section 3

Scope of Evaluation (*)

301. (*) Evaluation Criteria. In addition to the major criteria listed in the basic letter, TEMP 999 provided the following criteria:

a. (*) Effectiveness

(1) (*) Angular resolution -- Y° (X square meter targets).

(2) (*) Range resolution -- X m (Y yds).

(3) (*) ....

b. (*) Suitability

(1) (*) ....

This paragraph expands on the criteria in the basic letter, including the more minor criteria.

If no expansion is necessary, use "301. (*) Evaluation Criteria. See basic letter."

302. (*) Test Chronology. Project operations commenced in .... on 13 November 1977. Table 3-1 summarizes the various tests including the targets and ECM used.........

This paragraph is an expansion of paragraph 5 of the basic letter. Details such as periods during which testing was suspended (including full particulars regarding any Deficiency Reports that were issued), dates of sorties/firings, etc., should be included.

Test chronology is especially important for projects that involved extensive testing over long periods of time, particularly when several ranges were used or long delays were suffered because of deficiencies.

303. (*) Limitations to Scope. In addition to the major limitations cited in the basic letter, testing was limited in the following ways:

a. (*) ....

If no expansion on the basic letter is required, use "303. (*) Limitations to Scope. See basic letter."

Section 4

Tests and Results (*)

If necessary, this section may be introduced by a "General Approach" paragraph (new 401). Typical content might be a test geometry or scenario that was used throughout the testing.

401. (*) Test E-1, Low-Altitude Targets

a. (*) Object. To determine performance against low-altitude maneuvering targets in the presence of ECM.

b. (*) Procedure

This subparagraph simply tells how the equipment was operated and how the data were gathered.

It may be lifted out of the Test Plan; usually it is possible to summarize the procedure of the Test Plan, however. For example, the Test Plan may identify specific data sheets, recordings, etc, to be used. In the report it is usually sufficient to say that data were recorded manually or automatically, etc.

c. (*) Data Analysis

This subparagraph describes how the data were analyzed, including significant assumptions and mathematical relationships and definitions of such significant factors as success/failure/no-test, material failures and failure categories, and up and down times. This subparagraph is also based on an equivalent subparagraph in the Test Plan.

d. (*) Results and Discussion

(1) (*) In 38 attempted penetrations, targets were detected at an average range of ... (criterion: $\geq$ ...).

(2) (*) Following detection, track was established on ....

These are the clear, unambiguous results of testing and analysis. Some aids in preparing them follow:

(1) Write them in the past tense, and emphasize numbers rather than adjectives -- these two things will help you keep conclusions from creeping in. (Conclusions do not belong in the enclosure.)

(2) Don't let recommendations creep in. "With normal lighting in the space, operators had difficulty reading the display" is a result -- it will support an "additional recommendation" later in the enclosure that "action be taken to improve the readability of the display." Don't foul up the "results" section by putting a recommendation here -- instead, identify the deficiency here (e.g., "A need was identified for a ...."), in the past tense; save the recommending for later.

(3) Summarize the data base rather than presenting a mass of raw data, but don't summarize so much that you leave out numbers completely. For example, consider a test whose object is to determine the range at which detection occurs; the data base consists of 120 runs of a target against the detection device. It is usually not necessary to provide a tabulation of the detection range in each of the 120 runs. (If it is desirable to publish these run-by-run data, an annex is a better place to put them.) It is usually sufficient to provide a mean detection range, or a set of means as functions of specified variables (e.g., with or without active jamming), and to specify the size of the data base. But don't go beyond this summarization and attempt to pass off a conclusion such as "The system demonstrated the capability to detect at operationally useful ranges." Don't throw away MOEs and MOSs in favor of adjectives.

(4) When the data base consists of questionnaires filled in by test personnel, remember that the results that are being reported are <u>results of analysis</u> of these questionnaires, and analysis is a COMOPTEVFOR function -- not a function to be performed by a reader of the report. For this reason, do not use statements such as "Two of four pilots commented that ...." This statement says we didn't do our job of analysis and follow-up (interviews, etc.) to find out whether the comments are valid or not. COMOPTEVFOR should report that a certain condition existed, not that a certain percentage of people thought it did.

(5) When reporting results with "demonstrated" values and estimates at a confidence level, use the following format -- it avoids analytic jargon (e.g., the lower one-sided...):

R) "The demonstrated MTBF of system X was 227 hours (criterion: $\geq$ 200 hours), based on two failures in 454 hours of operation. At the 80% confidence level, the actual MTBF is at least 105 hours."

R) (6) When you compare a demonstrated value to an evaluation criterion, avoid a potentially misleading statement such as "exceeded the criterion." It is true that the thoughtful reader of "The demonstrated MTTR was 2 hours, which exceeded the 0.5-hour criterion" will realize that repair took too long. A hurried reader, however, may draw a quick, wrong conclusion -- particularly if he's used to thinking about MTBF and A_o, which are better when bigger. Instead, say "The demonstrated MTTR was 2 hours (criterion: $\leq$ 0.5 hour)."

(7) The total results of this section of the enclosure should completely substantiate the results in the basic letter. But the way the results are presented may differ between the two parts of the report because of layout. Results in the enclosure are organized by E- and S-tests; results in the basic letter are organized by objective.

9-4

Section 5

Operational Considerations (*)

This section is optional. If it is not used, assign section number 5 to the next section.

The purpose of this section is to:

(1) Amplify the Operational Considerations presented in the basic letter, when that is necessary. (Note that use of an Operational Considerations paragraph in the basic letter does not *make use of this section mandatory.)*

(2) Provide the rationale for Additional Recommendations in the next section that are based on operational thinking rather than on test results presented in Section 4.

Section 6

Additional Recommendations (*)

601. (*) Additional Recommendations.

a. (*) Provide operating procedures that:

(1) (*) Contain pictorial layouts.

(2) (*) Conform to MIL-M-15071G (NAVY) in form and format.

(3) (*) ....

b. (*) Make the following changes:

(1) (*) Provide a slide-open cabinet for access.

(2) (*) Replace fasteners with easy-to-operate captive fasteners.

(3) (*) ....

c. (*) Investigate the feasibility of:

(1) (*) Adding a tape reader at Station No. 2.

(2) (*) Using a standard Navy lubricant instead of the proprietary lubricant that was required by the test system.

This is also an optional section. (Note that if there is no Operational Considerations section, this section is numbered Section 5.) The purpose of this section is supplement paragraph 9 of the basic letter with recommendations that are not individually of interest at the decision-making level.

Section 7

Services Provided (*)

This section provides a record for future use in estimating costs of OT&E. Include here in tabular or other convenient form the services provided during the phase of testing being reported. Services include such things as dedicated and not-to-interfere ship support, test aircraft, targets, and operating personnel. One page should usually suffice to record this information.

Annex A

Instructions for Annex Writing

Annexes present material pertinent to the evaluation, but not appropriate for inclusion in enclosure (1) because of length or detail. Such material would be individual firing summaries, as opposed to the integrated and summarized data presented in Section 4. Pertinent reports from other commands, etc., may be included.

Annexes must be referred to in the text of the enclosure, and listed on the contents page.

CLASSIFICATION

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER 999-OT- I	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) COMOPTEVFOR REPORT ON CNO PROJECT 999-OT-I, Initial Operational Evaluation of the New Weapons System (OPNAV Report Symbol 3960-12)		5. TYPE OF REPORT & PERIOD COVERED (Final) (Partial) 20 NOV - 30 DEC 1977 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) COMOPTEVFOR (Commander Operational Test and Evaluation Force)		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS COMOPTEVFOR Naval Base Norfolk, VA 23511		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS Chief of Naval Operations Navy Department Washington, DC 20350		12. REPORT DATE (Assigned by Mail Room) 13. NUMBER OF PAGES 34
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)		15. SECURITY CLASS. (of this report) CLASSIFICATION 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE REVIEW/DECL ON (DATE)

R)

16. DISTRIBUTION STATEMENT (of this Report)

Distribution limited to U.S. Government Agencies only; Test and Evaluation Document dated . Other requests for this document must be referred to Chief of Naval Operations (OP-098), Navy Department, Washington, DC 20350 via Defense Documentation Center using DDC Form 55.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

(*) A brief summary prepared by the OTD. It is most easily prepared by combining paragraph 1 (Purpose) and 8 (Recommendations) of the basic letter.

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE
(Change 1) S/N 0102-LF-014-6601

CLASSIFICATION

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

1207. The Quick-look Report

a. Usually a Quick-look Report and the letter of the Report which cancels and supersedes it will be essentially identical. When you have written the first, the second is almost done -- there is usually no need to rephrase "Equipment Description" etc. -- just add the "the's" and whatnot to make prose out of the message. If substantive differences will exist between the two -- e.g., if post-Quick-look failure analysis causes reliability figures to change -- these differences must be identified and explained in the letter. For example "The demonstrated MTBF of system X was 227 hours, based on... This MTBF is less than was reported in reference (a) because one failure was detected during data analysis after reference (a) had been issued. At the 80% confidence level, the actual MTBF is at least 86 hours."

b. A sample Quick-look Report is provided on the following pages.

ROUTINE

R150422 JUL 88

FM COMOPTEVFOR NORFOLK VA

TO CNO WASHINGTON DC

INFO CHNAVMAT WASHINGTON DC COMNAVSURFLANT NORFOLK VA
CINCLANTFLT NORFOLK VA COMSECONDFLT NORFOLK VA
USS HEWES NWC CHINA LAKE CA

UNCLASSIFIED//N03960//

QUICK-LOOK REPORT OF OPEVAL OF SHIPBOARD CERBERUS MISSILE SYSTEM

A. NWC REPORT TR-XXX OF 28 SEP 86

B. COMOPTEVFOR LTR SER YYY OF 21 JUN 86

C. TEST AND EVALUATION MASTER PLAN NO. XXX OF 17 MAR 86

1. SUMMARY. THIS IS QUICK-LOOK REPORT ON OPEVAL (OPERATIONAL EVALUATION) OF SHIPBOARD VERSION OF CERBERUS MISSILE SYSTEM, PERFORMED UNDER CNO PROJECT XXX-OT-IIA. BASED ON COMPLETE PERFORMANCE ANALYSIS AND PRELIMINARY, INCOMPLETE SUITABILITY ANALYSIS, SHIPBOARD CERBERUS DETERMINED TO BE OPERATIONALLY EFFECTIVE AND POTENTIALLY OPERATIONALLY SUITABLE. PROVISIONAL APPROVAL FOR SERVICE USE AND LIMITED PRODUCTION RECOMMENDED. END SUMMARY.

2. SYSTEM DESCRIPTION

A. CERBERUS MISSILE SYSTEM IS ANTI-SURFACE-SHIP WEAPON SYSTEM CONSISTING OF 150-NMI-RANGE AIR-BREATHING RF/IR (RADIO FREQUENCY/INFRARED) HOMING MISSILE, WEAPONS CONTROL SYSTEM, AND LAUNCHER. CERBERUS HAS THREE VARIANTS: SHIP-, AIR-, AND SUBMARINE-LAUNCHED. THIS TESTING WAS OF SHIP-LAUNCHED CERBERUS INSTALLED USS HEWES (FF 1078).

B. CERBERUS IS TARGETED FROM EXTERNAL SOURCES (NTDS (NAVY TACTICAL DATA SYSTEM) IN HEWES). ALIGNMENT DATA FOR MISSILE'S INERTIAL MIDCOURSE GUIDANCE SYSTEM ARE PROVIDED BY SINS (SHIP'S INERTIAL NAVIGATION SYSTEM). NTDS AND SINS DATA ARE PROCESSED BY WEAPONS CONTROL SYSTEM'S LCC (LAUNCH CONTROL CONSOLE), WHICH CALCULATES FLIGHT PATH TO DESIGNATED TARGET THAT MINIMIZES CHANCES OF HITTING FORBIDDEN TARGETS EN ROUTE, AND PROGRAMS MISSILE ACCORDINGLY. LAUNCH IS OPERATOR-INITIATED AT LCC. FOR THIS TESTING, TWO-TUBE LAUNCHER WAS MOUNTED FORWARD IN HEWES.

3. BACKGROUND

A. CERBERUS MISSILE SYSTEM WAS DEVELOPED IN RESPONSE TO OPERATIONAL REQUIREMENT OR-007X.

B. OT&E {OPERATIONAL TEST AND EVALUATION} OF CERBERUS BEGAN IN 1984 {OT-I}. LCC TARGETING AND INITIALIZATION CAPABILITIES WERE VERIFIED, AS WERE MILESTONE II THRESHOLDS FOR ON-BOARD SYSTEM RELIABILITY, MAINTAINABILITY, AND AVAILABILITY.

C. MISSILE SURVIVABILITY DURING FLIGHT WAS ASSESSED AS HIGH BY NWC CHINA LAKE IN REF A.

D. CAPABILITY OF EXTERNAL SOURCES TO PROVIDE TARGETING DATA WAS VERIFIED IN RELATED OT&E UNDER CNO PROJECT YYY-OT-IIB {SEE REF B}.

E. CERBERUS OPEVAL BEING CONDUCTED IN THREE CONCURRENT PHASES: OT-IIA FOR SHIPBOARD VERSION, OT-IIB FOR AIR-LAUNCH, OT-IIC FOR SUB-LAUNCH.

4. SCOPE

A. OBJECTIVES. OBJECTIVES OF PROJECT XXX-OT-IIA WERE TO DETERMINE:

{1} PROBABILITY THAT SYSTEM WILL BE AVAILABLE, LAUNCH, AND DETONATE ON DESIRED TARGET.

{2} CAPABILITY OF SYSTEM TO READY CERBERUS FOR LAUNCH AT DESIRED TIME.

{3} CAPABILITY OF MISSILE TO HIT TARGET.

{4} PROBABILITY OF NOT HITTING FORBIDDEN TARGET.

{5} PROBABILITY OF WARHEAD DETONATION {GIVEN HIT}.

{6} SURVIVABILITY/VULNERABILITY OF SYSTEM.

{7} ADEQUACY {VALIDATION} OF CERBERUS FLIGHT SIMULATION.

{8} SYSTEM RELIABILITY, MAINTAINABILITY, AND AVAILABILITY.

{9} LOGISTICS SUPPORTABILITY IN, AND COMPATIBILITY WITH, SHIPBOARD ENVIRONMENT.

{10} INTEROPERABILITY WITH NTDS AND SINS.

{11} ADEQUACY OF PLANNED TRAINING.

{12} TRANSPORTABILITY OF CERBERUS MISSILE, AND MISSILE SAFETY IN SHIPBOARD STORAGE.

{13} ADEQUACY OF HUMAN ENGINEERING DESIGN.

B. EVALUATION CRITERIA. FOLLOWING CRITERIA PROVIDED REF C:

{1} OVERALL MOMS {MEASURE OF MISSION SUCCESS}: PROBABILITY OF PROPER TARGETING, LAUNCH, HITTING TARGET, DETONATION, DAMAGE ASSESSMENT -- 0.62.

{2} FOLLOWING TARGET DESIGNATION, MISSILE READIED FOR LAUNCH IN 30 SECONDS OR LESS WITH PROBABILITY OF 0.95.

{3} GIVEN LAUNCH, PROBABILITY OF HITTING TARGET -- 0.74.

{4} PROBABILITY OF NOT HITTING FORBIDDEN TARGET -- 0.95.

{5} GIVEN HIT, PROBABILITY OF WARHEAD DETONATION -- 0.95.

{6} MISSILE SURVIVAL RATE IN LAUNCHER/MAGAZINE STORAGE -- 0.80 FOR 8 MONTHS.

{7} ON-BOARD SYSTEM 8-HOUR MISSION RELIABILITY -- 0.984.

{8} ON-BOARD SYSTEM MTTR {MEAN TIME TO REPAIR} -- 1.5 HOURS.

{9} MISSILE AVAILABILITY AT LAUNCH COMMAND -- 0.99.

{10} ON-BOARD SYSTEM OPERATIONAL AVAILABILITY -- 0.95.

C. LIMITATIONS TO SCOPE

{1} ACTUAL AND FORBIDDEN TARGETS SIMULATED BY HULKS/BARGES EQUIPPED WITH RF AND IR SOURCES. SIMULATIONS NOT FULLY REPRESENTATIVE OF ACTUAL SHIPS.

{2} PROBABILITIES OF HITTING TARGET AND NOT HITTING FORBIDDEN TARGETS ESTIMATED PRIMARILY ON BASIS OF NON-FIRING EXERCISES AND COMPUTER SIMULATION.

(3) PROBABILITY OF PROPER DAMAGE ASSESSMENT NOT TESTED. ASSUMED TO BE 1.00 IN MEASURE OF MISSION SUCCESS CALCULATIONS.

(4) EFFECTS OF ENVIRONMENTAL EXTREMES NOT TESTED.

5. PROJECT OPERATIONS

A. OT-IIA OPERATIONS WERE CONDUCTED ABOARD HEWES IN VIRGINIA CAPES AND ROOSEVELT ROADS OPERATING AREAS FROM 7 JUN TO 5 JUL 88.

(1) SEVENTY-EIGHT NON-FIRING EXERCISES WERE CONDUCTED. TARGETS IN NTDS DATA BASE WERE DESIGNATED, FORBIDDEN TARGETS WERE ASSIGNED, AND MISSILES WERE PREPARED FOR LAUNCH. LCC RECORDINGS OF MISSILE PARAMETERS, NTDS GROUND TRUTH, AND RECORDED SINS DATA WERE EXERCISED ON NWC'S CERBERUS FLIGHT SIMULATION PROGRAM TO RECONSTRUCT TIMING OF MISSILE PREPARATION, AND TO PREDICT PROBABLE OUTCOME OF SIMULATED LAUNCHES.

(2) THREE LIVE FIRINGS (NON-WARHEAD) WERE CONDUCTED.

(3) LCC MAINTAINED IN ALERT STATUS (OR HIGHER) FOR 620 HOURS DURING PROJECT OPERATIONS.

B. DATA FROM 22 MISSILE FIRINGS IN DT-II, OT-IIB, AND OT-IIC USED TO SUPPLEMENT OT-IIA DATA BASE FOR ANALYSIS.

C. CERBERUS FLIGHT SIMULATION PROGRAM WAS VERIFIED USING RESULTS OF LIVE SURFACE LAUNCHES IN DT/OT-II. PROGRAM WAS THEN EXERCISED APPROXIMATELY 200 TIMES TO DERIVE MOMS.

6. RESULTS

A. MISSION SUCCESS. BASED ON COMBINATION AT-SEA FIRINGS AND CERBERUS FLIGHT SIMULATION, MOMS WAS 0.72 FOR BARRIER PATROL AND TRANSIT OPERATION SCENARIOS. MOMS FOR SELECTIVE ATTACK SCENARIOS VARIED FROM 0.65 TO 0.83 (CRITERION 0.62).

B. TIME TO LAUNCH

(1) ON BASIS OF 78 NON-FIRING EXERCISES, DEMONSTRATED PROBABILITY OF LAUNCHING IN 30 SECONDS OR LESS WAS 0.97 (76 OF 78) (CRITERION 0.95). FAILURES TO MEET CRITERION (32 AND 34 SECONDS) APPEARED ASSOCIATED WITH HEWES MANEUVERING AND ROUGH SEAS, CAUSING RAPIDLY FLUCTUATING SINS AND MISSILE MIDCOURSE GUIDANCE SIGNALS.

(2) DATA ANALYSIS INDICATED TIME TO ALIGN CERBERUS MIDCOURSE GUIDANCE SYSTEM MAY BE EXCESSIVE (UP TO 30 MINUTES)

IN SOME SEA CONDITIONS. PROBLEM MAY BE ASSOCIATED WITH FREQUENCY OF WAVE ACTION; DETAILS WILL BE PROVIDED IN FORMAL EVALUATION REPORT.

C. CAPABILITY TO HIT TARGET

(1) ON BASIS OF NON-FIRING EXERCISES, ESTIMATED PROBABILITY OF HITTING TARGET (ASSUMING NO FAILURES) WAS 0.95 (74 OF 78). FOUR MISSES APPEARED ASSOCIATED WITH BOW-ON TARGET ASPECT IN ROUGH SEAS, WHICH DEFEATED IR HOMING LOGIC.

(2) ON BASIS OF 8 SURFACE LAUNCHES (INCLUDING 5 FROM DT-II), DEMONSTRATED PROBABILITY OF HITTING TARGET WAS 1.0 (CRITERION 0.74).

