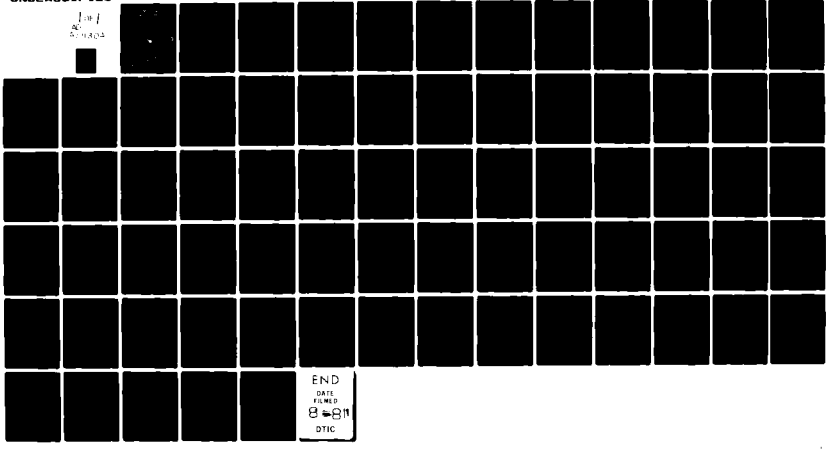
AD-A101 304 NAVAL MATERIAL COMMAND WASHINGTON D C F/G 20/3
PLAN FOR ENSURING ELECTROMAGNETIC ENVIRONMENT EFFECTS CONTROLS --ETC(U)
DEC 77

UNCLASSIFIED NL



END
DATE FILMED
8-81
DTIC

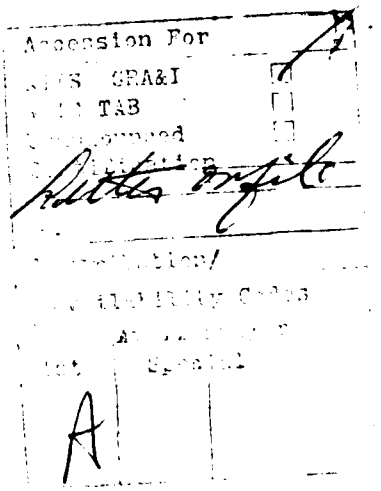
LEVEL II

PLAN FOR ENSURING ELECTROMAGNETIC ENVIRONMENT EFFECTS CONTROLS IN ACQUISITIONS

DEPARTMENT OF THE NAVY
NAVAL MATERIAL COMMAND
TACTICAL ELECTROMAGNETIC SYSTEMS STUDY ACTION COUNCIL

30 DECEMBER 1977

PLAN FOR ENSURING ELECTROMAGNETIC ENVIRONMENT EFFECTS CONTROLS IN ACQUISITIONS



TACTICAL ELECTROMAGNETIC SYSTEMS STUDY
(TESS)
ACTION COUNCIL

CONTENTS

CONTENTS (Continued)

GLOSSARY OF ACRONYMS

AM - Acquisition Manager

AP - Acquisition Process

ASPR - Armed Service Procurement Regulation

ASU - Approval for Service Use

C^3 - Command, Control, and Communications

COMOPTEVFOR - Commander Operational Test and Evaluation Force

DCP - Decision Coordinating Paper

DP - Development Proposal

DT&E - Development Test and Evaluation

ECAC - Electromagnetic Compatibility Analysis Center

ECCM - Electronic Counter-Counter Measures

ECM - Electronic Counter Measures

E^3 - Electromagnetic Environment Effects

EM - Electromagnetic

EMC - Electromagnetic Compatibility

EMCAB - Electromagnetic Compatibility Advisory Board or Electromagnetic Compatibility Analysis Board

EMCPP - Electromagnetic Compatibility Program Plan

EME - Electromagnetic Environment

EMI - Electromagnetic Interference

EMP - Electromagnetic Pulse

EM-Power - Electromagnetic Power

EM-Safety - Electromagnetic Safety

EMV - Electromagnetic Vulnerability

E-O - Electro-Optics

ESM - Electronic Warfare Support Measures

EW - Electronic Warfare

FOT&E - Final Operational Test and Evaluation

GLOSSARY OF ACRONYMS (Continued)