D. CAPABILITY TO NOT HIT FORBIDDEN TARGETS

(1) ON BASIS OF NON-FIRING EXERCISES, ESTIMATED PROBABILITY OF NOT HITTING FORBIDDEN TARGET WAS 0.99 (77 OF 78). OF 4 SIMULATED LAUNCHES THAT FAILED TO HIT DESIGNATED TARGET, 3 IMPACTED WATER CLOSE ABOARD TARGET. FOURTH OVER-FLEW TARGET AND ERRONEOUSLY ACQUIRED FORBIDDEN TARGET WITH IR SEEKER. RF SIGNAL CORRELATION DID NOT PRECLUDE HOMING, BECAUSE IR HOMING PREEMPTS RF HOMING.

(2) ON BASIS OF 7 DT/OT-II SURFACE LAUNCHES WITH FORBIDDEN TARGETS IN TARGET AREA, DEMONSTRATED PROBABILITY OF NOT HITTING A FORBIDDEN TARGET WAS 1.0 (CRITERION 0.95).

E. WARHEAD DETONATION

(1) IN 22 NON-WARHEAD FIRINGS DURING DT/OT-II, THERE WERE 21 CASES WHERE PROPER FUZING WAS VERIFIED. TELEMETRY FAILURE PRECLUDED VERIFICATION DURING ONE FIRING. BASED ON FUZE ACTUATION, ESTIMATED PROBABILITY OF WARHEAD DETONATION WAS 1.0 (21 OF 21).

(2) THREE WARSHOTS HAVE BEEN FIRED; TWO DURING DT-IIC (SUBMARINE LAUNCH), ONE DURING OT-IIB (AIR LAUNCH). ALL DETONATED, FOR A DEMONSTRATED PROBABILITY OF DETONATION (GIVEN HIT) OF 1.0 (CRITERION 0.95).

F. SURVIVABILITY/VULNERABILITY. NO MAJOR DEFICIENCIES NOTED.

G. CERBERUS FLIGHT SIMULATION. HIGH CORRELATION OF HIT/MISS WITH ACTUAL MISSILE FIRINGS.

H. RELIABILITY

{1} DURING DT/OT-II, 10 CERBERUS MISSILES {5 FOR SURFACE LAUNCH, 5 FOR AIR LAUNCH} WERE SUBJECTED TO TOTAL OF APPROXIMATELY 1020 DAYS OF SHIPBOARD STORAGE IN MAGAZINE OR LAUNCHER. ONE MISSILE FAILED {MIDCOURSE GUIDANCE}, FOR DEMONSTRATED MTBF {MEAN TIME BETWEEN FAILURES} OF 1020 DAYS. GIVEN THIS MTBF, DEMONSTRATED PROBABILITY OF SURVIVING 8 MONTHS OF STORAGE WAS 0.79 {CRITERION 0.80}.

{2} DURING OT-IIA, LCC WAS OPERATED {ALERT AND ABOVE} FOR 620 HOURS. TWO FAILURES OCCURRED {BOTH IN COMPUTER/PROCESSOR}, FOR DEMONSTRATED LCC MTBF OF 310 HOURS. LAUNCHER SUSTAINED NO FAILURES. BASED ON THESE DATA, DEMONSTRATED 8-HOUR MISSION RELIABILITY OF ON-BOARD SYSTEM WAS 0.97 {CRITERION 0.984}.

I. MAINTAINABILITY. DEMONSTRATED MTTR OF ON-BOARD SYSTEM WAS 1.2 HOURS {CRITERION 1.5 HOURS}. MTTR VALUE DERIVED FROM 2 ACTUAL REPAIR ACTIONS, AND 12 ACTIONS RESULTING FROM INSERTION OF PRE-FAULTED MODULES.

J. AVAILABILITY

{1} IN DT/OT-II, 13 MISSILES WERE SUBJECTED TO LAUNCH COMMAND IN SURFACE LAUNCHER. ALL WERE LAUNCHED SUCCESSFULLY, FOR DEMONSTRATED MISSILE AVAILABILITY AT LAUNCH OF 1.0 {CRITERION 0.99}.

{2} DURING OT-IIA, ON-BOARD SYSTEM WAS UP FOR 683 HOURS, DOWN FOR 2.5 HOURS, FOR DEMONSTRATED OPERATIONAL AVAILABILITY APPROACHING 1.0 {CRITERION 0.95}.

K. LOGISTICS SUPPORTABILITY, COMPATIBILITY, AND INTEROPERABILITY. NO MAJOR DEFICIENCIES WERE NOTED IN THESE AREAS. MINOR DEFICIENCIES WILL BE DISCUSSED IN FORMAL EVALUATION REPORT.

L. TRAINING. DRAFT NAVY TRAINING PLAN APPEARED ADEQUATE FOR OPERATORS AND MAINTENANCE PERSONNEL.

M. TRANSPORTABILITY. CERBERUS MISSILES WERE TRANSPORTED AND DELIVERED BY UNDERWAY AND VERTICAL REPLENISHMENT DURING DT-IID. NO PROBLEMS WERE NOTED.

N. SAFETY. NO SAFETY PROBLEMS ASSOCIATED WITH HANDLING, TRANSPORTING, OR STORING CERBERUS MISSILES HAVE BEEN NOTED.

O. HUMAN ENGINEERING

(1) ON LCC, SOME FUNCTIONS SHIFTED FROM ONE BUTTON POSITION TO ANOTHER AS MODE OF OPERATION CHANGED. THIS IS CONDUCIVE TO INPUT ERROR UNDER STRESS CONDITIONS.

(2) MODE/STATUS INDICATORS ON LCC WERE TOO BRIGHT. THEY OBSCURED ALPHANUMERICS AND CONTRIBUTED TO EYE FATIGUE.

7. OPERATIONAL CONSIDERATIONS

A. MISSILE RELIABILITY. ONLY MISSILE FAILURE WAS DETECTED DURING CHECKOUT ABOARD SCHEDULED LAUNCH AIRCRAFT. MISSILE HAD PASSED IDENTICAL CHECK THE PREVIOUS DAY, AFTER APPROXIMATELY 120 DAYS OF SHIPBOARD MAGAZINE STORAGE AND 18 EARLIER SUCCESSFUL ON-BOARD-AIRCRAFT CHECKS. BECAUSE THESE CHECKS MAY CONTRIBUTE TO MISSILE FAILURES, AND BECAUSE RATE OF THESE CHECKS EXCEEDED ANTICIPATED OPERATIONAL CHECKOUT RATE OF ONE PER 30 DAYS, FAILURE TO MEET 8-MONTH MISSILE SURVIVAL RATE (0.79 VERSUS 0.80 CRITERION) NOT CONSIDERED SIGNIFICANT.

B. ON-BOARD SYSTEM RELIABILITY. ACCORDING TO CONTRACTOR, BOTH LCC COMPUTER/PROCESSOR FAILURES MAY HAVE HAD IDENTICAL CAUSE (OVERLOADED TRANSISTOR IN TIMING CIRCUIT). BOTH FAILURES HAVE BEEN REPRODUCED, AND FIX HAS BEEN INSTALLED AND VERIFIED IN CONTRACTOR'S LABORATORY.

8. CONCLUSIONS. SHIPBOARD VERSION OF CERBERUS MISSILE SYSTEM:

A. IS OPERATIONALLY EFFECTIVE, BASED ON DEMONSTRATED CAPABILITY TO HIT DESIGNATED TARGETS WHILE AVOIDING FORBIDDEN TARGETS.

B. HAS POTENTIAL TO BE OPERATIONALLY SUITABLE, PROVIDED LCC RELIABILITY AND HUMAN ENGINEERING DEFICIENCIES ARE ELIMINATED.

9. RECOMMENDATIONS

A. PROVISIONALLY APPROVE SHIPBOARD CERBERUS MISSILE SYSTEM FOR SERVICE USE AFTER:

(1) ENSURING THAT CAUSE(S) OF LCC COMPUTER/PROCESSOR FAILURES HAS BEEN ELIMINATED.

(2) ELIMINATING FUNCTION SHIFT ON LCC BUTTONS DURING MODE CHANGES.

(3) REDUCING INTENSITY OF LCC MODE/STATUS INDICATORS (SUGGEST A DIMMER SWITCH).

B. PROCEED WITH PLANNED FY88 BUY OF SHIPBOARD CERBERUS MISSILE SYSTEMS.

C. CONDUCT OT-III AS PREREQUISITE TO APPROVAL FOR SERVICE USE, TO VERIFY SYSTEM OPERATIONAL SUITABILITY.

D. INVESTIGATE POSSIBILITY THAT MISSILE ALIGNMENT TIMES MAY BE EXCESSIVE IN SOME SITUATIONS.

BT

1208. Using Contractor Support in Writing Reports

a. If you use contractor support in writing reports, make sure the contractor has an up-to-date copy of this Guide -- so he knows how the report should be written.

b. Emphasize to him that on this job there's no payment by the pound.

c. Review the product as it is being produced to make sure it's on track.

d. Tell him not to hesitate to call/visit the Staff Technical Editor if he has a problem.

1209. Preparing and Staffing Reports on DEPCOMOPTEVFORPAC Projects. In order to minimize the time required to process reports on projects assigned to DEPCOMOPTEVFORPAC, the following procedures are used:

a. During project operations, and upon their completion, the Headquarters OTC visits Deputy to become aware of preliminary results. As appropriate, areas of concern in the Evaluation Report are discussed.

b. When Deputy has a working draft of the report, as many Deputy staff members as are required come to Headquarters, and a common working draft is prepared. This working draft is reviewed in parallel in the Headquarters, through the 02 level.

c. The common working draft will be returned to Deputy. Any remaining issues will be resolved by the Deputy Commander with the Force Commander before he issues the recommended draft for signature.

1210. Checklists. The attached sheets are designed to help the OTD avoid some of the most frequent report errors.

QUICK-LOOK CHECKLIST

1. Summary paragraph actually summarizes, including conclusions and recommendations. ( )

2. Equipment description says what the thing is supposed to do. ( )

3. Background says why someone thinks the Navy needs the thing. ( )

4. Objectives are listed in the proper order (operational effectiveness ones first, then reliability, maintainability, etc.). ( )

5. Limitations are <u>limitations to the evaluation</u>, not how hard it was. ( )

6. Evaluation criteria are in the same order as objectives. ( )

7. Testing gives an idea of the way testing was conducted (scenarios), and how much was done (number of bombs, etc.). ( )

8. Results address objectives (and associated criteria) in the same order as they are presented. ( )

9. All objectives (and criteria) are addressed, except as noted in limitations to scope. ( )

10. If operational considerations are included, they assist in going from results to conclusions and recommendations. ( )

11. Conclusions address operational effectiveness first, then operational suitability. ( )

12. Conclusions derive from results -- no hardware mentioned for the first time, no discrepancies identified for the first time, etc. ( )

13. Recommendations address the milestone (full-scale development, production, etc.). ( )

14. Recommendations derive from conclusions. ( )

LETTER REPORT CHECKLIST

1. Purpose is the standardized paragraph of the sample report in the OTD Guide. ( )

2. Equipment description emphasizes the function of the equipment, and how equipment tested differed from the planned configuration. ( )

3. Background summarizes key elements of the development, with emphasis on results of prior T&E. ( )

4. Objectives are in the proper order (operational effectiveness, first, followed by operational suitability objectives (reliability, maintainability, etc.) ( )

5. Evaluation criteria quantify (and do not simply repeat) objectives. ( )

6. Limitations to scope clearly describe actual limitations to the evaluation. ( )

7. Project operations provides insight into the operational realism and amount of testing. ( )

8. Results are keyed to objectives, in the same order as objectives, and address all objectives and evaluation criteria (unless exempted by limitations to scope). ( )

9. Results do not conclude. ( )

10. Operational considerations (if included) discuss operational aspects which influence interpretation of results, and conclusions. ( )

11. Conclusions address operational effectiveness first, then operational suitability. ( )

12. Conclusions don't introduce new thoughts -- no hardware is mentioned for the first time, no discrepancies are identified for the first time, etc. ( )

13. Recommendations address the milestone (full-scale development, approval for sevice use and production, etc.). ( )

14. There are no new thoughts in recommendation. ( )

15. If there was a quick-look, any differences between this and the quick-look are identified <u>and explained</u>. ( )

ENCLOSURE CHECKLIST

1. Enclosure amplifies -- does not repeat -- letter. ( )

2. Enclosure <u>has no conclusions</u> buried in it -- disguised as results, operational considerations, etc. ( )

3. Enclosure has only <u>additional</u> recommendations (in self-contained section). ( )

4. Enclosure is <u>fully consistent</u> with letter. ( )

Section 13

Tactics Guides

1301. Introduction

a. A major function of OT&E is the assessment of tactics for employment of new weapon systems. Weapons system tactics are published in OTGs (OPTEVFOR Tactics Guides) by:

(1) Commanding Officers of VX Squadrons, on subjects under their cognizance.

(2) COMOPTEVFOR, on all other appropriate subjects.

b. The TEMP identifies the tactics development aspects of a T&E project as follows:

(1) Tactics development is specified as an objective of each appropriate phase of future OT&E in Part IV of the TEMP.

(2) Anticipated OTG publication dates are shown in the OT&E Reports line of Part II of the TEMP.

1302. Types of OPTEVFOR Tactics Guides

a. OPTEVFOR Preliminary Tactics Guides provide early information on tactical employment of new weapons systems entering or in early stages of full-scale development. They are prepared at the conclusion of OT-I or early sub-phases of OT-II.

b. OPTEVFOR Tactics Guides provide baseline tactics for employment of new weapons systems. They are prepared at the conclusion of OPEVAL.

c. OPTEVFOR Follow-on Tactics Guides provide refined tactical information on new weapons systems actually in production. They are prepared at the conclusion of OT-III.

1303. The Elements of an OPTEVFOR Tactics Guide. OPTEVFOR Tactics Guides are designed to provide the fleet user with the following types of information:

a. Operational capabilities of the equipment. What will it do for the user -- in operational terms. DT&E may tell what an equipment does against some spec that means something to an engineer. OT&E tells what it will do for that an ESM (electronic support measure) system has a receiver sensitivity of X dB -- OT&E says what it will do against specific Soviet emitters when its antenna is mounted so high. Operational capabilities include operating procedures that tell you how to get the most out of the equipment -- e.g., if you want to listen at _____ MHz, secure the _________. Operating procedures do not tell how to turn the equipment on and how to tune it -- they do not substitute for operator manuals.

b. Tactical concepts -- not pat solutions to big problems, but rather starting points for the user's thinking. Building blocks, or small pieces of the problem. What sonobuoy pattern worked best under what conditions, how HARPOON seeker characteristics can be used to increase the probability of acquiring a selected target in a formation, etc.

c. Tactical procedures -- the means by which a commander could implement tactical concepts (e.g., maneuver so that the target has an open-ocean background).

1304. What These Elements Mean. In the OPTEVFOR view, tactics, first and foremost, is a way of thinking -- a thought process. An OPTEVFOR Tactics Guide assists a fleet user in his thinking process, by providing some of the framework for his thinking. The Guide does not present dogma or cookbook style do's and don'ts, but rather is a thoughtful treatment of aspects of the equipment that the user must understand if he is to use it wisely. It tells him the things he should be thinking about in making his decision to use the equipment.

1305. Tips on Planning or Writing an OTG. The following tips have been developed through experience -- there is no significance to the order of their appearance.

a. Stay alert to tactical considerations from the time you first hear of a new project start.

b. Do not fill an OTG with "knobology."

c. Ask yourself what you would need to know if you were a fleet user of the equipment.

d. Interface with the fleet before, during, and after writing.

e. Use every opportunity to take part in fleet operations.

f. Define the level of fleet user you are going to address the OTG to (i.e., weapons officer, CO, aircraft commander, task group commander, etc.).

g. Bounce your ideas off other people -- never write in isolation.

h. Bring higher levels of command (Section Head, ACOS, 02, 02T, etc.) into the discussion.

i. Don't try to impress the reader with your education. Keep mathematics out of the OTG as much as possible.

j. Consult other communities.

k. Keep the OTG as concise as possible.

l. Do a lot of thinking. OTGs are mostly derived from a little bit of testing, plus a lot of thought in writing.

m. Use diagrams -- saves words.

n. Keep the security classification as low as possible.

o. When designing OT&E, work out the Test Plan to maximize the useful operational data to be obtained.

p. When designing a test and collecting data, remember that the subjective impressions of those carrying out the test can be very important in formulating tactics and deciding how best to use the equipment -- the human factor.

q. The OTG format is flexible -- take advantage of this. Make the product readable. Nobody is forced to read it -- it has to sell itself in early paragraphs.

r. It is better to explain the capabilities and limitations of the equipment, and from that what you think its tactical philosophy should be, than to give detailed tactical instructions.

s. Avoid overemphasizing equipment weaknesses -- strike the proper balance between capabilities and limitations.

t. Do not try to adapt existing tactics to new equipment. Start with a blank sheet of paper. Know the equipment, and think how best you can use it. Keep in mind the possibility of improving usage as a result of tactical feedback.

u. Highlight areas where operator training is especially critical. Where appropriate, suggest methods of training.

v. Remember that OTGs are half the output of OT&E. (Evaluation Reports are the other half.)

1306. Publication Dates of Tactics Guides. According to OPTEVFORINST 3960.2A, when a Tactics Guide is required by the TEMP, it will be published within 120 calendar days after completion of project operations.

R) 1307. Short Titles. A sequential numbering system is used for OTG short titles. COMOPTEVFOR Code 02T (AUTOVON 690-5177) assigns the short titles for all OTGs.

1308. Cancellation or Review Dates. A cancellation or review date is assigned to each OTG, to assist in keeping tactical information current and non-obsolescent. Code 02T advises the OTD on dates.

1309. Format and Content of OPTEVFOR Tactics Guides. Use a format that best suits the material you are presenting. A sample format that has been used in several OTGs is contained in the pages following. Use it if you like.

OPTEVFOR TACTICS GUIDE XX-81

F-22C AIRCRAFT

(R

Downgrading Statement*

Classification*

**If applicable. Do not use on UNCLASSIFIED Tactics Guides.*

The form of the cover is the same whether the guide is promulgated by a VX Squadron or by COMOPTEVFO[R] The color of the cover indicates the overall classification of the guide. If the guide is promulgat[ed] by a VX Squadron, the applicable squadron seal will appear in the upper left corner.

DEPARTMENT OF THE NAVY
COMMANDER OPERATIONAL TEST AND EVALUATION FORCE
NORFOLK, VIRGINIA 23511

02T:cebjr
3510
Ser XXX
6 June 1981

CLASSIFICATION*

From: Commander Operational Test and Evaluation Force
To: Distribution

R) Subj: Tactics Guide XX-81 for the Mk XX Mod 0 Fire Control System (Report Symbol OPNAV 3960-13) (*)
(This sample title indicates that OT-II was just completed on the Mk XX Mod 0; start the title with "Preliminary" or "Follow-on" if OT-I or OT-III resulted in this Guide.)

Ref: *The only reference that normally would be required here is a previous OPTEVFOR Tactics Guide being superseded or modified, or a high-classification supplement to this document.*

1. (*) This OPTEVFOR Tactics Guide contains information on tactical employment of the Mk XX Mod 0 FCS (Fire Control System), as installed in __________ and ____________ type ships. Section 1 of this Guide describes the Mk XX Mod 0 FCS as it was tested, and the scope of testing. Section 2 discusses the tactical capabilities/limitations of the FCS considered to have been demonstrated during testing. Section 3 presents recommended tactics for employing the FCS. Section 4 describes areas that warrant further investigation.

2. (*) This Tactics Guide summarizes, for early fleet use, those tactical considerations OPTEVFOR was able to develop during OT&E (operational test and evaluation). The information contained herein is considered sound, but is preliminary in nature and therefore subject to change. Comments on the tactics and procedures presented are invited and encouraged.

3. (*) Navy organizations on the distribution list may obtain additional copies of this document from Director, Naval Tactical Support Activity, in accordance with OPNAVINST 5070.7. All other requests for copies should be forwarded to (COMOPTEVFOR, VX-1, etc., as appropriate).

DOWNGRADING STATEMENT* *Required if not on cover sheet.*

CLASSIFICATION*

4. (*) The following pertains to this Tactics Guide: (R

a. TAC D&E Category Code (two-letter, 10 digit).

b. TAC D&E Number (e.g., OTF 18-77, OTF 3-78).

c. Appropriate NWPs (e.g., NWP 32, NWP 55-2-P3).

d. Cancellation date.