HERF - Hazards of Electromagnetic Radiation to Fuels
HERO - Hazards of Electromagnetic Radiation to Ordnance
HERP - Hazards of Electromagnetic Radiation to Personnel
NDCP - Navy Decision Coordinating Paper
NMC - Naval Material Command
OPEVAL - Operational Evaluation
OR - Operational Requirement
OT&E - Operational Test and Evaluation
PAT&E - Production Acceptance Test and Evaluation
PM - Project/Program Manager
POA&M - Plan of Action and Milestones
PP - Procurement Plan
PPM - Procurement Policy Memorandum
P-Static - Precipitation Static (Triboelectricity)
RADHAZ - Radiation Hazards
RFI - Radio Frequency Interference
RFP - Request for Proposal
RDT&E - Research, Development, Test and Evaluation
SEMCIP - Shipboard Electromagnetic Compatibility Improvement Program
SEMI - Special Electromagnetic Interference
S/S - Specifications and Standards
T&E - Test and Evaluation
TECHEVAL - Technical Evaluation
TECS - Tactical Electromagnetic Coordination and Support
TEMP - Test and Evaluation Master Plan
TESSAC - Tactical Electromagnetic Systems Study Action Council
TEP - Test and Evaluation Plan
TSTP - Total Ship Test Program

EXECUTIVE SUMMARY

Policy has been established and directives have been in existence for at least ten years requiring that the deleterious aspects of the electromagnetic environment (EME) effects be addressed throughout the acquisition process. Enforcement and hence compliance with these directives has been inconsistent at best.

The purpose of this document is to provide a plan for the (CNM) to establish a management process to ensure that the necessary steps are taken throughout the acquisition process to control the adverse effects of the EME. To accomplish this, the plan requires that:

- The CNM review of planning and procurement documents for all electronic/electrical equipment, systems and platforms include a formal review to assure that appropriate EME effects control actions are accomplished or planned.
- *The directives which govern planning and procurement be revised to include* requirements for EME effects.

By applying existing assets, capabilities, technology and tailoring existing specifications and standards, significant improvements can be made in the control of adverse EME effects. However, to facilitate EME effects control, significant shortcomings need to be corrected. For example, specifications and standards require updating.

Section 1 of this document states the purpose and applicability of the plan. In section 2, describes the existing situation of EME effects ~~is described.~~ Section 3 relates EME effects controls to the various phases of the Navy acquisition process and to pertinent major planning and procurement documents. In section 4, policy and its enforcement relative to EME effects are emphasized and required actions and responsibilities for accomplishing them are set forth. Annexes provide exhibits of required documentation changes and review guidelines, and pertinent references.

It is recognized that implementation of this plan will require attention and expenditure of efforts at all levels of management and engineering throughout the Naval Material Command. In view of the heightened expectations of meeting planned operational capabilities, this expenditure will be justified.

1. INTRODUCTION

1.1 Purpose

The purpose of this plan is to set forth Naval Material Command policies and implementation procedures whereby it will be assured that EME effects controls are adequately applied during the acquisition process.

This plan responds to the tasking of the Chief of Naval Material, in subparagraph 2.d. of his letter MAT-034:RBB/ELEX-095:RCW of 12 April 1976 which required that TESS Action Council "Develop for the Naval Material Command detailed plans which ensure that the deleterious aspects of the EME are adequately considered in the acquisition process."

1.2 Scope

This plan pertains to all acquisitions for platforms, systems and electrical and electronic equipment. The thrust of this plan is to delineate necessary steps to be taken to ensure that adequate electromagnetic environment effects control measures are taken at appropriate points in the acquisition process. Although the specific acquisition procedures and necessary EME effects actions vary with the type of procurement, whether weapons, platforms, or support hardware and equipment, the approach for ensuring that the necessary actions are taken is essentially the same. Technical procedures and guidelines are provided only to the extent necessary to describe and facilitate review of EME effects actions and plans. A guide, in handbook form, also prepared under the auspices of the TESS Action Council, will provide details necessary to treat EME effects controls at the program level. The acquisition process through first production only is addressed herein, although it is intended and expected, that where appropriate in later acquisitions of a previously developed platform/system equipment, the provisions of this plan shall be applied. The deployment phase as well as the correction of fleet problems will be covered by the TESS Action Council In-Service Support Plan for EME Effects. It is not the intent of this plan to define needed resources since recommendations in this area have been made to the CNM by separate correspondence. The RDT&E needed to enhance the consideration EME effects is addressed in the TESS Action Council Program Plan for EME Effects RDT&E.