Distribution: *This is the minimum distribution. (For programs sponsored by OP-02, see 02T for minimum distribution.) Include all of these in all Guides, as indicated below.*

CNO (OP-090)
(OP-96)
(OP-095)
(OP-953)
(OP-098)
(OP-981)
(OP-983)
(OP-0_) *(Program Sponsor (DMSO, DCNO or ACNO))*
NAV__SYSCOM (PM-__) *(Cognizant PM, of there is one)*
(__-__) *(Cognizant Deputy or Assistant Commander)*
(__-__) *(Cognizant Acquisition Manager)*
CINCLANTFLT
CINCPACFLT
CINCUSNAVEUR
COMSECONDFLT
COMTHIRDFLT
COMSIXTHFLT
COMSEVENTHFLT
COM__LANT
COM__PAC
Participating fleet units, including the project ship (if any) and ISIC, plus all potential user ship, squadrons, etc.
COMOPTEVFOR
DEPCOMOPTEVFORPAC
NAVPGSCOL
PRESNAVWARCOL
CNET
ONR
CNA
CO, SWOSCOLSCOM
NAVTACINTEROPSUPPACT
DIRNAVTACSUPPACT (50)

Contents (*)

A) NOTE: The format presented is only an example, not a required format.

AD-A124 168 OPERATIONAL TEST DIRECTOR GUIDE CHANGE 4(U) OPERATIONAL 3/4
TEST AND EVALUATION FORCE NORFOLK VA 20 SEP 82
COMOPTEVFOR-INST-3960.1B

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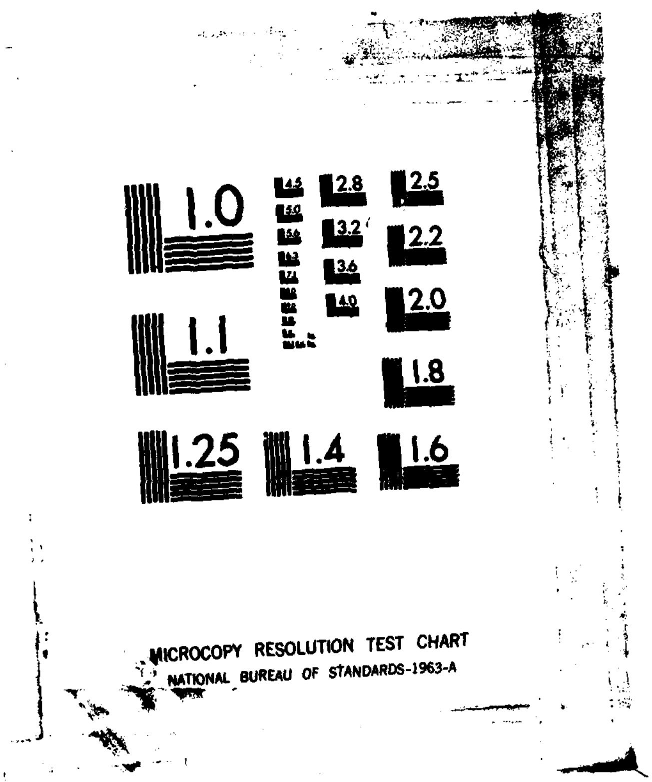
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MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

<u>Acronyms and Abbreviations</u> (*)

CIC	Combat Information Center
FCS	Fire Control System

Acronyms should be defined (spelled out) on the first occurrence in the text, and listed here. Two methods of spelling out are allowed by the Navy Correspondence Manual, i.e., CIC (Combat Information Center) or Combat Information Center (CIC). The former method (acronym first) is used by COMOPTEVFOR.

Acronyms for naval activities included in the Standard Naval Distribution List (which includes almost every activity) need not be spelled out or listed on the acronym page. The Operational Test Director is not precluded from spelling out and listing such acronyms, however, if readability will be improved (e.g., acronyms for obscure activities).

Acronyms which are defined (spelled out) in the letter need not be spelled out again in the enclosure, except on this page.

References (*)

If references were used in the letter, repeat them here in the same order in which they appear in the letter. Follow them with references mentioned in the sections to follow, in the order in which they are first mentioned in these sections.

Section 1

Introduction (*)

101. (*) System Description

The purpose of this paragraph is to provide a sufficiently detailed description of the system that subsequent discussions of its capabilities/limitations/employment are readily understood. If the system being discussed is completely new and therefore not well known in the fleet, this paragraph may be quite lengthy. If, on the other hand, the system is an improved version of an older system, this paragraph need only address the improvements and can be relatively short. The use of photographs, diagrams, and tables for conciseness and clarity is encouraged.

Within this paragraph, describe any ways the system tested is known to differ from the system to be installed in the fleet. These differences include system differences per se, and differences in the way the system will be installed (for instance, antenna location). Be as operationally specific as possible (for instance, "the system tested did not receive inputs from the doppler radar, etc."), as opposed to developmentally general (for instance, "the system tested was a prototype"). This type statement conveys little useful information to the operational commander.

102. (*) Scope of Testing

The purpose of this paragraph is to describe what was done which lead to the tactical employment considerations discussed later. The object is to present, as clearly as possible, a summary of the testing, so the reader can decide for himself how much confidence to place in our findings and recommendations. The important elements of this paragraph are the ship, aircraft, etc., in which the system was installed, and the scenarios in which the system was exercised, together with a summary of the amount of time (and weapons delivered, etc.) the system was exercised. Do not include material of no interest to operational commanders, such as listings of suitability tests. Do include pertinent information on weather conditions during the testing, and level and type of enemy threat the system was employed against.

If simulations were employed in the testing, they should be mentioned specifically. Simulations include U.S.-built versions of threat emitters, and computer simulations of missile intercepts.

103. (*) Limitations to Testing

Identify here the aspects of the new weapons system that were not adequately tested. Inadequate testing is defined to include a total absence of testing, and testing whose results are suspect because of limited data, unrepresentative pretest preparation, etc. The purpose of this paragraph is to flag for the reader those aspects of the system that we're not sure we have a complete handle on - - to avoid misleading him.

Section 2

Tactical Considerations (*)

This section discusses the capabilities and limitations of the system that were determined during testing, and on which recommended tactics were based. The purpose is to identify known system elements, so that they need not be reestablished by fleet units investigating different tactics or different scenarios. These known system elements are those operationally interesting parameters that have been sufficiently defined for reasonable confidence. They include such things as target acquisition range as functions of target size, geometry, dynamics, etc. They include (and these are very important) negative system elements, such as a DECM system's inability to counter LOW BLOW. This section contains, then, a listing of the system's tactical capabilities and its tactical limitations that form the basis of any discussion of tactical employment.

The organization of this section should present the facts in the most understandable manner. In some cases this section will best be organized by addressing individual missions in which the system will be employed. In other cases it will best be organized by discussing system modes of operation. Still others will best be organized by threat categories. No rules are established, except the standard one to strive for accuracy, readability, clarity, and brevity, in that order.

Section 3

Tactical Applications (*)

This section provides guidance on the tactics to use with a new weapons system. This guidance may take many forms. For a towed array it might be an operating guideline addressing questions such as the depth to operate as a function of layer, or bearing resolution procedures. For a projectile or fuze, it might be a decision matrix of projectile/fuze combinations for different targets. Realistic operational situations might be posed (XYZ missile ready to launch, enemy deploys chaff), and our guidance specifies the best tactic in response (check fire, fire salvo of three, etc.).

Organize the section as logically as possible. Consider organizing it to parallel Section 2.

Section 4

Areas for Further Study (*)

This section identifies areas that warrant further investigation. Some of these areas may follow from the discussion in paragraph 103, Limitations to Testing. Others may be suggested by possible changes in the threat, or by possible other uses of the equipment.

Annex A

Instructions for Annex Writing

1. Annexes present pertinent material not appropriate for inclusion in the body of the Guide, because its length or detail would destroy the continuity of the text. Such material would be detailed tabulations of equipment characteristics, or voluminous sketches of run geometries.

2. If annexes are used, they must be referred to in the appropriate place(s) in the text of the main body of the Guide, and listed on the contents page.

Section 14

Oral Presentations On OT&E

1401. General. OT&E briefings are like any other Navy briefings -- they cover the facts as we know them in a logical, concise fashion. They are usually conducted at the Flag level, and are often called for ahead of their scheduled dates, with little warning. Some specific guidance on OT&E-peculiar aspects is provided below.

1402. Before Operational Testing. Frequently an OTD or OTC will be called upon to brief the OT&E plan to decision makers, usually to show them how OT&E will address issues critical to the next program decision. If you find yourself in this position, first and most important -- make sure you understand what these issues are. Then, for your briefing:

a. State these issues -- but only those that can be resolved through OT&E.

b. Then, as simply and clearly as possible, shown how the OT&E plan addresses them.

c. Where appropriate and possible, give the audience a feel for how much confidence our testing should give us. For instance -- if MTBF is a critical issue -- show what the MTBF would be at the 80% confidence level if the equipment operates for the planned duration of OPEVAL with only 1 or 2 failures. By the way -- use numbers that assume that the equipment works well -- don't presuppose that the equipment's no good.

1403. When Operational Testing is Accomplished. Briefings on OT&E results are best structured as follows:

a. Objectives of the phase completed.

b. Brief summary of testing (number of rounds fired, etc.), and major limitations to the evaluation.

c. Results - keyed to objectives.

d. Operational considerations (particularly as regards interpreting results).

e. Conclusions on operational effectiveness and operational suitability.

f. Recommendations.

If analysis is incomplete, say so. If conclusions are tentative, say so. Etc.

1404. Programmatic and Future Test Issues. If you brief on these and related subjects, remember that you are briefing from an OT&E viewpoint. Don't include things not within our area of responsibility (e.g., system cost versus cost of a similar system).

1405. Typical OT&E Briefing Requirements

a. Periodic Program Reviews (OPNAV/SYSCOM/Labs).

b. Milestone II Preview.

c. Milestone II.

d. Milestone III Previews (Pre-CEB, CEB, Pre-DNSARC,
R) DNSARC, DSARC, DDTE Review).

e. Milestone III.

1406. Sample CEB-Type Briefing. In the following pages is an example of a management-level briefing on results of an OPEVAL. The management decision being considered is the ASU/production decision. Note that this sample briefing is geared to an audience interested primarily in top-level results, conclusions, and recommendations --not in details. Details are necessary, however:

a. If we recommend against the system. The briefing must fully substantiate negative conclusions and recommendations.

R) b. If the briefing is to DDTE -- this briefing is much more test-oriented than the decision-oriented briefing of the sample.

CLASSIFICATION

COMOPTEVFOR

OPERATIONAL EVALUATION

SHIPBOARD WEAPONS SYSTEM MK XX MOD X

CNO EXECUTIVE BOARD

DATE OF PRESENTATION

DOWNGRADING

INSTRUCTIONS

CLASSIFICATION

Lead off with a "purpose of briefing chart" -- it may not be used in the actual briefing because earlier briefings (e.g., the DA's) may make it unnecessary. But it is essential that <u>you prepare it</u> -- it will help focus your thinking on the right questions.

PURPOSE OF BRIEFING

- TO PROVIDE COMOPTEVFOR'S OPERATIONAL EVALUATION OF THE SHIPBOARD WEAPONS SYSTEM MK XX MOD X
    - OPERATIONAL EFFECTIVENESS
    - OPERATIONAL SUITABILITY
- TO PROVIDE COMOPTEVFOR'S RECOMMENDATIONS REGARDING ASU/PRODUCTION

The briefing is organized much like the letter portion of an Evaluation Report, or a Quick-look Report. If either of these has been issued, the briefing should be based on it.

BRIEFING OUTLINE

- SUMMARY OF TESTING
- MAJOR TEST RESULTS
  - OPERATIONAL EFFECTIVENESS
  - OPERATIONAL SUITABILITY
- CONCLUSIONS
- RECOMMENDATIONS

On this slide, highlight the test program to give the audience a feel for the test conditions and the magnitude of the data base.

The information presented here is similar to that contained in paragraph 5 ("Project Operations") of the letter report. (R

CLASSIFICATION

OPEVAL TEST SUMMARY

- CONDUCTED ABOARD USS BIGELOW (DD 942) 2 MAY - 30 JUNE 1977
- DETECTION, TRACKING, AND FIRING EXERCISES
  - SINGLE AND UP TO 6 SIMULTANEOUS TARGETS
  - CLEAR AND JAMMING ENVIRONMENTS
- EXTENT OF TESTING
  - 212 DETECTION/TRACKING RUNS
  - 38 VALID FIRING RUNS
  - 15,083 ROUNDS FIRED
  - 1019 HOURS SYSTEM OPERATION

CLASSIFICATION

These are the OPEVAL objectives of the Test Plan or TEMP, abbreviated or condensed where possible, to keep the slide from being too busy. For example, the actual Test Plan objectives for this program included words about jamming and single/multiple targets. These words have been left off this slide because they were just used on the preceding slide.

List "effectiveness" objectives first, then "suitability" objectives.

CLASSIFICATION

OPEVAL OBJECTIVES

- DETERMINE CAPABILITY TO DETECT AND TRACK THREAT-REPRESENTATIVE TARGETS
- DETERMINE CAPABILITY TO ENGAGE (KILL) AIRBRONE TARGETS
- DETERMINE RELIABILITY, MAINTAINABILITY, AND AVAILABILITY
- ASSESS COMPATIBILITY AND SUPPORTABILITY IN INTENDED ENVIRONMENT
- DETERMINE PERSONNEL AND TRAINING REQUIREMENTS

CLASSIFICATION

These are major limitations similar to those presented in paragraph 4.c. ("Limitations to Scope") of the letter Evaluation Report. (R

Note that the first limitation ("no combat system integration") explains why "interoperability" was not an objective on the preceding slide. Thus answering a potential question from people familiar with the elements of operational suitability.

This slide concludes the "Summary of Testing" section of the briefing. The audience now knows:

1. What we did
2. Why we did it (our objectives)
3. What we couldn't do

We are now ready to address the major test results -- keyed to objectives.

LIMITATIONS TO SCOPE OF OPEVAL

- SYSTEM NOT PRODUCTION CONFIGURATION
  - NO COMBAT SYSTEM INTEGRATION
  - FUNCTIONALLY EQUIVALENT COMPUTER
- TARGETS
  - SPEED (MACH 0.8) LESS THAN SYSTEM CAPABILITY (MACH 1.6)
  - NO TERMINAL MANEUVER
  - NO WARHEAD
- WEATHER
  - GENERALLY CLEAR
  - SEA STATES 1-2
  - MODERATE TEMPERATURES

In this sample briefing, results are good -- observed performance is better than threshold, as is performance at the 90% confidence level. So not much else need be said about these figures. If results had been poor, an additional slide would be required to address deficiencies. For example, if observed probability of kill had been 0.25, a slide would be required addressing failure modes (pointing errors, too low a rate of fire, hang-fires, etc.)

Even with these good results, a firing summary slide should be prepared as a back-up slide.

OPERATIONAL EFFECTIVENESS

	THRESHOLD[1]	OBSERVED	90% CONF	REMARKS
PROBABILITY OF DETECTION (BEYOND 8000 METERS)	0.9	1.0	0.98	173 OF 173[2]
PROBABILITY OF TRACK THROUGH ENGAGEMENT	0.9	0.98	0.96	185 OF 188[3]
PROBABILITY OF KILL	0.75	1.0	0.93	35 OF 35[4]
REACTION TIME	3 SEC	< 2 SEC	--	--

[1] DCP #XX OF 22 APR 77

[2] 173 VALID TARGET DISCLOSURES AT MAX SYSTEM RANGE

[3] TOTAL INCLUDES TRACK ATTAINED FOR TARGET DISCLOSURES INSIDE MAX RANGE

[4] INCLUDES 12 IN CLEAR, 23 IN JAMMING ENVIRONMENT

This slide addresses the bottom-line of operational effectiveness. Although it may not be used, it's always good as a back-up slide.

FIRING SUMMARY

DATE	TARGET	ENVIRONMENT	ROUNDS FIRED	RESULTS
5-10-77	TDU	CLEAR	278	SUCCESS[1]
,	,	,	,	,
,	,	,	,	,
,	,	,	,	,
6-30-77	LOFAT	JAMMING[2]	202	NO-TEST[3]

[1] SUCCESS: 1 TDU HIT OR 5 LOFAT HITS

[2] BROAD-BAND NOISE 13-18 GHZ

[3] INVALID TARGET PROFILE CAUSED EARLY ENGAGEMENT TERMINATION

SUMMARY: 35 SUCCESS (23 IN JAMMING), 0 FAILURES, 1 NO-TEST

Both "operational effectiveness" objectives were addressed on the preceding two slides (one primary, one back-up). In many cases, this would close out the first portion of "results".

In this sample OPEVAL, however, the Quick-look Report discussed a deficiency in operational effectiveness, and made a recommendation on the subject. For that reason, it should be included in this briefing.

DEFICIENCY

- SYSTEM SOFTWARE MISSES TARGET UPDATE INFORMATION UNDER CERTAIN CONDITIONS OF CLOSURE RATE/AZIMUTH
- RESULT IS DELAYED TARGET ENGAGEMENT
- DEFICIENCY DID NOT PRECLUDE SUCCESSFUL ENGAGEMENT DURING TESTING

This slide addresses the first three suitability objectives. Because the system met all R, M, A thresholds, and because no R, M, A deficiencies were mentioned in the OPEVAL Quick-look Report, this is the only slide required for these objectives.

Note that the order of the columns (threshold, observed, etc.) is the same as their order on the operational effectiveness slide. When presenting similar material on different slides, try to organize the slides the same way. It helps the audience and reduces the chances of misreading.

Note also that all essential numbers are on the chart -- MTBF, A_i, and A_o can be derived from the times and numbers of failures shown. This may help the briefer answer a question.

OPERATIONAL SUITABILITY

	THRESHOLD[1]	OBSERVED	90% CONF	REMARKS
MTBF	40 HR	85 HR	55 HR	12 FAILURES
MTTR	3.0 HR	2.2 HR	---	25 REPAIR ACTIONS[2]
AVAILABILITY (OPERATIONAL)	NONE	0.82[3]	---	
AVAILABILITY (INHERENT)	0.93	0.97	---	

MTBF - MEAN TIME BETWEEN FAILURES (ADJUSTED TO COMBAT PROFILE IAW DCP #XX)

MTTR - MEAN TIME TO REPAIR

[1] DCP #XX OF 22 APR 77

[2] INCLUDES 13 INDUCED FAILURES FOR MAINTAINABILITY TESTING

[3] 1019 HR DEMAND USAGE TIME, 266 HR DOWNTIME

This slide highlights the remaining objectives related to operational suitability.

This finishes the "Results" part of the briefing. If the Quick-look Report had had an "Operational Considerations" section, it would probably be appropriate to have one in the briefing. The sample OPEVAL did not require one, so the next part of the briefing addresses "Conclusions".

OPERATIONAL SUITABILITY

- COMPATIBILITY
  - INTERFERENCE FROM AN/SPS-XX RADAR PRECLUDED ACQUISITION/TRACKING
- SUPPORTABILITY
  - INTEGRATED LOGISTIC SUPPORT PLAN APPEARED ADEQUATE
- PERSONNEL REQUIREMENTS
  - PROPOSED MANNING LEVELS APPEARED ADEQUATE
- TRAINING REQUIREMENTS
  - NAVY TRAINING PLAN DEFICIENT IN MAINTENANCE TRAINING
  - ADDITIONAL 1-2 WEEKS HANDS-ON FAULT-LOCATION & REPAIR REQUIRED

The conclusions of a briefing on OT&E results always address operational effectiveness and operational suitability.

When the finding is "for" operational effectiveness or operational suitability, it is usually not necessary to say why - that is usually obvious.

When the finding is "not for", as is the case here regarding operational suitability, it is necessary to highlight the reasons for the down-check.

CLASSIFICATION

CONCLUSIONS

- THE SHIPBOARD WEAPONS SYSTEM MK XX MOD X IS OPERATIONALLY EFFECTIVE.
  - SOFTWARE ANOMALY REQUIRES INVESTIGATION/RESOLUTION

- THE SHIPBOARD WEAPONS SYSTEM MK XX MOD X HAS POTENTIAL FOR OPERATIONAL SUITABILITY. HOWEVER,
  - COMPATIBILITY PROBLEMS WITH SPS-XX MUST BE ELIMINATED
  - INTEROPERABILITY WITH COMBAT SYSTEM MUST BE DEMONSTRATED

CLASSIFICATION

These management-oriented recommendations lay out a get-well plan. They cover all reported discrepancies -- and <u>do</u> <u>not</u> <u>introduce</u> <u>new</u> <u>thoughts</u>!