2. BACKGROUND

2.1 General

The electromagnetic environment (EME) can adversely affect nearly all Navy electronic, electrical , electro-optical, electromechanical or electroexplosive systems, as well as personnel and fuels. Similarly, all electronic/electrical systems contribute to some degree to the EME. In some cases this contribution is intentional, in other cases it is inadvertent. Thus, it is necessary to ensure that each new item that is added to the Navy inventory will not have its performance unacceptably degraded by the EME nor unacceptably degrade the performance of other systems by its contribution to the EME.

Various terms have been used to describe the adverse effects from electromagnetic energy or the absence of adverse effects. The most commonly used term is Electromagnetic Compatibility (EMC) which when used generically covers all effects from and contributions to the EME. However, this term also has been used to describe only a portion of the total scope of adverse EME effects. Thus, to avoid confusion in this plan the term EME effects or E^3 will be used to cover all electromagnetic effects, which includes EMC, HERO, RADHAZ, EMP, ECCM, SEMI, EMV, EMI, RFI, HERP, HERF, EM-Power, P-Static and lightning. The following section is a general discussion of the contribution to the EME and the effects of the EME.

2.2 Contributors to the EME

The electromagnetic environment in which the Navy must operate is created by a multitude of sources. Primary contributors are own forces and friendly transmitters, enemy transmitters, electromagnetic pulses (EMP), spurious emissions from own equipment such as motor noise and intermodulation products from ship topside nonlinear interactions ("rusty bolt effect"), and natural sources such as lightning, static or atmospheric noise. The dominant contributor to the environment will depend upon locale and circumstances. For example, during normal noncombat operations, primary sources of emissions would be own and nearby units' transmissions and intermodulation sources. In an attack scenario, enemy transmitters would be an added major contributor. Hence, the EME in which Navy equipment must survive and operate in is use-dependent and scenario-dependent.

2.3 Victims of the EME

There are two basic causes of adverse EME effects. One results from undesired energy entering through intended avenues of entry (antenna, transmission line) into systems, equipment or devices that by intent use EM energy. The second results from unintended entry and response.

The principal intended receivers are radar, communication, EW, RF guided and controlled weapons and target detecting devices (fuzes). Degradation of receivers can result from either responses caused by signals outside the intended frequency band or undesired signals in the operating frequency band. Elimination of the first cause is primarily a receiver design problem; the second cause is much more difficult to resolve, since it involves not only design but control of frequency use and spurious emissions as well.

Examples of unintentional reception problems are manifold; for instance, Hazards of Electromagnetic Radiation to Ordnance (HERO), to Personnel (HERP), to Fuels (HERF) and electronic circuits responding to EM energy (EMV). These are specifically recognized problems and generalize the issue; energy coupled into an inadvertant receptor with consequent undesired results. Although the control of problems from the unintended reception of energy is primarily a design consideration, it also involves control of the EME that equipment and personnel must operate and survive in by appropriate installation practices or operational constraints.

2.4 Status

The current status of the Navy's technology, capability and specifications and standards to control electromagnetic effects problems are provided in the TESS Action Council EME Effects Summary Report to the CNM, of 30 September 1977. That report concluded that the Navy has both the technology and capability to significantly improve its EM effects posture. It is in the application of technology and capabilities that the correction and avoidance of EME effects problems has suffered. Since correcting existing problems is often economically prohibitive and/or logistically complex, the most significant and cost effective impact can be made in preventing problems in equipments, systems and platforms from the early phases of acquisition. In the past there has been no enforced requirement to apply the available assets, thus, it is mandatory that NMC management ensures compliance with procedures necessary to address EME effects throughout the acquisition process. This is not intended to imply that EM effects problems can be

solved easily or without additional technology in some cases. However, significant improvements can be made by using available resources and capabilities. Actions have already been initiated within the Headquarters, Naval Material Command and the Systems Commands to implement parts of this plan. For example, the Directorate for Reliability and Engineering, Staff, CNM, forwards planning and procurement documents, in particular the draft Operational Requirements, Development Proposals and Decision Coordinating Papers to the CNM Director Tactical Electromagnetic Programs (ELEX-095) for review with respect to EME effects. Initial actions have also been taken to cause the required changes in some of the governing directives, as indicated in Annex A hereto.