Note that the briefing has answered the mail -- it has done what the "Purpose" slide said it was supposed to do.

RECOMMENDATIONS

- SOLVE COMPATIBILITY PROBLEM AND DEMONSTRATE SOLUTION DURING OT&E
- AFTER SUCCESSFUL DEMONSTRATION, GRANT PROVISIONAL APPROVAL FOR SEPVICE USE AND PROCEED WITH NECESSARY LIMITED PROCUREMENT
- RESOLVE SYSTEM SOFTWARE ANOMALY
- AT EARLIEST OPPORTUNITY, CONDUCT OT-III TO
  - VERIFY INTEROPERABILITY WITH COMBAT SYSTEM
  - PROVIDE BASIS FOR FULL APPROVAL FOR SERVICE USE
- EXPAND MAINTENANCE TRAINING TO INCLUDE ADDITIONAL HANDS-ON TROUBLESHOOTING AND REPAIR

Section 15

Creation and Maintenance of an OTD Journal

1501. Introduction. Each OTD should maintain a chronological record of his project. The purpose of this record is multiple; for instance, it provides a history for your replacement in the event you are transferred; it may enable you to answer new questions about an old test; it can serve as substantiating data if events, agreements, etc. are later questioned. (It may be the sole record of something that later becomes important.) This record may exist in several forms; loose-leaf notebooks, steno pads, memos for the record, cassette recordings, etc. Collectively they are called an OTD Journal. If an individual OTD Journal consists of a combination of steno pads, recordings, etc., one document (the Master) should maintain the overall chronology, and should reference individual steno pads, recordings, etc. for details, where appropriate.

1502. Content. The OTD Journal records for possible later use everything the OTD considers of significance in his program. While each OTD must use his own judgement when deciding what is significant, it is better to record too much than too little. And it is better to record as soon as an event occurs, rather than to wait until later and risk forgetting. Among the things which may have significance are:

a. Funding requirements/transactions for OT&E.

b. Agreements made at meetings or over the phone regarding future testing.

c. Summaries of program meetings and conferences, including attendees, areas of discussion, and stands taken by the various players.

d. Mention of working drafts, etc. exchanged between the OTD and other program individuals or offices, with notations indicating where copies may be found in the OTD's files.

e. Notations summarizing oral business contacts with individuals associated with the program (CNO, NAVMAT, SYSCOM, Labs, other Services, DDR&E, contractors, etc.) together with their codes, symbols, phone numbers, etc.

f. Mention of receipt of incoming program messages, letters, data packages, etc., together with their storage locations.

g. An on-scene record of testing (see paragraph 1503 below).

h. A record of drafts (messages, reports, etc.) prepared for higher-level review and approval (draft completion dates, cut-board dates, significant events in the review process, approval dates, etc.).

i. Identification (by date/time group or serial number and date) of outgoing program documentation, with primary addressee and storage location.

j. Significant program information (funding changes, schedule slippages, PASU, etc.), together with the source of the information.

k. The line of reasoning that led you to take a particular stand on an issue, or that caused you to select certain parameters, etc. This may be of critical importance to your replacement who is trying to figure out why you set things up the way you did.

1503. On-Scene Record of Testing. A running account of testing is an important part of an OTD Journal. In many cases this account is best made on a cassette recorder as the operation progresses. (Don't forget extra cassettes and batteries--and get somebody assigned to transcribe for you.) In any event, its purpose is to describe the way the testing actually occurred; what happened, when, and who (what) was involved. It identifies the operation (by run number, etc.), and provides a running time-correlated commentary to the end of the exercise. Particular attention is on recording unusual events (breakdowns in communications, intruders in the area, etc.). Differences between actual and planned scenarios are noted and explained. The OTD's impressions, qualitative assessments of performance, and any other information which later might help him reconstruct the testing, are recorded. Keep in mind that an OTD Journal is your document, to help you (and your successor). It's like a computer -- you only get out what you put in.

1504. Pack-up Kit. Check with our Supply regarding instruments and other aids to you when you go off on an operation.

1505. <u>Retention of Test-Related Information</u>

a. The OTD's Journal, together with the documents, data packages, etc. that are referred to in the Journal should be retained by the OTD as long as the CNO-assigned T&E number remains active.

b. When the CNO-assigned T&E number is retired, the OTD should take the following actions:

(1) Make a list of all project documents originated outside the Force, by classification, originator, type, identifier, data, and subject -- the same way they would be listed in a "Reference" page of an Evaluation Report. Label this list "Project Documents Not Retained" and destroy the basic documents in accordance with established administrative and security procedures.

(2) Make up a retention package containing the OTD Journals, the list marked "Project Documents Not Retained," and single copies of significant documents originating from within the Force (including data packages). Mark the retention package "T&E Number..." and forward it (with inventory) to COMOPTEVFOR (Admin) for storage, and notify the DCOS of this action.

Section 16

OTC/OTD Relationships With Others

1601. Introduction. In business dealings with other agencies/organizations, the OTC or OTD acts as a representative of COMOPTEVFOR. In these dealings he presents the COMOPTEVFOR viewpoint, as he knows it, based on written and oral guidance and good judgement. If that viewpoint is not accepted, he retires politely and initiates action to get this viewpoint put into writing for COMOPTEVFOR action.

1602. With CNO Staff. These dealings will usually fall into the category of advising CNO on the adequacy of planned T&E. Often they will involve a disagreement with the DA regarding the time for, or cost of, proper OT&E. Remember that OPTEVFOR is usually the only advocate of proper OT&E below the CNO level. Concentrate on making OT&E advocates within the CNO staff -- at least advocates for your own OT&E. Convince them of the real need for this OT&E; show them how a relatively small outlay in targets, etc., can result in profound savings later on and in better systems in the fleet, earlier. Remember that most of these officers don't make decisions; their job is to convince those who do. Provide them with convincing arguments; don't just tell them that's the way COMOPTEVFOR wants it.

1603. With the DA

a. It helps if you can convince the DA that we're not out to shoot his program down. In every program there will be disagreement regarding requirements for T&E; if the DA is at least aware that we're on the side of fielding good equipment, these disagreements will be resolved with less noise. The first disagreement will probably be associated with program structure; how T&E supports the milestones. Present the COMOPTEVFOR position (see Section 6), explain this position, and if possible cite examples of programs that suffered because of poor structure. As much as possible keep the program moving in the right direction through working meetings, informal exchanges of working drafts, etc. But if the program stops or is moving uncontrollably in the wrong direction, go formal through your own chain of command. If you are put down because you're not a technical expert, remember that your technical qualifications are immaterial. You're an operational expert; no one else connected with the program may ever have been to sea. You and the people in the project office are not debating opponents; you are allies in getting good equipment in the fleet.

b. In some programs it may be convenient (or absolutely necessary) to use DA field agencies to get OT&E data reduced and, to some degree, analyzed. In these situations it is mandatory that these people be under the operational control of COMOPTEVFOR (represented by the OTC/OTD/Program Analyst) while they are working on OT&E data. Their work is defined in advance, and their results are furnished <u>only</u> to COMOPTEVFOR, unless COMOPTEVFOR has specifically approved a wider distribution.

1604. <u>With the Manufacturer</u>. You will be involved with him at meetings, program reiews, critical design reviews, visits to the plant, and during factory testing. Deal with him as much as is necessary to get our job done. But avoid any association with him which could possibly compromise your (and therefore COMOPTEVFOR's) independence and integrity. If you need to spend all day at his plant, have lunch there but pay for it. Don't go out to dinner with him. At the same time, try not to leave any impression of hostility or mistrust. Be professional and remember that you're a representative of the Navy's <u>independent</u> OT&E organization. Maintain not only the independence, but also the appearance thereof. Also, remember that in dealings with the manufacturer you're working as part of the Navy's <u>development</u> team, and that visits to the manufacturer are <u>arranged through</u> and <u>with the permission of</u> the DA. Go in uniform and check in with the NAVPRO.

1605. <u>With Cognizant Navy Field Activities</u>. While these are closely related to the Washington DA, you will usually find them more receptive to your views than is the DA. This is because they can veiw T&E requirements (including OT&E) from a technical viewpoint not obscured by costs or schedules (as a good DA must). In spite of this difference, the guidance of paragraph 1603 is basically applicable.

Section 17

COMOPTEVFOR in JOT&E (Joint OT&E)

1701. Background. For weapon system development/acquisition programs established by joint agreement between two or more services, the T&E conducted during development is referred to as JT&E (joint test and evaluation). The testing for operational evaluation is referred to as JOT&E. JT&E programs may also be initiated by DDTE in accordance with DOD Directive 5000.3. (R

1702. COMOPTEVFOR Involvement. The extent of COMOPTEVFOR participation in JOT&E is determined on a case-by-case basis. OTD/OTC responsibilities regarding this participation differ according to whether or not the Navy is lead service in the development/testing.

1703. Navy Lead Service. If the Navy is lead, the provisions of OPNAVINST 3960.10 apply to the JOT&E, and COMOPTEVFOR performs essentially the same functions as in ordinary OT&E, with the following modifications:

a. All planning is coordinated with the other services.

b. The COMOPTEVFOR Test Plan may include testing to be performed by the other service. If this is the case, differences in perferred format, working, etc. may dictate that the other service's verbatim input be included as a separate section or annex in the Test Plan.

c. If Test Plans do include both services' testing, there will probably be a joint sign-off on the letter of promulgation (and an associated joint review process). This requirement should be taken into account in estimating publication lead time, etc. (Note: this can apply equally to other JOT&E documents -- reports, for example. The ground rules regarding who prepares and signs what require early resolution -- again on a case-by-case basis.)

d. Whether or not combined o1 separate Test Plans are issued, it is usually extremely important that the methods by which each service evaluates the same thing are identical. That is, in reliability calculations, each service includes the same failure types, uses the same criteria for no-tests, etc. These matters must be understood and agreed to in advance of testing. Working out these agreements is a major function of the OTD in JOT&E planning.

1704. Other Lead Service. When another service is lead, OPNAVINST 3960.10 does not apply directly. However, because DOD Directive 5000.3 is applicable to all services, the philosophy of OPNAVINST 3960.10 does apply, and the OTD's functions will be similar to those described in paragraph 1703.

R) 1705. Non-Acquisition JOT&E. Non-acquisition JT&E (concept testing) is directed by DDTE, who also budgets and funds it. If the Navy is involved, OP-983 normally asks COMOPTEVFOR to review the proposed testing, to see if it is "operational." If it appears to be in our bailiwick, we assign an OTD. He then will work under a Joint Test Directorate whose Navy Deputy is usually appointed from an appropriate operational command. The OTD's test function is similar to that he would have in normal operational testing. The evaluation function may be quite different, however, because the Joint Test Directorate (not COMOPTEVFOR) reports results to DDTE (for approval).

1706. Assignment Within COMOPTEVFOR. Policy and procedures for assigning responsibilities for planning, prosecuting, monitoring, and reporting JOT&E is contained in COMOPTEVFOR-INST 3930.6. For assistance in JOT&E matters, contact Code 02D.

Section 18

Glossary

ACAT. Acquisition category. See OPNAVINST 3960.10 for types and criteria.

ASU. Approval for service use. See OPNAVINST 4720.9.

Availability. A measure of the degree to which an item is in an operable and commitable state at the start of a mission when the mission is called for at an unknown (random) time. In OT&E, A_o (operational availability) is the usual measure. (See Operational Availability.) (R

Compatibility. One of the elements of operational suitability. The capability of a system (or subsystem) to operate in its intended environment without adverse effects to or from other systems. Includes effects from vibration, radiation, power fluctuations, etc.

Critical Issues. Those aspects of a system's capability, either operational, technical, or other, that must be questioned before a system's overall worth can be estimated, and that are of primary importance to the decision authority in reaching a decision to allow the system to advance into the next acquisition phase. (A

Critical Failure. One that prevents the system from performing its mission. (Compare Major Failure and Minor Failure.)

DA. Developing Agency (usually a SYSCOM).

DDTE. Director Defense Test and Evaluation. According to DOD Directive 5000.3, DDTE has overall responsibility for T&E matters within the DOD. (A

DSARC. The Defense Systems Acquisition Review Council is an advisory body to the Secretary of Defense on the acquisition of major defense systems. Among other duties, the DSARC makes recommendations to SECDEF at major program milestones, based on its review of program progress. See DOD Directive 5000.2.

DT&E. Development test and evaluation. See Section 2 for comparison with OT&E.

Evaluation Criteria. Standards by which achievement of required operational effectiveness/suitability characteristics, or resolution of technical or operational issues may be (A judged. According to DOD Directive 5000.3, at Milestone II and beyond, evaluation criteria must include quantitative goals (the desired value) and thresholds (the value beyond which the characteristic is unsatisfactory).

Evaluation Report. One of the two products of OT&E. (The other product is the Tactics Guide.)

Existing Weapons Systems. Weapons systems that have been introduced into the fleet. OT&E on existing weapons systems is OT-IV. The fleets and their TAC D&E organizations are responsible for tactics used with existing weapons systems. (Compare New Weapons Systems and Future Weapons Systems.)

FOT&E. Follow-on operational test and evaluation. OT&E conducted after the first major production decision.

FSD. Full-scale development. Engineering development between Milestones II and III.

Future Weapons Systems. Weapons systems in the conceptual phase. OT&E associated with future weapons systems is OT-0. CNO sponsors are focal points for tactical considerations associated with future weapons systems. (Compare New Weapons Systems and Existing Weapons Systems.)

Goals. See Evaluation Criteria.

Interoperability. The capability of a system (or subsystem) to transfer information (or services), as required, to or from other systems (or subsystems). A radar is interoperable with a gun system if the radar causes the gun to point at the target; CAINS (Carrier Aircraft Inertial Navigation System) must be interoperable with SINS (Ship's Inertial Navigation System) for initial alignment; a fuze must be interoperable with the warhead in order for the firing signal to get through. Note that the man/machine interface is an information or services transfer. Thus operability is included in interoperability.

IOT&E. Initial operational test and evaluation. All OT&E that precedes the first major production decision.

JT&E Program. An OSD program for joint test and evaluation, sponsored by the DDTE, structured to evaluate or provide information on system performance, technical concepts, system requirements or improvements, systems interoperability, improving or developing testing methodologies, or for force structure planning, doctrine, or procedures.

Logistic Supportability. The degree to which the planned logistics (including test equipment, spares and repair parts, technical data, support facilities, and training) and manpower meet system availability and wartime usage requirements.

Maintainability. The capability of an item to be retained in or restored to specified conditions when maintenance is performed by personnel having specified skill levels, using prescribed procedures and resources, at each prescribed level of maintenance and repair. MTFL, MTTR, and MSI are frequently calculated in maintainability evaluations.

Major Failure. One that causes the system to lose some operational capability, and degrades mission accomplishment. If detected before the mission, would probably be mission-aborting. (Compare Critical Failure and Minor Failure.)

MFHBF/MTBF. See Reliability.

Milestone 0 Decision. The decision to investigate ways to acquire a new capability to meet a valid need essential to the mission.

Milestone I Decision. The decision to explore a concept for mission accomplishment.

Milestone II Decision. The decision to begin engineering development of a concept.

Milestone III Decision. The decision to produce a system.

Minor Failure. Affects performance but can be worked around to avoid impacting the mission. (Compare Critical Failure and Major Failure.)

MIP (Master Information Paper). A document used in support of the proposed program/budget. See OPNAVINST 5260.1.

Mission Reliability. See Reliability.

MSI (Maintenance Support Index). The ratio of total man-hours required for maintenance (preventive plus corrective) to the total operating (up) time. Frequently computed as part of Test S-2, Maintainability.

MTFL. Mean time to fault-locate. The total fault-location time divided by the number of critical/major failures. Frequently computed as part of Test S-2, Maintainability.

R) MTTR. Mean time to repair. Frequently computed as part of Test S-2, Maintainability, and usually computed as $MTTR_g$ (geometric MTTR). $MTTR_g$ is the antilog of the quotient obtained by dividing the sum of the logs of the individual critical/major repair times by the number of critical/major repair actions.

New Weapons Systems. Weapons systems whose characteristics have been defined explicitly, but that have not yet entered the inventory in appreciable numbers. OT&E of new weapons systems spans OT-O through OT-II. COMOPTEVFOR is responsible for developing tactics for new weapons systems. (Compare Future Weapons Systems and Existing Weapons Systems.)

Operability. See "Interoperability."

Operational Availability. (See Availability for basic definition.) A_o is measured in two different ways according to equipment usage.

1. For start-stop type equipment (e.g., a diving suit's life support system, a radio transmitter for an SSBN, a machine gun), A_o is the ratio of successful starts (turn-ons, actuations) to attempted starts.

2. For more-or-less continuously operated equipment (e.g., search radars, passive sonars), A_o is the ratio of up time (performing its mission or in alert, capable of performing its mission) to the sum of up time plus down time (down for preventive/corrective maintenance, awaiting repair parts, etc.).

Operational Effectiveness. Fundamentally, the capability of a system, when it is operating the way it is supposed to (e.g., not broken), to perform a necessary mission/function. Operation in the presence of enemy action is assumed; hence Survivability and Vulnerability are treated as part of operational effectiveness. See DOD Directive 5000.3 for a formal definition.

Operational Suitability. Fundamentally, the likelihood that in the intended operational environment the system will perform the way it is supposed to. See DOD Directive 5000.3 for a formal definition.

OPEVAL. Operational evaluation. The last phase of IOT&E.

OPNAVINST 3960.10. The fundamental Navy instruction on T&E.

OPSEC (Operations Security). See paragraph 1006 for a discussion of this subject.

OT&E. Operational test and evaluation.

PASU. Provisional ASU. See OPNAVINST 4720.9.

PAT&E. Production acceptance test and evaluation. See OPNAVINST 3960.10.

Quick-Look Report. An informal, usually message-format, evaluation report published by COMOPTEVFOR. Always superseded by a formal evaluation report.

RDT&E. Research, development, test, and evaluation. See NAVSO P-2457 (RDT&E Management Guide).

Reliability. The duration or probability of failure-free performance under stated conditions. In OT&E, reliability is usually reported in one of two ways: (R

1. Mission Reliability. For equipment operated only during a relatively short-duration mission (as opposed to equipment operated more-or-less continuously), the probability of completing the mission without critical or major failure. Frequently expressed as exp (-t/MTBF), where t is mission duration and MTBF is as defined below.

2. MTBF (Mean Time Between Failures). For more-or-less continuously operated equipment, the ratio of total operating time to the sum of critical and major failures. Sometimes modified to MFHBF (mean flight hours between failures).

Required Operational Characteristics. System parameters that are primary indicators of the system's capability to be employed to perform the required mission functions, and to be supported. (R

Required Technical Characteristics. System parameters selected as primary indicators of achievement of engineering goals. These may not be direct measures of, but should always relate to the system's capability to perform the required mission functions, and to be supported. (A

Standardized S-Tests. In OPTEVFOR Test Plans the following standardized S-Tests address the major elements of operational suitability. (Others may be added, as appropriate.)

Test S-1, Reliability

Test S-2, Maintainability

Test S-3, Availability

Test S-4, Logistics Supportability

Test S-5, Compatibility

Test S-6, Interoperability

Test S-7, Training Requirements

R) Survivability. The degree to which a system is able to avoid or withstand a hostile environment without suffering an abortive impairment of its capability to accomplish its designated mission.

TAC D&E. Tactical development and evaluation organizations. See Existing Weapons Systems.

A) Thresholds. See Evaluation Criteria.

T&E. Test and evaluation. See OPNAVINST 3960.10.

R) TEMP. Test and Evaluation Master Plan. The controlling document for all T&E. See OPNAVINST 3960.10 and DOD Directive 5000.3 for format and content.

R) Vulnerability. For weapon system acquisition decisions, three considerations are critical in assessing system vulnerability: susceptibility -- a system limitation or weakness (may not be exploitable); accessibility -- the openness of a system to exploitation by a countermeasures technique; and feasibility -- the practicality and probability of an adversary exploiting a susceptibility in combat.