3. EME EFFECTS CONSIDERATION IN THE ACQUISITION PROCESS

3.1 General

In order to place EME effects control in perspective with the acquisition process, this section relates the management and technical actions required, to the various phases of the acquisition cycles, identifies pertinent planning and procurement documents, and highlights needed changes in existing documentation. The adverse effects of the electromagnetic environment can only be controlled by taking explicit actions early and throughout the acquisition cycle. To ensure that these actions are planned and provided for, the control of EME effects must be an issue treated in planning and procurement documents and the subject of regular review at the CNM level to assure compliance. Thus, it is necessary to force the consideration of EME effects into the main stream of the acquisition process by modifying the appropriate acquisition documents and their governing instructions.

3.2 Major EME Effects Considerations

Procurements of all types and magnitudes are covered in this section, hence, it is by necessity, general in nature. The acquisition actions are comparable and in the same sequence for any system or equipment being developed and procured, but the scope and degree of complexity of the action may differ considerably. EME effects control for platforms is significantly different from systems and equipment in that the design of subsystems/equipment is generally fixed, while the design of the platform is flexible. Thus, control is based on subsystem/equipment selection, arrangement, installation and interface technology and platform structural hardening. This section is a representative overview of EME control as related to the phases of the acquisition process. Detailed actions required at the program level during the acquisition process will be contained in the Guide prepared for the TESS Action Council. Generally, the PM/AM will also need technical EME effects support throughout the acquisition cycle to conduct analyses and reviews and to provide advice. Depending on the complexity of the acquisition from an EME effects standpoint, the required support may vary from informal consultation to the establishment of a formal arrangement with an EME effects expert or the establishment of an advisory group such as an EMC advisory/analyses board (EMCAB).

The following are the major EME effects actions required during the acquisition process. These are summarized in figure 3-1. EME efforts support should be