Annex A

Tips on Preparing Correspondence

A101. Fundamentals of Writing OPTEVFOR Correspondence

a. Logic. The fundamental requirement in good writing is logical organization -- the discussion proceeds in logical steps from beginning to end, without irrelevancies or digressions. One way to insure logical organization is to start with an outline. Divide the correspondence into its major parts and list them in a natural order (e.g., "Statement of the Problem", "Alternate Solutions", "Recommended Course of Action"). Then list the various things to be discussed in each major part, as if you were designing vugraphs to brief the subject. When you list these various things, make their order logical. For example, if you're discussing the history of a problem or a test program, discuss it the way it happened -- chronologically. If you're discussing a system's capabilities, discuss them in the order in which they would be used (e.g., detection, tracking, engagement). Once you have established an order, stick to it. For example, if you write that the system has parts X, Y, and Z, don't then provide detailed descriptions of Z, X, and Y.

b. Wording. A logical outline provides the framework; words expand the outline into a completed draft. Do not assume that just any old words will do; words have meaning and deserve to be selected accordingly. The following recommendation from a draft Evaluation Report is an example of near-random use of words:

"Stabilize tracking solutions, lest the system as non functioning will not be militarily useful at sea in the new future it was designed for."

This extract from a draft comment letter is another example of near-random use of words:

"Minimum functional performance parameters must be specifically stated to determine operational effectiveness acceptability."

Pay attention to words -- to their meanings. Make sentences say what you mean.

c. Headings. Writers sometimes ignore the meaning of headings; "Results" paragraphs end up full of conclusions; a

"Required Operational Characteristic" is presented as "Safety will be tested. . .," which is certainly not a system characteristic. In Evaluation Reports, the tendency to ignore headings increases as you get further into enclosure (1). The "Results and Discussion" paragraphs of the last few S-Tests often read like "Additional Recommendations."

d. Adjectives and Adverbs. Be careful of these things. They tend to become unjustified superlatives, or they inject bias (or the appearance of bias). Stick to nouns or verbs as much as possible. That "The system is degraded by . . ." may be obvious from test results; that "The system is seriously degraded by. . ." may be in the eye of the beholder. This is not to say that COMOPTEVFOR will not include that something is "seriously degraded." He may, but he will demand that it be substantiated.

e. Acronyms. Do not assume that by defining an acronym you have told the reader what the thing is. VAST (Versatile Avionics Shop Test), EXCAP (expanded capability), and ICAP (improved capability) have very little information content compared to MTBF (mean time between failures), and will probably require amplification so the reader understands what is being discussed. Too many acronyms tend to make confusing, boring reading. There are two ways you can prevent this:

(1) Use plain English rather than trade jargon.

(2) Never use an acronym if it will appear only once; consider not using acronyms if they will appear only a few times, particularly if their appearances will be widely separated in the text.

g. Editing. Editing is the responsibility of the author, and it is the responsibility of each reviewer of a draft. Failure to exercise these responsibilities results in proposals like the following:

"If the sensitivity of the baseline design to provision of the several desired performance enhancements is to have been determined during the concept verification phase, then those results should be summarized in the NDCP for Milestone I, and recommendations made as to which should be incorporated into the validation baseline conceptual design."

This elegantly phrased nonsense illustrates the most important aspect of editing -- making sure the thing makes sense. Putting in the correct hyphens and commas is important -- but any educated person can do that. Making sure the thing makes sense can often be done only by specialists in the subject matter; if they chop nonsense like the example, we're in trouble. Read aloud what you have written. Have someone else read it aloud to you. If it passes both those tests, print it!

A102. General Instructions for Correspondence

a. Before a document is released for review it should be edited ruthlessly to eliminate nonessential words and phrases.

b. Underline with caution. The reader should be intelligent enough to recognize important facts without having a whole paragraph underlined for him. Also, underlines may make an important introductory sentence look like a paragraph heading. Many readers ignore headings.

c. Avoid long sentences. Even though they are straightforward, the reader may have trouble assimilating their content. Break them into shorter pieces of digestible size, even though it means adding a word or two.

d. If possible, use short words instead of long words or combinations having the same meaning.

use	instead of	utilize
therefore	instead of	for this reason
because	instead of	due to the fact
estimate	instead of	make an approximation

e. Use words in common use. Don't force the reader to his dictionary by using an uncommon word unless no other word will do.

f. Drafts for approval should be double-spaced. This allows changes and corrections to be made neatly, without awkward writing in the margins. Neat, readily understood changes can go to the Admiral without retyping.

g. Changes and corrections of moderate length should be made with erasable black pencil, not with pen or colored pencil.

h. Changes of more than moderate length (rewriting more than a few consecutive lines) should be made by having the changed version typed (double-spaced) on a separate piece of paper, which should then be scotch-taped into the document.

A103. Specific Guidelines for Standardization and Accuracy

a. Use of Hyphens

(1) In general, use a hyphen to join two or more words serving as a single adjective before a noun.

110-volt line	high-speed turn
30-foot depth	long-distance transmission
signal-to-noise ratio	computer-derived data

(2) There are exceptions to this general rule:

(a) When the first word is an adverb ending in "ly" which obviously is going to operate on the word that follows it:

A readily available spare

An increasingly negative reading

(b) In commonly used, compound adjectives, now accepted as a single word: (check the dictionary)

lightweight aircraft

underwater test

(3) Some compound nouns (nouns consisting of two or more words that name one subject) are hyphenated:

light-year

watt-hour

Many compound nouns omit the hyphen. Many have been fuzed into single words. The only way to tell is to check the dictionary.

(4) When it is necessary to spell out numbers (for example, the first word of a sentence), use a hyphen for the numbers twenty-one through ninety-nine (when appropriate).

(5) Do not use hyphens in Mark/Mod designations unless you are quoting a reference which does:

e.g., Mk 4 Mod 3

(6) Hyphens are supposed to reduce confusion and ambiguity. If you don't like them, try rephrasing the sentence to eliminate them:

"The receiver was a 1-kg, 600-cm^3 computer-controlled system."

This could be written:

"The receiver weighed 1 kg, occupied 600 cm^3, and was controlled by a computer."

Note that the first sentence is both more direct and shorter.

b. Use of Symbols

(1) Use "%" instead of "percent." (Except on messages.)

(2) Use "°" instead of "degrees."

c. Use of Numbers

(1) Watch out for too many significant figures. Be sure the data substantiate the significant figures you use, and that they are really necessary. For instance:

"The equipment failed to demonstrate the required 65-hour MTBF. The actual MTBF was 4.38 hours, with 90% confidence that it is at least 1.67 hours."

Test data may substantiate 4.38 and 1.67 hours, but the point is that "about 4 hours" and "about 2 hours" are no where near 65 hours. That's what we're trying to get across to our readers.

(2) Numbers under 10 are spelled out except for time and measurement:

"A team of four UDT swimmers completed the 1-nmi course in 1 hour 25 minutes."

(3) In messages, where transmission accuracy is not under our control, critical numbers should be written out.

d. Terminology Clarity

(1) COMOPTEVFOR statements concerning aspects of a program imply our having already considered the statement, and the word "considered" should not be used. For example, instead of saying "The tests are considered unsatisfactory for the following reasons ...," word the statement to read "The tests are unsatisfactory . . ."

(2) In general, the word, capability is used for describing machinery/hardware/software/things. Ability is generally associated with people.

(3) Don't say "observe" when you mean "monitor." We "monitor" DA testing for IOT&E in conjunction with DT&E. We "observe" test scenarios, firing exercises, aircraft flights, equipment operation, etc.

(4) "Defensive Blocking" and "Shouldering". These terms have been used to describe maneuvers by our ships to restrict undesirable Soviet ship positioning. While fully understood by Navy personnel, to outsiders the terms suggest a form of physical contact which can be provocative or harassing. In order to preclude such interpretations, the standard naval term "screening" is used.

(5) "High-Value Target" and "High-Value Unit." These terms define the U.S. Navy's principal ships from an enemy's point of view, i.e., as potential targets. The CNO considers it important that we emphasize our offensive capabilities, as opposed to our defensive requirements, when we refer to Navy units. This can be accomplished, in part, through the use of specific ship designations such as CV or LPH; in cases where a generic term is required, use "main body" in place of "high-value target" or "unit".

(6) "Overflight." While this term may be applicable to boundaries, coastlines, land masses and other fixed objects or large reference points, it is not appropriate to use it with reference to ships. At high and mid altitudes, it is difficult to determine if an aircraft flew precisely over a ship. In addition to the questionable accuracy of the term, the word connotes a scene where a helpless ship is subjected to an unchallenged aircraft. Since, in most instances, the aircraft is probably conducting a surveillance mission, its action should be referred to as having conducted surveillance of the subject ship.

e. Use of Acronyms

(1) In COMOPTEVFOR correspondence the acronym precedes the definition; e.g., MTBF (mean time between failures). If the definition is only a collection of words, these words are written in lower case. If the definition is a proper name of an equipment or system, use upper case; e.g., VAST (Versatile Avionics Shop Test). Do not hyphenate definitions for MTBF, MTTR, etc.

(2) ASCM (anti-ship-capable missile) is not to be used in OPTEVFOR correspondence.

f. Listing. When listing objectives, evaluation criteria, etc., in subparagraphs, end each subparagraph with a period, not a comma or semicolon. For example:

"3. The DA will provide:

a. Certification of readiness for OPEVAL.

b. Technical support as required.

c. ...."

g. Preparation Dates on Outgoing Correspondence

(1) Messages. It appears in the lower right-hand corner (the same area used for the 'chop' ladder).

(2) Rough Correspondence. It appears in the lower right-hand corner.

(3) Smooth Correspondence. It appears on the green copy sheet and is the same as the date of ACOS chop.

h. Message Nit Picks. Whenever possible articles (e.g., a, an, the) are avoided in messages. Use of short verbs is encouraged (e.g., is, were, will). Instead of saying "originator" in the text of messages, use "COMOPTEVFOR."

i. Use of Metric Units

(1) The Department of Defense has directed use of the international metric system in all activities consistent with operational, economical, technical, and safety considerations. Specifically directed was that technical reports, studies, and position papers include metric units of measurement in addition to or in lieu of U.S. customary units.

(2) Planning documents (DCPs, TEMPs, Test Plans, etc.) and reports associated with OT&E are considered to be included in "technical reports, studies, and position papers" and will use international metric units as the primary measurements, with U.S. customary units in parentheses where necessary.

(3) The DOD-approved metric system described in ASTM E 380-72e of 29 November 1973 will be followed, except that the traditional Navy units "nmi" and "knot" will not be transformed to metric in COMOPTEVFOR documents.

Annex B

Survivability/Vulnerability Guidelines

B101. Introduction. While the details of S/V (survivability/vulnerability) evaluation vary considerably, depending on the system, its function, etc., the fundamental steps an OTD must take with regard to S/V are essentially constant. They are: (R

a. Determine if S/V is an issue in the OR. If it is not, but it appears that it should be, take action to bring this to CNO's attention.

b. Determine that if a threat statement is required by OPNAVINST 3811.1 series, it is in hand. (For assistance, contact the Force Intelligence Officer (Code 24).)

c. Ensure that the NDCP and TEMP address S/V in sufficient detail; that necessary S/V criteria are provided in each document; and that the S/V criteria provide sufficient guidance for the DA, contractor, and OTD.

d. In the TEMP and related DT&E planning documents, ensure that the DA is committed to testing that will support an S/V evaluation, and that assets to demonstrate criteria are identified (ranges, targets, etc.).

e. Ensure that OT&E addresses the real threat, using realistic targets and countermeasures.

f. The bottom line is this -- determine if the system will complete its mission. If it will, it's survivable and not overly vulnerable to hostile actions.

B102. S/V References and Points-of-Contact (A

a. The following is an incomplete listing of S/V reference documents. For help in using them, see your analyst or 02T.

(1) General S/V Guidance

(a) DOD Directive 5000.3.

(b) OPNAVINST 3960.10.

(c) CNM ltr dated 20 Apr 1978 (repetitive errors in TEMPs). (See paragraph B103.c. below.)

(d) OPNAVINST 3811.1 (threat statements).

(e) NAVMATINST 3882.2 (threat statements).

R) (f) NAVMATINST 3900.16 (NAVMAT Combat Survivability Program).

(2) <u>Electromagnetic S/V Guidance</u>

(a) DOD Directive C4600.3.

(b) SECNAVINST C3430.2 (ECCM).

(c) CNM ltr ser 218 of 13 Mar 1979 (E^3 (electromagnetic environmental effects) in acquisition programs).

(d) NAVMATINST C3430.3 (ECCM).

(e) NAVMATNOTE 2400 of 5 Dec 1978 (E^3 in acquisition programs).

(f) CNO ltr 987/P6/69884 of 25 Nov 1975.

(g) NAVMATINST 2410.2 (EMP).

(h) CNO memo 987/P6/569885 of 1 Aug 1975 (EMP).

(3) <u>Other S/V Guidance</u>

(a) NAVMATINST 9110.2 (structural firing tests).

(b) NAVMATINST 9110.3 (shock hardening of government-furnished items).

(c) OPNAVINST 9010.300.

(d) NAVSURFWPNCENINST 8020.2 (explosives used in naval weapons).

(e) SECNAVINST S5430.86 (CBW).

(f) OPNAVINST 09110.2 (ship shock tests).

(g) NAVMATINST 09110.1 (ship shock tests).

(h) JTCG/AS-77-D-001 (aircraft system S/V requirements).

b. S/V points-of-contact for the Navy Labs can be found in Annex C. Within the Navy Material Command, points-of-contact are:

(1) Dr June Amlie (MAT-08D13): AV 222-9015.

(2) Mr Norm Jackson (MAT-08DE): AV 222-1887.

c. Liaison with the Naval Security Group (see SEC-NAVINST C3430.2) should be initiated by letter. (A sample is provided at the rear of this annex.) The point-of-contact is Mr. Sam Wong, AV 292-0655.

B103. S/V Aspects of Program Documentation (A

a. Review OPNAVINST 3811.1.

b. The directives and instructions listed in paragraph B102 require that S/V be addressed at all stages of development, and that program decuments address the S/V issues that are of concern. The OTD must be familiar with the directions and instructions that affect his system, and must be ready to insist -- early on -- that their provisions be adhered to. Failure to do so may well result in an inability to make a meaningful S/V assessment.

c. The Required Technical Characteristics contained in the NDCP and TEMP should contain a complete set of S/V criteria. (Most initial drafts are devoid of S/V criteria.) CNM ltr dated 20 Aug 1978 on TEMP errors states, "Make sure that there is a list of key technical/operational characteristics, showing performance parameters, goals, and thresholds. The primary errors in this area have been related to inadequate R&M (Reliability and Maintainability) requirements and lack of or inadequate S/V requirements. Technical characteristics should include S/V requirements and design R&M requirements..." Furthermore, the NDCP is required to present the various alternatives, including S/V tradeoffs.

d. Part III of the TEMP should outline the DA's plan of action; insist that it specify how system survivability will be demonstrated.

e. The Required Operational Characteristics should be based on the mission of the system and the combat environment in which the system is expected to operate. (See Codes 24, 02T, and 02B, your analyst, and fellow OTDs for assistance.)

B104. The E-Tests

a. Testing for S/V should be approached in two ways: that which can actually be done during active project operations, and that which cannot. The first should be accomplished as in Test E-3 in the sample Test Plan of Section 10.

b. The scenario-related E-tests must be designed to demonstrate the system's capability -- or lack of capability -- to accomplish its mission in the intended environment. You should employ the best tactics (ours and theirs) available and the best countermeasures (ours and theirs) available. Targets must be realistic, and must be employed realistically. (Try to translate BQM-34s destroyed one-at-a-time on a sunny day, with flat seas, clear Med environment in June to destroying a raid of four AS-6s with jamming in the North Atlantic in January.)

c. Test E-3 in the sample Test Plan focuses on the "cheap kill" aspect of system survivability. Here is where a majority of the DA's S/V test results can be useful; they will be available only if you have ensured beforehand that the DA will conduct the required tests. (For example, using the model shown in Figure B-1.) Equipped with the threat statement, required operational characteristics, knowledge of test results to be expected from the DA and NAVSECGRU, and the list of considerations of paragraph B105, you should be able to modify the sample Test E-3 to fit your needs. You should concentrate on issues that you cannot actually test. If technical questions arise, consult the Navy Lab people (see Annex C or the NSAP representative).

B105. <u>Survivability/Vulnerability Considerations</u>

a. Consider degradation from:

(1) Man-made Environment

(a) Blast effects of underwater, air, contact, or penetrating conventional high-explosives and nuclear weapons.

(b) Fragment damage (primary and secondary).

(c) Progressive fire/flooding/component failure.

(d) Small arms fire (primary and secondary effects).

(e) Chemical and biological weapons effects.

(f) Nuclear radiation and EMP effects.

(g) Thermal effects (nuclear, laser, and on-board fire).

(h) Interference (enemy, friendly, or intra-platform):

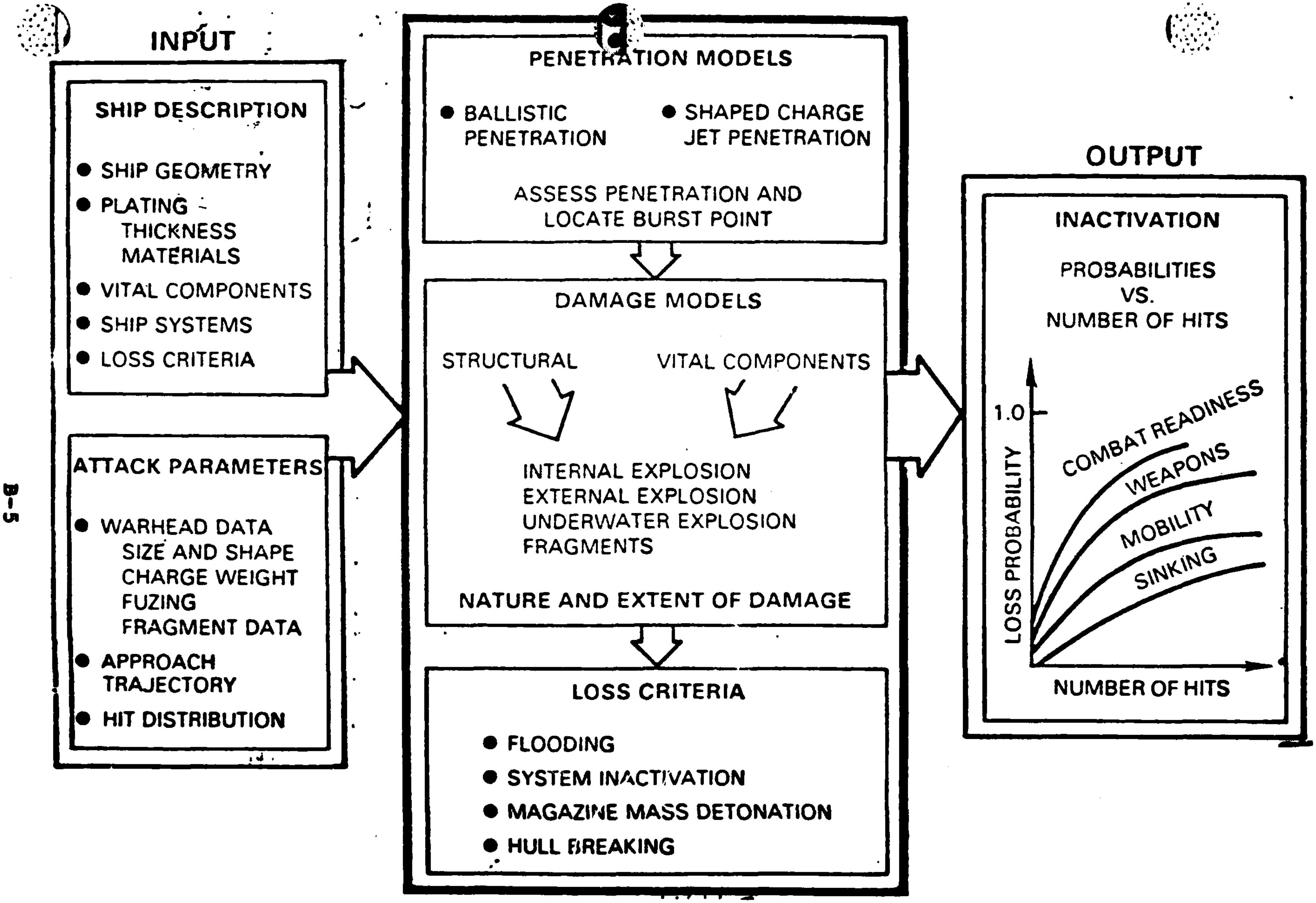

Figure B-1

<u>Ship Vulnerability Model</u>

1. Laser.

2. Electromagnetic (EMI).

3. Chaff.

4. Smoke, dust (detonation or created).

(i) Early burst of own weapons.

(j) Mistargeting of own weapons.

(k) Sympathetic detonations.

(2) Natural Environments (Note: Equipment performance in the natural environment is evaluated under "Compatability." The effects of the natural environment are also considered here, because they can enhance or diminish the simultaneous effects of enemy action.)

(a) Sea state (wave dynamics, salt spray, green water, shock, and vibration).

(b) Weather conditions (rain, hail, clouds, haze, fog, dust, and wind).

(c) Climate (temperature extremes, temperature cycles, and humidity).

(3) Enemy Countertactics

(a) Detection of platform or weapon system signatures (visible, infrared, magnetic, noise, wake, and electromagnetic).

(b) Interference (smoke, dust, camouflage).

(c) EMCON.

b. A ship (or weapon system) is survivable if it is:

(1) Difficult to detect, classify, or track. The following elements pertain:

(a) Radar cross section control.

(b) IR signature control.

(c) Visible signature control.

(d) UV signature control.

(e) Electronic signature control (EMCOM).

(f) Acoustic signature control.

(g) Radio frequency signature control.

(h) Wake control.

(2) Difficult to hit. The following pertain:

(a) Size, maneuverability, and speed.

(b) IR, optical, UV, electronic, and active weapons countermeasures.

(c) Torpedo, missile, and gunfire launch warning.

(3) Difficult to damage. The following pertain:

(a) Shock, fire, and fragment protection.

(b) Compartmentation.

(c) Stability margins.

(d) CW/BW protection.

(e) Air blast protection.

(f) Redundant critical components and paths.

(g) Reduced mode operation.

(h) Armor and internal blast protection.

(i) Small-caliber projectile protection.

(j) Fuzing plates.

(k) Critical personnel redundancy, and personnel protection.

(l) Magazine fire protection.

(m) Survivable communications (internal and external).

(n) Laser protection.

(4) Easy to repair. The following pertain:

(a) Quick-fix critical cables.

(b) Seaworthiness patches.

(c) Personnel survival.

(d) Critical spares.

(e) Modular construction.

(f) Alternate lighting.

(g) Survivable communications.

B106. Assessing a Ship's Physical Vulnerability*

a. Survey topside electronics and assess their vulnerability in light of operational experience (e.g., Vietnam) and associated studies (e.g., CG 32 and FFG 7). Recommend corrective measures.

b. Review results of the EMP test of the ship at the EMPRESS (Electromagnetic Pulse Radiation Environment Simulator for Ships) facility with full electronics and other mission-critical equipment in operation. Identify deficiencies in equipment and system design, recommend corrective action, and develop operational procedures for minimizing mission degradation by EMP.

c. Assess the adequacy of shock resistance of ship systems in light of results from shock trials, and evaluate corrective measures taken. Analyze results of shock tests vis-a-vis current and projected enemy weapons.

d. Identify deficiencies in equipment arrangements and locations that may compromise the ship's survivability. Recommend corrective measures (e.g., segregation of systems operating in parallel and consolidation of systems operating in series).

e. Identify critical elements (including subsystem paths) in the operational sequence whose inactivation results in high-level degradation of system performance. Recommend corrective measures (e.g., redundancy, manual override).

f. Identify deficiences in damage control measures (e.g., fires, flooding), and equipment location and protection

*Reference: DTNSRDC Technical Report 76-0116, Vulnerability Issues in Total Ship System Operational Test & Evaluation, Sept 1976 (See Figure B-2)

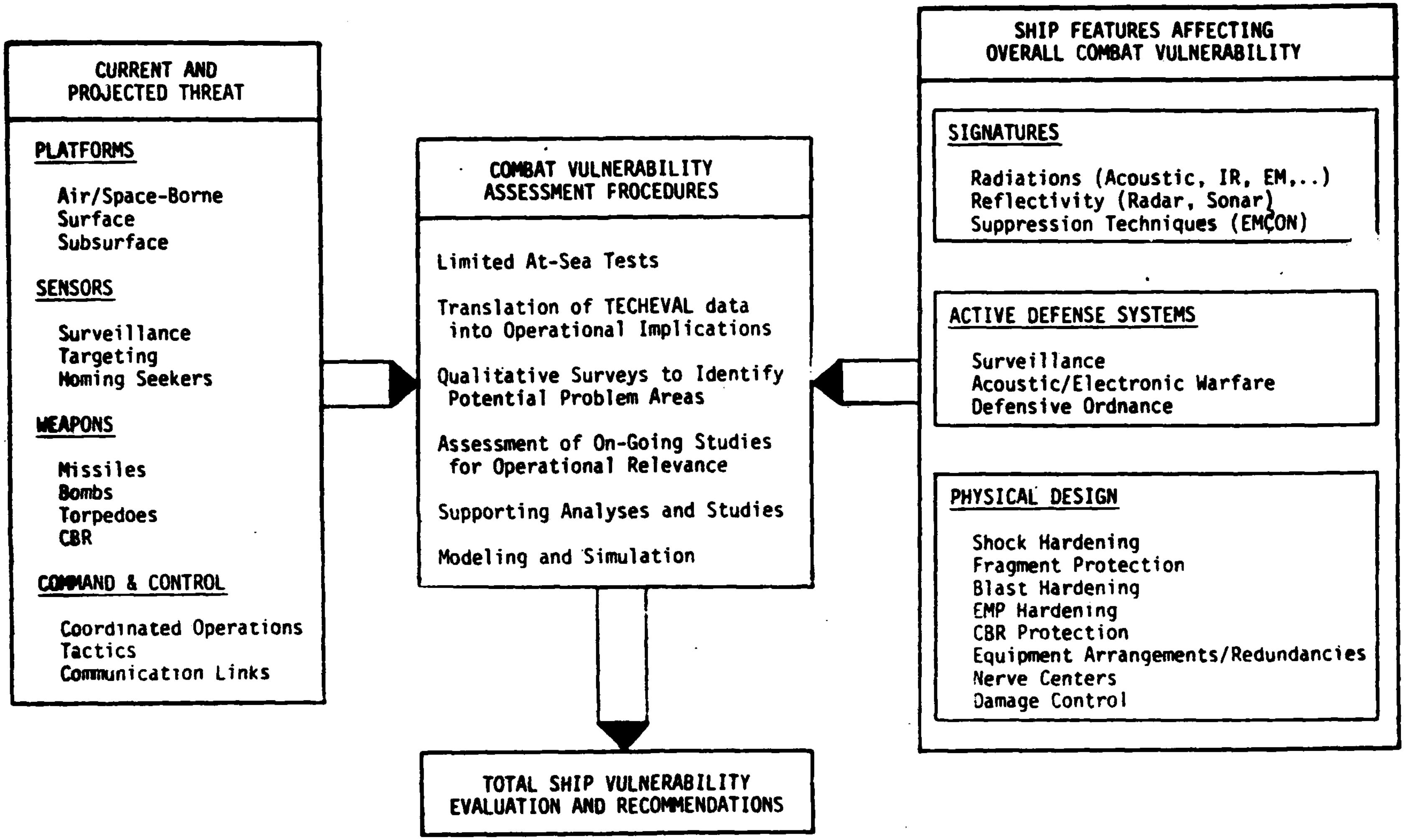

Figure B-2

Issues for Total Ship Vulnerability Assessment in OT&E

in light of operational and damage experiences (e.g., BELKNAP, FORRESTAL, etc.). Recommend corrective measures.

g. Conduct at-sea tests, using non-toxic smoke or gas agents, of the adequacy of personnel protection measures against chemical, biological, and radiation weapon effects. Recommend corrective measures.

h. Conduct at-sea operations of the "damaged" ship to simulate degraded performance states for different types and levels of impairment that may result from weapon effects. Assess total ship operational effectiveness in these degraded modes.

B107. Assessing a Ship's Signature

a. Conduct an EMPASS (electromagnetic performance of aircraft and ship systems)-type survey of the ship. Develop tactics to minimize vulnerability because of intentional radiations of shipborne equipment.

b. Conduct radar ranging of the ship at the RAM (radar area measurement) site in the Chesapeake Bay to determine the far-field radar cross-section as seen by enemy search and targeting radars. Conduct a near-field radar survey to identify critical points/areas (highlights) of the ship as seen by an active radar homing-missile seeker. Propose modifications to eliminate/reduce critical highlights, and tactics to minimize vulnerability to active radar sensors and weapon systems.

c. Conduct an IR/EO survey of the ship using captive-missile-seeker test procedures. Propose tactics to minimize vulnerability.

d. Analyze data from ship noise trials. Evaluate the impact of own-ship noise on friendly ship sonars and sonobuoys. Propose preliminary tactics to minimize acoustic vulnerability.

e. Conduct magnetic and pressure profiling of the ship and assess the ship's vulnerability to underwater influence-fuzed weapons (e.g., mines).

f. Evaluate the effectiveness of suppression techniques installed on the ship to reduce ship emissions and radiations in the electromagnetic and acoustic frequency ranges.

DEPARTMENT OF THE NAVY
COMMANDER OPERATIONAL TEST AND EVALUATION FORCE
NORFOLK, VIRGINIA 23511

644:kmb
3960
Ser XXX
Date

From: Commander Operational Test and Evaluation Force
To: Commander Naval Security Group

Subj: Signal Susceptibility and Vulnerability Assessment of the New Weapon System

Ref: (a) SENAVINST C3430.2

1. In accordance with the provisions of reference (a), it is requested that the Naval Security Group conduct a signal susceptibility and signal vulnerability assessment of the New Weapon System during the operational evaluation currently scheduled 23 September - 20 December 19XX. Point of contact for resource identification and coordination is LCDR J. A. MALO, DEPCOMOPTEVFORPAC, Code 604A (A/V 951-5531) or LCDR L. W. BAUER, COMOPTEVFOR, Code 644 (A/V 690-5021).

ACOS
By direction

Copy to:
(DA)
CNO (Sponsor)
(OP-983)
DEPCOMOPTEVFORPAX/VX- (OTD)
CHNAVMAT (MAT-08D13)
(MAT-08DE)

SAMPLE S/V LETTER TO NAVSECGRU

Annex C

Navy S/V Test Facilities

C101. Summary of Navy Labs

a. NADC. Naval Air Development Center, Warminster, PA, 18974; Info Operator: AV 441-2000; NSAP Coordinator: AV 441-3100.

Mission: Principal RDT&E center for naval aircraft systems (less aircraft-launched weapons systems).

Areas: Failure mode effects analysis, SAM and AAA survivability modeling, aircraft combat loss analysis, aircraft failure analysis.

b. NSCC. Naval Coastal Systems Center, Panama City, FL, 32401; Info Operator: AV 436-4011; NSAP Coordinator: AV 436-4204. (R

Mission: Principal Navy RDT&E activity in support of naval missions and operations that take place primarily in the coastal (continental shelf) regions. Includes RDT&E for mine countermeasures, diving and salvage; coastal and inshore defense (less ASW), swimmer operations, and amphibious operations.

Areas: Mine countermeasures effects analysis (acoustic vulnerability analysis), torpedo CM effects analysis, hostile swimmer CM effects analysis.

c. NOSC. Naval Ocean Systems Center, San Diego, CA, 92152; Info Operator: AV 933-1011; NSAP Coordinator: AV 933-2851. (R

Mission: Prime Navy RDT&E center for C^3 (command, control and communications); ocean surveillance; surface- and-air-launched undersea weapon systems; and supporting technologies.

Areas: Systems analysis, torpedo CM, surveillance systems (EM, EO signature quantification), EW systems, SOSUS improvement, C^3 architecture, and C^3 land-based test site.

d. NPRDC. Navy Personnel Reasearch and Development Center; Info Operator: AV 933-1011; NSAP Coordinator: AV 933-7424.

Mission: Prime Navy Activity for human resource RDT&E in areas of manpower, personnel, education, and training.

Areas: No direct survivability work. Human factors analysis possible, however.

e. NSRDC. Naval Ship Research and Development Center (David W. Taylor), Bethesda, MD, 20084; Info Operator: AV 287-0101; NSAP Coordinator: AV 287-1681.

Mission: Prime Navy RDT&E center for Navy vehicles and logistics.

R) Areas: Design of surface combatants, aircraft carriers, craft, and submarines against effects of conventional and nuclear weapons delivered under and above water. Analysis of vulnerability to these forms of attack, along with fire and own ship ordnance hazards. Development of protection systems against external and internal blast, fragments, and underwater shock. These include aircraft carrier magazine armor; lightweight armor systems for protecting topsides of surface combatants; spot armoring and blast-resistant design of search/surveillance antennas and weapons system directors; and hull, propulsion, and auxiliary system shock hardening. Cost-benefit analysis of protection options and survivability features such as arrangements and redundancy are also included, as well as characterization of threat weapons effects and determination of ocean environment and seakeeping characteristics in various seaways for use in combat capability assessments. Surface ship and submarine signature control efforts include surface ship and submarine silencing along with IR/EO/RCS and magnetic signature control as well as determining antiship IR seeker aimpoint tracks. Also military effectiveness studies of the above features.

f. NSWC. Naval Surface Weapons Center, Dahlgren, VA, 22408; Info Operator: AV 249-1110; NSAP Coordinator: AV 249-7164.

Mission: Prime Navy RDT&E center for surface ship weapons systems, ordnance, mines, and strategic systems support.

Areas: Platform survivability analysis (threat interactions); integrated weapon systems S/V analysis; weapons effects RDT&E; EM vulnerability T&E; armor and materials RDT&E; CM/BW S/V; nuclear weapons effects; launchers, guns, electronics, and electrical subsystem vulnerability; ship S/V test and analysis, missile S/V test and analysis, aircraft S/V test and analysis; IR and EO decoys; RF decoys; fuze countermeasure.

g. NUSC. Naval Undersea Systems Center, New London, CT, 06320; Info Operator: AV 636-0111; NSAP Coordinator: AV 636-2250.

Mission: Prime Navy RDT&E center for submarine warfare and submarine weapons systems.

Areas: Torpedo acoustic noise, C^3 effectiveness, ocean environment (effects on detectability), target strength, force S/V analysis, threat detection, communication effects on S/V.

h. NWC. Naval Weapons Center, China Lake, CA, 93555; Info Operator: AV 245-9011; NSAP Coordinator: AV 245-3793.

Mission: Prime Navy RDT&E center for air warfare systems (except ASW) and missile weapons systems.

Areas: EW, ECM, IRCM, ARM, ASMD, C^2, target detection, classification, and hardkill systems analysis and development; target vulnerability for weapons effectiveness (surface tgts); aircraft survivability T&E (tactics, threats, computer description, vulnerability assessment, S/V technology).

C102. Capabilities and Facilities for Measuring Ship Signatures

a. Measurements of ship (and submarine) radiated-noise signatures in acoustic frequency bands for sonar, torpedo, and mine threat assessments are conducted on several callibrated ranges, either Navy-owned or available to the Navy.

(1) East Coast

(a) AUTEC (Atlantic Underwater Test and Evaluation Center), Andros Island in the Bahamas, located off the Florida east coast, is a Navy-owned facility under the command of NUSC/New London. The AUTEC acoustic range is a deep-water (> 1000 ft) facility using a fixed hydrophone array moored off the bottom. NUSC is responsible for scheduling use of the range and for providing all support.

(b) MONOB (Mobile Noise Barge), located off Port Everglades, Florida, is a Navy-owned facility designed and dedicated to ship (and submarine) acoustic trials by and for

NSRDC. Other users can have access to MONOB, but on a not-to-interfere basis. MONOB can be moved around; acoustic measurements for submarines, for example, are normally made from a deep-water moor either in Exuma Sound or in the TOTO (Tongue-of-the-Ocean), both of 6,000-ft depth. This facility is under the command of NSRDC/Carderock.

(2) West Coast

(a) SCARF (Santa Cruz Acoustic Range Facility), located at Santa Cruz Island 20 miles off the California coast, is a private facility owned and managed by the General Motors Corp. All activities including data acquisition are carried out by GM under contact with Navy and other (industry) users. The SCARF uses a deep-water (> 1000 ft) moored fixed hydrophone array. The Puget Sound Naval Shipyard is the Navy's principal user of SCARF.

R) (b) Carr Inlet, located off Fox Island 20 miles from Bremerton, Washington, is a Navy-owned facility under the command of PSNSY (Puget Sound Naval Shipyard). It is a relatively shallow-water (< 390 ft) facility that employs a moored fixed hydrophone array system. Normally, the hydrophone elements are located at depths of 50, 100, 200, and 300 ft. SSRNM (Surface Ship Radiation Noise Measurement) operational test facilities at San Clemente, California, supplement the BARSTUR and GARF facilities discussed below.

(c) BARSTUR (Barking Sands Tactical Underwater Range), located off the island of Kauai, Hawaii, is a Navy-owned facility primarily used as a weapons tracking range and for conducting fleet exercises. It is a calibrated range with a capability for precise tracking of missiles (by surface radars) and torpedoes (by underwater fixed hydrophones), and for precise position fixing of ships and submarines. A ship/sub noise measurement capability has been added to BARSTUR. This range comes under the command of PMTC.

A) (d) GARF (Guam Acoustic Range Facility) is a ship/submarine noise measurement facility off the island of Guam. It is under the command of LOGPAC.

AUTEC, MONOB, SCARF, Carr Inlet, and GARF acoustic facilities are calibrated Navy-certified ranges and, in general, all use compatible data acquisition, processing, and analysis techniques for ship (and submarine) radiated-noise measurements.

b. In-situ acoustic measurements of ship radiated-noise using line hydrophone arrays and/or sonobuoys deployed from a work boat can also be made if a calibrated range cannot be used. Such measurements, however, are limited by instrumentation inadequacies, and they lack the precision obtained when using a calibrated range for exact position (and range) fixing. In-situ measurements can provide useful information with regard to gross acoustic characteristics and deficiencies of ships such as: critical tonals, propellor singing and cavitation inception speeds, etc.

c. The capabilities and facilities on each coast for ship IR/EO signature measurements and analysis are described below.

(1) East Coast

(a) There is no calibrated range for making IR signature surveys of ships, so in-situ techniques have to be employed. One possibility is to mount a captive missile-seeker in a helo or aircraft and fly against the ship, simulating a missile trajectory; the information thus collected pertains only to the particular seeker used. Measurements of a broader nature need to be made using wide-band radiometers such as spectrometers/interferometers to get the spectral distribution of a ship's IR signature, and imagers to determine the spatial distribution. Another possibility is to instrument the EMPASS aircraft for simultaneous measurement of EM and IR signatures. However, it would be more appropriate to use a helo that can fly at low altitudes corresponding to actual missile trajectories. These types of IR measurement devices could be located on some fixed land station with a capability for "exact" position fixing of the ship target. NRL is currently performing IR measurements with high performance aircraft utilizing dual-band captive seekers and imagers to support electronic warfare programs. DTNSRDC has made IR measurements utilizing thermocouples on a ship before it conducted passes through the NRL RAM site located at their Chesapeake Bay Division, Maryland. DTNSRDC and NRL possess the expertise and experience to assist OPTEVFOR in planning and carrying out ship IR measurement programs. (R

(b) The NRL mobile radiation laboratory is routinely used to obtain high spectral resolution (0.5 cm^{-1}) EO signature data. Other ongoing activities in support of signature measurements utilize unique NRL facilities in the areas of E)/meteorology and atmospheric optical properties.

(c) The joint NRL Electro-Optical Technology Program Office/MIT (Lincoln Laboratory) ship IR measurement program has produced a data base of high spatial resolution, radiometric, IR ship signatures in both important atmospheric IR spectral windows (3-5 μm and 8-12 μm). Calibrated imagery of many modern Navy ships is being used to study geometrical, meteorological, diurnal, and other parameters effecting IR emission from ships, as well as IR signature computer models, and sensor design.

(2) West Coast. The same general statements with regard to the East Coast also apply here.

R) d. Radar Reflectivity

(1) East Coast. Ship radar reflectivity characteristics are highly aspect-dependent in terms of spatial and spectral distributions. They are also a function of polarization, elevation angle (as might be seen by incoming missiles on different trajectories), and frequency. The Navy-owned facility for making measurements of ship RCS (radar cross-section) from a fixed ground location is the RAM site located on the Chesapeake Bay, Maryland. This is a calibrated range possessing the necessary position-fixing capabilities. It is under the command of NRL. Only RCS measurements of ships (as might be seen by a surveillance/detection radar sensor) are made at the RAM site. With regard to what ship radar reflectivity measurements could/should be made, and by whom, the following is offered:

(a) Aspect-dependent (around 360°) RCS fine-grain measurements within potential threat radar bands, using the RAM site should be considered; measurements in the L, S, C, and X-bands could be accomplished. East Coast ships could be scheduled to make passes through this measurement range.