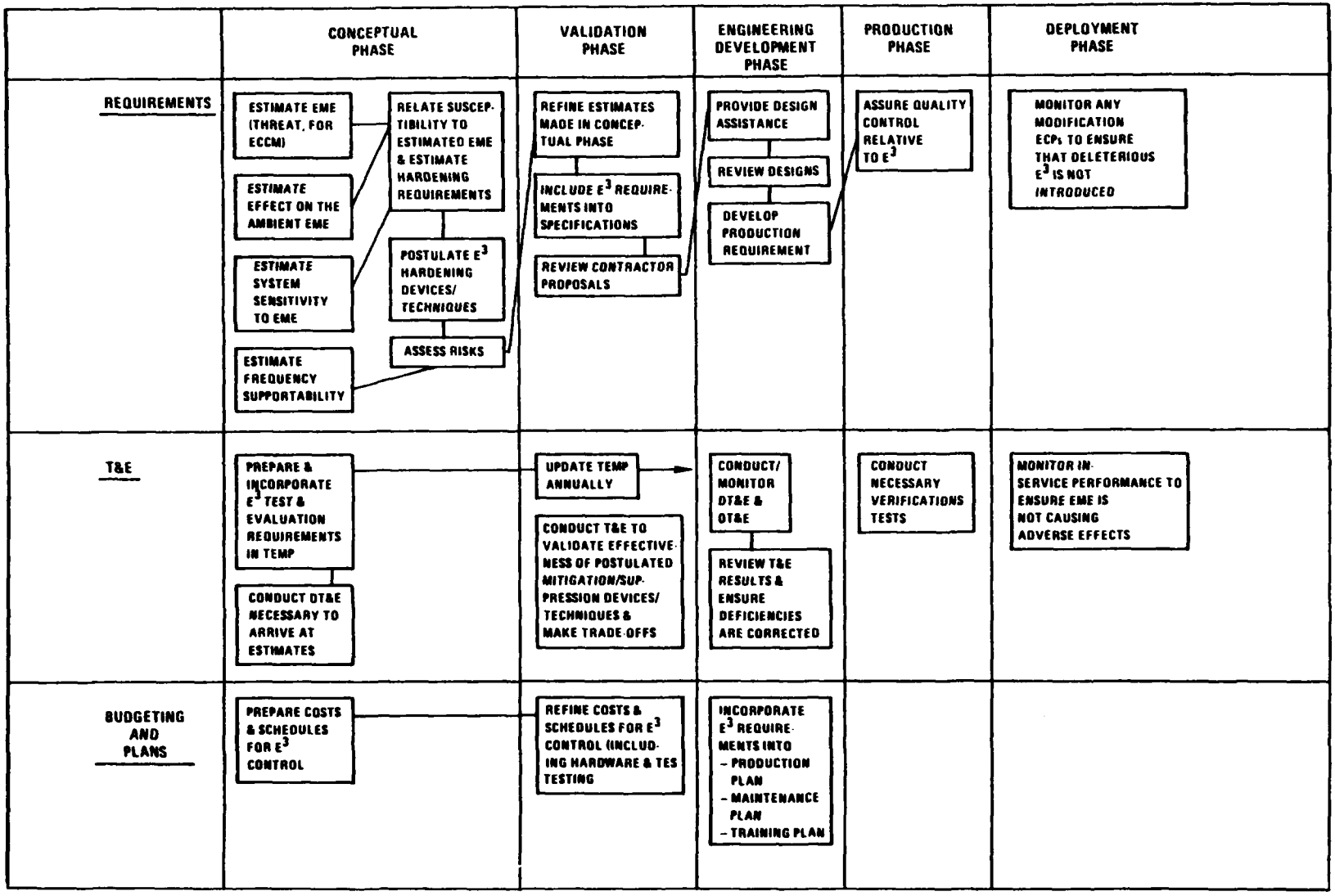


FIGURE 3-1. RELATIONSHIPS OF EME EFFECTS ACTIONS REQUIRED IN SYSTEMS ACQUISITION CYCLE

initiated during the conceptual phase. At that time it would consist entirely of Navy personnel; as the acquisition progresses, personnel changes may be required as emphasis changes. After the contract is let, contractor personnel must become involved.

3.2.1 Conceptual Phase

During the conceptual phase of any acquisition, consideration of EME effects must lead to a determination of the overall risks impacting the capability of the item under development to perform its mission in the anticipated EME. The EME effects impact is essentially based on emissions from the item affecting equipment already in the fleet, and affect on the item by the fleet and hostile EME. During the conceptual phase, the technical feasibility of the concept to achieve EM compatibility must be established. The following are relevant considerations:

- Estimate of the electromagnetic environment

The EME in which the item must survive and operate requires sufficient definition to arrive at a representative worst case situation. This estimate must must include not only friendly emissions but also the threat EME for equipments/systems which may be effected by unintentional or intentional (ECM) enemy transmissions. Likewise, the contribution by the item under development must also be estimated. Frequency supportability, including allocation and channelization concepts must also be considered.

Note: The EME is always changing as a result of addition or retirement of radiators. Also, as stated earlier, the EME that a particular item will encounter is dependent upon its location, scenario and installation configuration. Thus at this phase of development it is best to anticipate and be prepared for the worst; as development progresses, the anticipated EME can be reviewed based on better definitions of use and updated EME sources, and adjusted as appropriate.

- Estimate susceptibility to EME degradation.

The susceptibility of the equipment/system under development to degradation for the EME must be estimated, based on equipment and environmental parameters (e.g., power density, spectral density, etc.) In turn, the susceptibility of other systems and equipments to emissions from the new item must be established.

- Determine hardening requirements.

The hardening requirements can then be derived for the acquisition, by relating estimated EMEs to estimated susceptibility, on a worst case basis.

- Make risk assessment.

Based on the EME hardening requirements, hardening devices/techniques/procedures can be postulated. By relating hardening needs to available technology an assessment of the risks can then be made. In the case of platforms, the risk assessment must include the compatibility of required subsystems/equipments.