(b) The RAM site permits ship RCS measurements at near-grazing angles (to the horizontal). To make RCS measurements for elevation angles up to and exceeding 45°, it is necessary to use an instrumented airborne platform (e.g., EMPASS aircraft). Ship RCS measurements patterned after the RAM ground system type of data could be made using an airplane platform -- range measurements could be stored on magnetic tape.

(c) Another ship radar reflectivity characteristic is its doppler signature. NRL has an instrumented X-band system, designed primarily for recording doppler signatures of aircraft, that could be adopted for ship measurements. Doppler characteristics of a ship may be thought of as second-order vis-a-vis RCS, but they can be important from the point of view of classification clues.

(2) West Coast. NELC possesses a capability for making ship RCS far-field measurements in the X-band. They also possess an experimental S-band radar system which could be used for ship RCS measurements. The NELC installations are situated along the California coast. The radars are located 100 ft above ground level and permit only near-grazing angle measurements.

e. With regard to ship magnetic signatures, the Navy possesses several degaussing and deperming ranges on the east and west coasts that are used for making signature measurements. STNSRDC is the Navy's lead laboratory for submarine magnetic silencing, NSWC for surface ships. There is no counterpart laboratory on the West Coast. Other Navy laboratories participating in these programs include NUSC, NADC and NCSC. Also, NSWC has specialized interests in ship (and submarine) magnetics from the point of view of magnetic mine design. A description of the specific capabilities follows: (R

(1) East Coast

(a) Two degaussing ranges are located off Norfolk and Charleston. A third range, primarily for destroyers, is being established off Mayport. In addition to these degaussing ranges for transiting ships, the Norfolk facility has arrays of bottom-mounted magnetometers for making magnetic measurements of moored ships, such as during deperming operations. Charleston has specialized facilities for measuring and calibrating minesweepers. Operation of the degaussing ranges comes under the cognizance of the Commanding Officer of the Naval Station where the respective ranges are located. Technical guidance on the kinds of information and procedures to be used is provided by NAVSEA. DTNSRDC provides engineering support for hardware and software improvements. (R

(b) NSWC has a facility off Ft. Lauderdale for acquiring magnetic signatures of ships (and submarines).

(c) DTNSRDC has a land-based test site at its Annapolis Laboratory for making magnetic measurements on full-sized ship equipment. Electrical motors and generators can be operated under typical shipboard supply voltages and loads. Items weighing up to 40 tons can be investigated with arrays of magnetometers providing 171 magnetic measurement points. (R

(2) West Coast. The two degaussing ranges are located off San Diego and at Pearl Harbor. The San Diego facility has the additional capability of arrays of bottom-mounted magnetometers for making magnetic measurements of moored ships, both steel-hulled ships and minesweepers. Operation, administrative control, technical guidance, and range improvements are exercised the same as the East Coast facilities. (R

f. Ship Pressure Signature Measurements. The only Navy laboratory that does this is NSWC, White Oak. They possess a semi-portable instrumentation package that has been installed in Ft. Lauderdale and Ft. Monroe test facilities to make measurements of ship pressure signatures, primarily for purposes of pressure-influence mine design. The NSWC instrumentation package can be installed in any facility having a target tracking capability such as exists in many of the ranges discussed in previous paragraphs; or it can be installed in-situ, so long as some kind of tracking capability is available (it is critical to know target position, course, aspect, speed, etc. relative to the array of pressure-sensing elements). NSWC is developing a self-contained multi-influence recording system (AUTO-range) that can turn itself on-and-off automatically simply by the presence of a ship and record various signatures of interest (acoustic, magnetic, and pressure), primarily in the influence-mine frequency range. Generally speaking, "targets of opportunity" are ranged and, more seldom, scheduled ship runs are made through the Ft. Lauderdale and Ft. Monroe facilities to acquire pressure signatures. NSWC possesses a library of ship pressure signatures from dedicated ranging runs in which the ship motions were controlled. The Ft. Monroe range has been used to make simultaneous measurements of ship acoustic, magnetic, and pressure signatures.

C103. Navy EMP Simulation Facilities

a. EMP effects are one of the more important nuclear threats to the fleet. EMP from a high-altitude detonation hundreds or even thousands of miles away can cause permanent damage or temporary operational impairment of shipboard electronics and avionics equipment. EMP technology has been steadily developing at NSWC since it became the Navy's lead for NWE (nuclear weapons effects) in 1969. Because of the complexity of the problem, one aspect of the EMP program has been development of EMP simulation facilities. The principal milestones in this area are:

(1) Established the EMPRESS (Electromagnetic Pulse Radiation Environment Simulator for Ships) at the NSWC Solomons Facility in 1972.

(2) Established the EMPSAC (EMP Simulator for Aircraft) at NATC in 1976. Added the vertically polarized NAVES (Navy Aircraft Vulnerability EMP Simulator) in 1977.

b. EMPRESS. EMPRESS is a subthreat-level simulator designed for performing coupling studies of electrical/electronic systems aboard ships. The facility is capable of illuminating a ship, producing EMP polarized either vertically or horizontally and including both high-frequency and low-frequency components of interest. Although the facility is primarily for subthreat-level coupling studies of ships, it can be used for aircraft fly-by tests and near-threat level testing of small subsystems by locating the subsystems close to the facility (i.e., within 50 meters).

d. EMPSAC. The EMPSAC facility at NATC provides a means for EMP testing of naval aircraft, missiles, and avionics systems. The facility uses a 2.5 - megavolt pulser to excite antennas that provide either a horizontally or vertically polarized transient EM wave, generally at subthreat levels. (R

e. NAVES. NAVES was erected at NATC in 1977 and is a vertically polarized conical monopole over a ground plane.

f. Larger Ships. The only range facilities for conducting EMP platform hardening effectiveness tests is EMPRESS. The EMPRESS range is generally not adequate for tests of large ships because of its location; therefore, it is planned to relocate EMPRESS. It has not yet been established whether the EMPRESS Facility will be relocated in the Atlantic or in the Pacific. (R

Annex D

Intelligence Support

D101. General. OPNAVINST 3811.1A states in part that "for each weapons systems program, specific planning will be included for obtaining, updating and utilizing threat support throughout the life cycle of the program." To assist OTDs in obtaining adequate threat support for OT&E, Headquarters, DEPCOMOPTEVFORPAC, VX-1, VX-4, VX5, and OPTEVFORDET Sunnyvale have either full-time Intelligence Specialists (1630) or Collateral Duty Intelligence Officers assigned. (OPTEVFORDET New London is supported by Headquarters and informally by intelligence activities in the New London area).

D102. Types of Intelligence Available. OTDs should be aware of two types of intelligence: Finished Intelligence and Operational Intelligence.

a. Finished Intelligence, which includes published, agreed-upon information about current and projected enemy tactics and capabilities, is furnished through the NWP-12 series, and a special series of publications produced by the Naval Intelligence Support Center expressly for the RDT&E community (see paragraph D105). Additionally, tailored threat assessments and threat support plans exist which specifically support a single program or system. The NISC publications and tailored threat assessments are important because they represent the official Navy position and address the projected threat. Since the majority of operational testing involves future systems, understanding and incorporating projected threat information into the OT&E process is imperative. Consequently, frequent use of Finished Intelligence publications by OTDs is encouraged. The NWP-12 series is particularly important for test scenario development, since it provides insight into enemy tactics.

b. Operational Intelligence, which deals with information such as ship positions, satellite surveillance periods, and location of foreign intelligence collectors, is sent by message upon request and is particularly useful during at-sea/range testing when OPSEC is a prime concern.

D103. When to Use Intelligence. There are three periods when threat information is particularly important. The first is during the TEMP planning stage. Familiarity with the threat at this point will help an OTD anticipate required OT&E resources (e.g., targets and/or simulators) and identify critical T&E issues. The second important period is during development of the Test Plan. Updated threat information will help an OTD refine requests for test resouces and develop realistic test scenarios. In addition, it will provide a general framework upon which to evaluate the system. Finally, intelligence support should be considered during at-sea/range testing, to minimize the possibility of compromise.

D104. OTD Responsibilities. The Program Sponsor and CHNAVMAT are responsible for developing an intelligence support plan for each new program. However, it is incumbent upon every OTD to ensure that a threat support plan exists and that essential information is used during OT&E. Frequent liaison with the Intelligence Officer is encouraged and is required during TEMP and Test Plan preparation. If it is determined that existing threat support is inadequate, OPTEVFOR intelligence officers will assist OTDs in obtaining needed information.

D105. OPTEVFOR intelligence officers will:

a. Forward threat support requests to COMNAVINTCOM in accordance with OPNAVINST 3811.1A. (Intelligence officers at subordinate commands will forward threat support requests to COMOPTEVFOR for initial coordination.)

b. Ensure that Program Sponsors, Program Coordinators, and Program Managers receive copies of all OPTEVFOR threat support requests, as well as the data received in response to those requests.

c. Ensure that all project-related threat data are provided to the OTD.

d. Provide a quarterly report to COMOPTEVFOR (ATTN: Code 24) listing the threat support provided and/or planned for each assigned project.

e. Provide inputs and guidance to OTDs on threat matters during drafting of DCPs, NDCPs, TEMPs, Test Plans, and T&E reports.

f. Support model managers by coordinating intelligence inputs for NWPs.

g. Support the production of OTGs (OPTEVFOR Tactics Guides) and tactical memoranda with appropriate intelligence information.

D106. NISC publications recommended for use by OTDs:

a. Soviet Naval Threat Circa 2000 - DST-1200F-597-77.

b. Soviet Threat to Air Forces - DST-1300F-604-77.

c. Soviet Threat to Undersea Forces - DST-1200F-598-77.

d. Soviet Threat to Surface Forces - DST-1200F-590-77.

e. Soviet Ocean Surveillance Capabilities - DST-1430S-607-77.

f. Soviet C^3 Capabilities - DST-1270S-190-77.

g. Soviet Air Capabilities - DST-1300F-605-77.

h. Soviet Submarine Capabilities - DST-1220S-603-77.

i. Soviet Surface Capabilities - DST-1210S-602-77.

j. Soviet AAW/ASMD Capabilities - DST-1200S-601-77.

k. Soviet ASCM Capabilities - DST-1330S-606-77.

Annex E

Guidelines for Assessing Training Plans

E101. Introduction. NTPs (Navy Training Plans) are prepared in accordance with OPNAVINST 1500.8H. In comment letters on "for comment" drafts and in OPEVAL reports, OPTEVFOR addresses the adequacy of the NTP.

E102. Guidelines. The following guidelines are provided for reviewing NTPs:

a. Operation and Maintenance Training Requirements

(1) The first step is to verify the manning required for the new equipment. The DA should have established manning requirements based on OPNAV 10P23 and OPNAVINST 1000.16D. The operational concept for the new equipment and, therefore, the watch station requirements at Condition of Readiness I and III will impact manning, as will preventive and corrective maintenance requirements. Review these requirements with the DA.

(2) The second step is to check the installation schedule. The installation schedule back-dated by the required school length determines the required training schedule.

(3) Then check to make sure the required training schedule is preceded by adequate instructor training.

b. Installation Training Requirements. Make sure installation training (if required for the new equipment) is provided prior to delivery at the installation sites.

c. IMA (Intermediate Maintenance Activity) and Depot Training. Make sure provision is made for training IMA and depot repair personnel, consistent with the maintenance concept of the ILSP.

d. Training Facilities

(1) Equipment Delivery. Ensure the delivery schedule accommodates the requirements for operation and maintenance training.

(2) GPETE (General Purpose Electronics Test Equipment), SPETE (Special Purpose Electronics Test Equipment), and PSE (Pecular Support Equipment). Ensure that training site allowances of GPETE, SPETE, and PSE are consistent with

anticipated shipboard allowances. Additionally, ensure that allowances provide for continuous availability through the calibration cycle of training equipment. Ensure that calibration provisions have been made for equipment using new technology.

e. Training Adequacy. OT&E reports include an assessment of the adequacy of planned training. This evaluation may be limited by the training received (i.e., not as specified in the NTP), but the training that is provided should at least provide a basis for a qualitative assessment of the NTP.

Annex F (R

Evaluating Software Aspects of Systems

F101. Software OT&E Guidelines. This annex provides general guidelines for OT&E of software-intensive systems and computer software subsystems in accordance with software initiatives contained in DOD Dir 5000.3 and DOD Dir 5000.29.

a. Background. Software is a combination of computer programs (including test and maintenance programs), computer data, firmware, and documentation enabling computer equipment to perform various computational or control functions. Firmware is a hardware component that obtains its functional characteristics from factory-fixed software. Modern weapons systems use computers and associated software to perform functions critical to strategic and tactical missions. DOD estimates that over $3 billion is spent annually for weapons system software and that the cost is steadily rising, particularly the cost of maintaining operational software. In addition to increasing cost, technical and management problems with the way software is designed, developed, tested, and maintained tend to extend development schedules and degrade mission performance. Because of lower visibility in the acquisition process, development and testing of software is not given the same emphasis as hardware, even though it is just as critical to operational performance. Recent DOD software initiatives promote higher visibility and a more disciplined approach to management of software design, engineering, and programming to ensure production of effective software at minimum life-cycle cost.

b. Test Planning. Review DT&E plans for performance and quality-oriented testing. Ensure that this DT&E is clearly defined in the TEMP and that performance testing is planned at the completion of significant phases, particularly the software/hardware integration phase. Ensure that COMOPTEVFOR is afforded the opportunity to participate in test design and execution. If test results are significant, be prepared to evaluate and report separately. Before computer program acceptance, the DA should conduct software quality testing. This may be the final test of a performance test series at an LBTS (land-based test site), but if possible, it should be completed in the ultimate user environment (see MILSTD 1679 and TADSTAND 9). If the operational test environment is realistic and testing is scenario-driven, valuable operational information can be realized.

c. Configuration Management. During initial planning of software development, review configuration management procedures to be instituted during development. Development plans should provide sufficient configuration baselines to ensure stable software and documentation before the final IOT&E test phases. COMOPTEVFOR should subsequently participate in analyzing and evaluating the operational impact of proposed changes, and whether they are additions to or deletions from system software or hardware functions.

d. OT-II Integration Testing

(1) Combined Testing. Combined DT/OT testing can result in significant cost/time/services benefits and preclude unnecessary duplication. COMOPTEVFOR need not conduct a separate performance or software quality test on a software subsystem. However, independent monitoring and evaluation of DA and contractor efforts are necessary to ensure that necessary operational issues have been addressed.

(2) Scenario-Driven Tests. As integration progresses and the system matures, software should be exercised in operational scenarios with realistic tactics that closely simulate the expected combat environment.

(3) Early Estimates. If required by higher authority, an early estimate of potential system operational effectiveness and operational suitability may be prepared based on hardware and software performance at an LBTS.

e. OT-II OPEVAL. System operational effectiveness and operational suitability will be determined by testing the total system with fully integrated software and hardware in the ultimate user environment.

f. OT-III/OT-IV

(1) Purpose. OT-III is designed to complete unfinished IOT&E, test fixes, and refine tactics. These apply equally to hardware and software. OT-III may be continued or reopened until the objectives stated in the TEMP for that phase have been attained. OT-IV is designed to ensure demonstration of the achievement of program objectives for production system operational effectiveness and operational suitability. Other objectives include OT&E of the system in new environments or against new threats. Modifications as a result of fixes or in response to new environments or threats would not:

(a) Represent a major alteration of military or operational characteristics.

(b) Involve a hardware change requiring a major production decision.

(c) Be initiated by a change in the mission requirements.

(2) Fleet Distribution Decision. Since production systems may already be deployed and the software fix or modification may result in additional training, may affect interoperability,

or may require further tactics development, additional OT&E may be necessary. COMOPTEVFOR should reassess the effectiveness and suitability of the modified system in the first shipboard installation and report on that assessment before a fleet-wide distribution decision concerning the fix or modification.

g. Significant Software Alterations to Existing Systems

(1) Significant Alterations. The following considerations are used to measure/determine the significance of a software modification:

(a) Level of funding.

(b) New application for which additional system procurement is planned.

(c) Generated hardware changes requiring a production decision.

(d) Effect on training.

(e) Effect on interoperability.

(f) Modification initiated by a change in mission requirements altering the military or operational characteristics of the system.

(2) T&E of Significantly Modified Systems. T&E on these systems will be conducted in the same manner as for new systems. A T&E number will be assigned, a TEMP will be prepared, and the system will be operationally evaluated to determine operational effectiveness and operational suitability.

h. Summary. In general, COMOPTEVFOR performs the following functions during software development for new or existing weapons systems:

(1) Analyzes and relates system and software subsystem requirements to mission needs.

(2) Monitors software development throughout by tracking system operational requirements and identifying operational issues.

(3) Reviews DT&E plans to ensure that operational objectives have been considered.

(4) Provides user-oriented inputs or service to DT&E.

(5) Evaluates the operational impact of major changes.

(6) Plans and conducts OPEVAL on the new or modified system.

F102. Software Development Phases and Milestones

a. Phases. Software is a paper product. There are no development models or prototypes to provide visible milestones. The phases are marked by their related documents.

(1) Requirements Phase. System requirements are normally partitioned between software and hardware. This division results in two types of documents that represent this phase:

(a) Program Performance Requirements. This document states the required contribution of software to system performance. This statement must be complete, correct, and traceable to mission needs. It must be reviewed against system requirements for completeness.

(b) Interface Design Requirements. Interface requirements coordinate the activity of the hardware engineering effort to the software subsystem by ensuring adherence to key specifications so that the software may work. This document or documents may also describe how a particular software subsystem relates to other systems.

(2) Program Design Phase. This phase entails functional allocation of tasks to be performed by subprograms and their modules. Memory and timing budgets are laid out. Often a design walkthrough is performed, and the phase is terminated by a PDR (Preliminary Design Review). The basic document is the Program Design Requirements, a written procedural representation of what the software subsystem is to do in some combination of English, flow charts, and program design language. The OTD should attend the PDR.

(3) Module Implementation and Coding Phase. The project is broken into many parallel mini-projects. A CDR (Critical Design Review) is often performed early in this phase. The output of this process is a set of debugged software modules that run correctly by themselves. The OTD should also attend the CDR.

(4) Integration and Testing Phase. Historically, one-third to one-half of calendar project time and man-hours are expended in this phase. The output of this phase is a single system that works and conforms to system requirements.

(a) Software/Software Integration. Individual modules are combined and tested to form working subsystems.

(b) Software/Hardware Integration and Testing. The software subsystem is integrated with the results of hardware development. This process is often performed at an LBTS and may be expensive and time-consuming.

b. Milestones. Milestones in a software project are typically document reviews. The broad phases are separated or highlighted by documents. Milestones are events, not a percentage, and the milestones must be successfully passed (i.e., the document complete and approved) to mark the end of a phase. Some significant milestones that an OTD may become involved with are listed below by phase and generic name:

(1) Requirement Phase

(a) Mission Requirements Review.

(b) System Requirements Review.

(c) Software Requirements Review.

(d) System Performance Test Requirements Review.

(2) Program Design Phase. Functional Software Design Review (PDR).

(3) Module Implementation and Coding Phase. Detailed Module Design Review (CDR).

(4) Integration and Testing Phase

(a) Program Certification.

(b) Software Quality Test.

(c) Program Acceptance.

F103. Performance Measures and Analysis

a. General. Analysis procedures in test planning, test execution, and reporting for systems with major software subsystems are very similar to those procedures for systems without software. For most of the analysis, software need not be considered separately from the hardware. In this sense, software is simply an internal system component that gives the hardware system its particular external characteristics. Firmware should be treated as software until installation in a production system. When installed in a production system, the OTD should consider firmware as a piece of hardware. The trend in hardware development is towards increased use of software and/or firmware since software tends to increase system flexibility and lower modification costs. In this context, software is a means to an end rather than an end in itself. The measure of mission success methodology is just as valid for software intensive projects as for hardware only projects: Scenario-driven testing of complete systems is still the key principle for system evaluation, while reporting effectiveness and suitability of the total system is still the prime requirement. While the general analysis procedures are, for the most part unchanged, the critical impact of software does require some additional definitions and measures, especially in the area of failure analysis. These additional measures arise out of unique life-cycle problems associated with software, and are used to aid in subsequent repair of software faults. These software measures and their application are explained in the paragraphs that follow. Note however, that the measures of effectiveness that are determined for the software alone are used mostly for the DA to correct reported failures, whereas only overall system effectiveness/suitability should be used to determine readiness for ASU.

b. Effectiveness Criteria. The formation of operational requirements for various missions is still based on operational need. Therefore, in operational effectiveness testing it is unnecessary (and in most cases impossible) to set separate goals for software, although the requirement remains to measure and report the effects of software on system performance. Overall system operational effectiveness is the primary item to test for and report on; report the effects of software on operational effectiveness only if they can be isolated.

c. Suitability Criteria. In the suitability area, separating the software effects on the system will provide a more meaningful evaluation and will help the DA fix/improve the system; they should, therefore, be measured when possible. Remember, system thresholds specify the operational requirements of the entire system and not components. They pertain to both hardware and software. Separate threshold values for unique combinations of hardware and software may be presented as part of the analysis and reporting effort. Note, however, that measuring and reporting separately does not reduce the need to concentrate on determining the characteristics of the total system as the prime requirement. Additionally, human factors associated with the operator interface to the system (displays, control functions, etc) are highly important. For example, an aircraft pilot may indicate that if certain data were reformatted or moved to another display, system effectiveness would be increased.

d. Early Testing. The focus of attention at OT-O and OT-I should be directed toward assessment of the system's functions and how they support its concept of operations. This means that assessment of software design, and internal organization and operation, should be left to the DA. Early OT-II should be directed toward correcting gross errors discovered during OT-I or during the early specification efforts of OT-II. The object is to validate the software and hardware design on the basis of how well the implemented functions accomplish the system's operational requirements. In summary, early testing should focus on either the integrated program at the LBTS or, if available, breadboard models.

e. OT-II OPEVAL. At this stage, it is expected that easily isolated software problems have been corrected. Because of the impracticality of testing the almost infinite number of possible program paths in early OT&E, software problems can still be expected during OPEVAL. Most remaining software problems are due to use of faulty paths not previously executed. However, testing in scenario fashion leads to the assumption that use of these faulty paths is random, and use of a constant failure rate for analytical purposes is feasible.

(1) Definitions

(a) Hardware Fault. Any fault clearly associated with hardware, such as power loss, broken CRT, no video, etc.

(b) Software Fault. Any fault in which the hardware appears operational but the system is not functioning as required.

(2) Reliability (Test S-1)

(a) Although technical agencies define failures based on MIL STD 1679 and TADSTAND 9, operational failures are defined in terms of whether or not mission abort/degradation could have occurred or did occur. These operational definitions will be defined not only for the total system but also for hardware and software separately. For hardware, reliability computations are based on the assumption that failures are uniformly distributed in time (reliability estimates follow an exponential distribution). For software, this assumption is not technically correct but can be used provided the following conditions are met:

1. Major software failures (causing the system to be totally inoperative or marginal on a continuous basis) have been corrected before OPEVAL.

2. Minor software failures that are consistent (reproducible) are corrected before OPEVAL or are worked around during testing. For example, if a certain sequence of operator interactions is known to produce a fault but could be avoided by modifying the sequence, these faults should not be included in reliability computations but should be reported and discussed as they relate to overall system operational effectiveness.

3. The software system is large (in the sense of many functions).

(b) If the above conditions are met, the MTBF for software is determined by dividing total system running time (under operational stress) by the total number of mission aborting/mission degrading software faults (critical or major failures). Also, MTBF for hardware is computed as defined in COMOPTEVFORINST 3960.7, Analyst Notebook. Finally, total system MTBF is total system uptime (under stress) divided by the sum of hardware failures and software faults. Using the MTBF estimates, the probability of the system operating a specified length of time can be computed from the exponential distribution. In some projects, the system under test has more than one mode of operation or mission, so it is important to report the reliability of each mode or mission, rather than one overall figure. Data must be carefully analyzed to insure that they are correctly applied to each separate mode or mission. Failure rates are to be computed for each mode of operation to produce a weighted software system failure rate.

(c) Definition. Software reliability is the probability that the software subsystem will operate a specified period of time under given environmental conditions without a mission aborting/system degrading software fault (critical or major failure).

(3) Maintainability (Test S-2). Separation of hardware and software for analysis becomes particularly useful in this area. Hardware failures lead to fault locate time, supply problems, replacement time, calibration time, etc. The MTTR may be in hours or days. Software mean restoration time may be a matter of seconds or minutes (with no logistics problems). However, time to restore must include time to restore the software data base and files to their state before the failure, which may extend restoration times significantly. For example, a fire control system loses all track data if the system must be restarted. These track data must be reentered manually or new tracks must be established. This recovery time should be included in MTTR computations. Note that the point in time when a system is fully operational may be a judgement call by the OTD given the above restorations characteristics.

(4) Availability (Test S-3). System downtimes caused by software failures are normally terminated by program reloads or restarts. Program reloads do not have the typical hardware type of extended downtimes caused by fault isolation time, supply response time, etc. Therefore, availability figures for software are calculated using a relatively short downtime and result in A_o numbers very close to unity. With A_o normally close to 1, software availability becomes an insignificant measure.

(5) Qualitative Suitability Tests. Except for parts control, the qualitative approach and measures in Test S-4 apply to software as to hardware. Again, the emphasis is on treating software as a subsystem for purposes of analysis. The life-cycle testing described in MIL STD 1679 is not a part of OPEVAL; these tests must be conducted before OPEVAL unless a waiver is granted by OP-098. Human factors, training, and interoperability are key tests and, except for human factors, follow the same patterns as

for hardware. Human factor tests for software intensive systems require special treatment as outlined in the next paragraph.

(6) Human Factors Tests. The hardware-related tests for software-intensive systems are still required, but particular attention should be paid to the following major categories (refer to Question Catalog for Computer Generated Questionnaire): (1) Displays; (2) Workspace; (3) Controls; (4) Training; (5) Documentation; (6) Operating Procedures; (7) Life Cycle Support. In addition, strictly software questions should be asked (see computers and software in Questionnaire Catalog as amended).

(a) Operator-System Interface. The primary interaction between the operator and the software subsystem is through the system workstation. This workstation normally includes some of the following: a CRT display; various hardcopy devices (printers, BTRs, LOFAR grams, etc); a keyboard; a button panel; status lights; and, occasionally, audible alarms. The efficiency with which the operator interacts with these input/output devices (and thereby the software subsystem) can determine the success or failure of the mission during a high pressure (threat) environment. Therefore, problems associated with the operator interface must be examined carefully. The basic question is whether the operator has available all the information required to accomplish his task in the required time frame and in a format he can use efficiently. In other words, is the mission degraded because of the information exchange between the operator and the software subsystem?

(b) IPL (Initial Process Load). Initial loading of computer software is frequently a time-consuming and error-prone evolution. Questions should be asked to evaluate the reliability and facility of IPL.

(c) Diagnostics. Most hardware and software systems provide either automated or operator-assisted diagnostics to isolate and report on system/failures. This is absolutely essential for large scale software systems. Also, the system must provide a software test capability to determine the go/no-go condition of the software. The availability of such tools and the ease with which they are used will have a significant effect on system availability.

F104. Software Issues Checklist. The following list of items may or may not apply to a particular program. They are listed by test phase and are not in priority order. Their intention is mental stimulation of the OTD during program review.

a. OT-0 and OT-I

(1) Have operator personnel been involved in the planning and design of the system software?

(2) Have software requirements for operator overide/ lock-out control features been evaluated?

(3) Has the hardware/software/operator functional requirement mix been evaluated?

(4) Have the intended functions of the program been clearly specified, and do they support the system operational requirements?

(5) Have procedures for software management (changes and improvements) been developed?

(6) Have software management procedures been published in a Software Management Plan/Software Life Cycle Management Plan/ Computer Resources Plan or Software Development Plan?

(7) Have quantitative and demonstrable performance objectives been established and recorded in the NDCP and TEMP?

(8) Have software requirements been defined before Milestone II?

(9) Has the Life Cycle Support Agency been assigned?

(10) Do the support software, simulators, and training modules exist, or are they being developed and tested?

(11) Has the LBTS been chosen or planned?

(12) Have programming personnel been involved in the testing process? (Build a little, test a little.)

(13) Have core size estimates been established?

(14) Is there room in core to expand the program? The data base? (As required in TADSTAND D.)

(15) Has a stability estimate for each functional requirement been established? (Sensitivity to operational environment and tactics.)

(16) Does the development contract allow for change?

(17) Have all interface requirements been established (to other digital systems, to subsystems, to user, to other Services) for each system mode including OFF?

(18) Have performance objectives been established for casualty mode operations?

(19) Have on-line/off-line fault locate provisions been included in the system design?

(20) Has an independent V&V (verification and validation) agent and procedures been established?

(21) Has vital information that must be protected from failure been declared?

(22) Has the testing been designed to discover errors, not to prove that the software is error free?

(23) Are errors being recorded? Corrected promptly? Early failure rates analyzed?

(24) Is testing being designed to cover a broad range of stressful conditions, including integrated full system employment?

b. OT-II Integration

(1) Are software data transfer requirements clear?

(2) What data are lost following a halt and restart, and how long does it take to recover or regenerate the operating data base?

(3) Have configuration management procedures been established? Being followed? Are effective?

(4) Are changes to the system being documented? Formally approved?

(5) Have firm procedures for core reserve management been established? Being followed? (TADSTAND D again.)

(6) Does the software subsystem continue to reflect system operational requirements?

(7) Are current or projected tactical publications/operational environment/tactics being implemented in software design? (Assess at PDR and CDR.)

(8) Has a document review been conducted? (PDR and CDR.)

(9) Is the Life Cycle Support Agency participating in Integration Testing?

c. OT-II OPEVAL

(1) Is the program documented and by what standard?

(2) Before OPEVAL, have criteria and rules for failure assignment to components and subsystems been firmly established?

(3) Has the software demonstrated a level of maturity sufficient to proceed to OPEVAL? (TADSTAND 9 testing complete?)

(4) Has test design provided procedures to verify correction of previous errors/operational issues?

(5) Does the ILSP include software maintenance procedures?

(6) Can software failures be correlated to events/operational environment? Can the stress boundary be identified or defined?

(7) Does the evaluation report contain an assessment of software maintainability?

d. <u>OT-III and OT-IV</u>

(1) Has the change control and change management system been kept in effect until all objectives of the TEMP are attained and the T&E number is cancelled?

(2) Has conversion to the Life Cycle Support Agency been effected in accordance with the ILSP?

(3) Has the system been designated for new applications resulting in new interface requirements?

(4) Has all IOT&E been finished?

(5) Have effective procedures for responding to fleet software problems been implemented?

Annex G (R

Assessing Logistic Supportability

G101. Introduction

a. As its name implies, the ILS (Integrated Logistic Support) Plan is the document in which the DA discusses the various methods it will use to provide the full range of logistic support for the system in question. The ILS Plan should specify what support tasks will be accomplished, who will be responsible for their accomplishment, and how and when they will be accomplished.

b. ILS planning is an iterative process that begins in the program initiation phase (before Milestone I) and becomes increasingly more specific throughout the acquisition cycle. The same applies to the ILS Plan; the degree of detail required in it is a function of the system's status in the acquisition cycle.

c. The checklist provided in this Annex is a guideline for conducting a meaningful review of any ILS Plan -- although aviation systems use somewhat different terminology. Not all support topics will always apply; the nature of the system and its level of maturity will determine whether or not any given aspect of support should be addressed in any given ILS Plan. Nevertheless, even ILS Plans for systems in the program initiation phase should reflect an understanding of the full range of logistic support considerations. Such an understanding is expressed by including schedules for completion of support-related tasks (e.g., conducting the provisioning conference, finalizing the interim support plan, completing preliminary technical manuals, identifying support and test equipment) even though the exact nature of these tasks may not yet be known.

d. The OTD/OTC should use his knowledge of the system to identify those aspects of ILS that are not adequately addressed in the ILS Plan. Deficiencies should be discussed with the DA at the earliest opportunity, and should be reviewed for potential inclusion in a future Evaluation Report. The most significant recurring deficiencies in ILS Plans are:

(1) Submission of PTD (provisioning technical documentation) to the SPCC (Ships Parts Control Center) is not included as an ILS milestone, or the milestone is set too far in the future. (Navy supply support will not be available in less than 18 months after PTD submission.)

(2) Planning for the interim (contractor) support period is inadequate.

(3) Depot level maintenance activities are not designated; when depot level responsibilities will shift, there is inadequate planning for the transition.

(4) No milestone is established for identifying <u>all</u> common and special test equipment.

(5) Support of test equipment (e.g., training and operation/ maintenance manuals) is not considered.

ILS Plan Checklist

I. ILS Program Planning

a. Are appropriate organizational charts, responsibility matrices, ILSMT (ILS Management Team) membership, and related ILS Program organizational structures provided?

b. Are SPCC representatives included as members of the ILSMT?

c. Is the process for revising the ILS Plan described?

d. Are completion dates set, and responsible agencies designated, for the following ILS inputs?

(1) Navy Training Plan Conference.

(2) Navy Training Plan.

(3) Navy Support Date.

(4) Provisioning.

(a) Issuance/funding of a PRS (Provisioning Requirements Statement).

(b) Submission of PTD by the contractor, or certification of PTD before submission.

(c) Submission of an SML (Support Material List) by the contractor.

(d) Funding and ordering of SML spare parts by the DA.

(e) Assignment of Source, Maintenance, and Recoverability Codes.

(f) Delivery of initial OBRP (on-board repair parts) to each applicable maintenance activity.

II. Maintenance

a. Has an LSA (logistic support analysis) effort been implemented in accordance with MIL-STD-1388, 1388-1, and 1388-2? If not, is a justification for not conducting an LSA provided?

b. Is the extent to which LORA (level of repair analysis) will be applied addressed? (MIL-STD-1390 applies.)

c. Are ship installation, the method of installation, and check-out planning and schedule information provided?

d. Are the three levels of maintenance -- O (organizational), I (intermediate), and D (depot) -- discussed, even though not all are used?

e. Are reasons given for any levels of maintenance that are not used?

f. If required, have I- and D-level maintenance activities been designated and their specific tasks delineated?

g. Are the expected workloads for corrective and preventive maintenance defined for each level of maintenance?

h. If I- or D-level maintenance is initially performed by the contractor, are adequate provisions made for transition to organic support? (The timing and funding of the transition should be addressed.)

i. Activities designated to perform each level of maintenance will frequently change over the program's life (from DT&E to OPEVAL to service use). Are these shifts presented in the ILS Plan so that, at any point in time, the agency responsible for each set of maintenance requirements can be easily identified?

j. If new facilities (e.g., shops, buildings, maintenance areas) are required, will they be available to support the system? (Typically, military construction programs require 5 to 6 years for budgeting and completion.)

k. Are special skills and the numbers of technicians in each skill category adequately defined at each level of maintenance?

l. Is maintenance of support and test equipment considered? (APL/AEL (Allowance Parts List/Allowance Equipage List) support requirements, calibration requirements, etc. should be addressed.)

m. If applicable, have provisions been made for software maintenance? Have imbedded systems been identified?

III. Supply Support

a. Is the supply support for Training Units the same as for shipboard installations?

b. Given the thresholds established for reliability and operational availability, is the allowable mean logistic delay realistic?

c. Are initial spare parts procurements scheduled so as to support the plans for production and deployment and the Navy Support Date?

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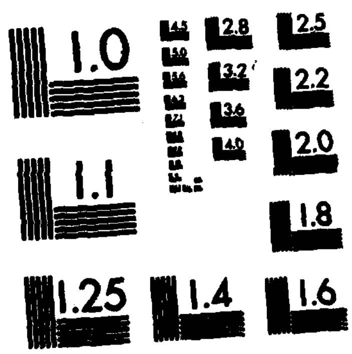

MICROCOPY RESOLUTION TEST CHART
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j. If new facilities (e.g., shops, buildings, maintenance areas) are required, will they be available to support the system? (Typically, military construction programs require 5 to 6 years for budgeting and completion.)

k. Are special skills and the numbers of technicians in each skill category adequately defined at each level of maintenance?

l. Is maintenance of support and test equipment considered? (APL/AEL (Allowance Parts List/Allowance Equipage List) support requirements, calibration requirements, etc. should be addressed.)

m. If applicable, have provisions been made for software maintenance? Have imbedded systems been identified?

III. Supply Support

a. Is the supply support for Training Units the same as for shipboard installations?

b. Given the thresholds established for reliability and operational availability, is the allowable mean logistic delay realistic?

c. Are initial spare parts procurements scheduled so as to support the plans for production and deployment and the Navy Support Date?

d. Does the ILS Plan state how repair parts will be provided to I-level maintenance activities?

e. Is the submission of all PTD (MIL-STD-1522 applies) to the SPCC scheduled at least 18 months before the Navy Support Date?

f. Are spares to be managed as ready spares (i.e., stowed in divisional spaces, but still under the cognizance of the Supply Department) so designated? Is the number of these things held to a minimum, to facilitate collection of usage data by the Supply Department?

g. Preliminary Supply Support

(1) Is the exact duration of the contractor support period defined? Are provisions included for extending this period if the Navy Support Date is delayed?

(2) Does the ILS Plan provide details for transition from contractor to organic support?

(3) Are the types and quantities of INCO (installation and checkout) kits described? Are provisions made for their timely delivery?

(4) Does the ILS Plan state whether the contractor must supply all required spare parts during the interim support period, or merely a specified list of items?

(5) Are contractor performance criteria (e.g., supply response time and turnaround times for spares to be repaired commercially) specified?

(6) Are CFE/GFE (contractor/government furnished equipment) included in the interim support plan?

(7) Are procedures described for requisitioning material from non-Navy sources during OPEVAL and the interim support period?

(8) In view of the potential problems associated with disruption of supply routines, are all non-standard procedures for acquisition/expenditure of spares justified?

(9) Are procedures described for expediting material and for providing requisition status during the interim support period?

h. The expense associated with a repairable system requires that this aspect of supply support be afforded considerable detail in the ILS Plan. Ask the following questions:

(1) Is a designated overhaul point assigned for each repair-

able to be repaired at the depot level? (Existing facilities should be employed to the greatest extent possible.)

(2) Are the source of the core pool of equipment and the responsibility for funding the spares pool discussed?

(3) Are sufficient details provided to cover shipment of failed repairables to the appropriate I- and D-level activities? (Shipping address, required documentation, identification of repairable material (especially important for non-standard items), and instructions concerning limits on cannibalization at the O-level should all be addressed.)

(4) Is the packaging required by ship's force to return failed repairables to the Designated Overhaul Point described by, and provided for in, the ILS Plan?

IV. <u>Support and Test Equipment</u>

a. Are all special tools, as well as peculiar and common support and test equipment, identified that are required at each level of maintenance?

b. Are there provisions to ensure that all items identified in IV.a. above will be made available in a timely manner? (Plans for procuring and delivering any peculiar support and test equipment not yet fully developed should be addressed specifically.)

c. Are the method and periodicity of test equipment calibration discussed?

d. Is procurement/delivery of auxiliary pieces of special test equipment (connectors, cables, chart paper, etc.) discussed?

e. Where applicable, have arrangements been made to modify test equipment software in conjunction with software changes in operational equipment?

V. <u>Packaging, Handling, Storage, and Transportation</u>

a. Are all required special containers, lifting rigs, and dollies scheduled for delivery?

b. Are special problems and solutions during underway replenishment addressed? Are all applicable methods of underway replenishment addressed?

c. Have special containers and special handling equipment been validated?

d. Where applicable, are special precautions described for sensitive items such as wet-cell batteries and integrated circuit boards?

e. Is packing material used in accordance with safety regulations?

f. Are special preservation requirements and shelf lives indicated?

VI. Technical Logistic Data

a. Has the ILS Plan provided the following information/procedures in accordance with NAVSEAINST 4105.1?

(1) Technical manual development and maintenance.

(2) Change control.

(3) Acceptance planning.

(4) In-process review.

(5) Validation and verification.

b. Will draft versions of technical manuals and PMS (Planned Maintenance System) documentation be provided to COMOPTEVFOR before OPEVAL?

VII. Manpower, Personnel and Training Support

a. If training facilities are required, will they be ready for IOC (initial operational capability)?

b. Has procurement been planned for systems/equipment for training purposes?

c. Does the ILS Plan provide for delivery of the system to the appropriate training site for installation before initial training?

d. Has training been planned for OPEVAL personnel and system users during the system's life cycle?

e. If a Navy Training Plan is required, will it be available for OPEVAL?

f. Does the crew scheduling and phasing plan allow sufficient personnel to be trained and on board before IOC?

g. Have Navy schools or courses actually been established?

h. Is an up-to-date table provided (as required by OPNAVINST 4100.3A) that summarizes total manpower resources required to operate and maintain the system through the first 10 years of operation?

i. Are personnel and training requirements discussed for operation, calibration, and repair of the various types of test equipment?