- Develop cost and schedule estimates.

The cost of EME effects control including T&E must be included in the program cost estimates, along with schedule and milestones.

3.2.2 Validation Phase

During the validation phase the estimates made in the conceptual phase must be refined. Areas of risk must be reassessed to assure that they have been adequately defined and can be resolved or minimized. Plans and requirements for EME effects control can then be established. The following are the major events during this phase;

- Refine estimates made in conceptual phase.

The estimates of the EME, susceptibility, hardening requirements and risk must be validated by analysis, tests and measurements.

- Validate hardening concepts.

The effectiveness of proposed mitigation/suppression devices/techniques for EME effects must be validated. Trade-offs in effectiveness versus cost can then be made and validated as necessary.

- Include EME effects requirements in specifications.

Specifications must define the EME in which the system must perform, and must also specify limitations on both spurious and intended emissions. Existing military standards and criteria shall be tailored as necessary and applied. For aspects that are not covered by existing standards, specific requirements must be generated. Specifications must include necessary contractor T&E to demonstrate compliance with requirements.

- Develop test and evaluation requirements.

The critical aspects of T&E requirements necessary to adequately assess the effects to and from the EME must be defined. Outlines of tests, in areas for definition and alleviation of risks, will be developed for use in engineering development and later phases. The necessary acceptance criteria or evaluation

procedures must be provided. In addition, special tests may be required during this phase to assure that new concepts or materials are satisfactory.

- Refine costs and schedules for EME effects control.

Costs and schedules will provide for necessary design assistance, design review and T&E requirements. Funding and schedule for hardware and special test equipment required for T&E must be included.

- Review contractor proposal.

The contractor proposal must reflect an understanding of EME effects relative to the procurement, address the anticipated EME environment and present a viable approach and plan for EME effects control.

3.2.3 Engineering Development Phase

During the engineering development phase, design assistance and technical review for EME effects control must be a continuing effort. The contractor will require the results of these reviews, as well as guidance and advice based on experience in the Navy community. In the case of major procurements, an EMCAB is an appropriate vehicle to ensure that this is accomplished while in other cases the mechanism may be less formal. However, the requirement for consultation and design review must be satisfied. One goal of DT&E and OT&E during this phase must be to demonstrate that the design meets specifications as related to EME effects. This entails a comprehensive test program based on a realistic environment and an accurate analysis and evaluation capability. Board of Inspection and Survey Trials should observe, report and require correction of EME effects discrepancies as well.

- Monitor and review contractor T&E.

If contractor T&E is included for EME effects control, the planned procedures, test and data review must be made by Navy representatives who are thoroughly familiar with the testing specialty to ensure the adequacy of tests and interpretation of the results.

- Conduct Navy Controlled T&E.

In some instances the contractor may not have the capability or facility to conduct the necessary tests, particularly for full system and intersystem tests. In these cases provisions must be made for necessary tests at Navy laboratories or during technical and operational evaluations.

- Include EME effects control requirements in production maintenance and deployment plans.

Production plans must ensure that the EME effects control design will not be prostituted in production, because of lack of quality control or configuration management. A maintenance plan will provide appropriate direction to assure that EME effects suppression measures and mitigation devices are properly maintained. A training plan must provide instructional material on the recognition and minimization of EME effects in operation.

3.2.4 Production Phase

During production it will be necessary to assure that the designated EME effects control measures are not degraded by techniques used in production. The following are the minimal requirements in this regard:

- Assure quality control relative to EME effects.

The manufacturing procedures and quality control must be reviewed relative to the EME effects requirement in the production plan. Provisions must be included for necessary assurance/verification tests.

3.2.5 Deployment Phase

In-service performance must be monitored by a reliable, established feed-back system to detect, and to correct EME effects when possible. Any modifications, ECPs and overhaul plans must be reviewed to assure that new deleterious EME effects are not introduced. Established EME effects control methods to be utilized after deployment are contained in the In-Service Support Plan for EME Effects.

3.3 Reflection of EME Effects Actions in Procurement Documents

The actions to control adverse EME effects described in the previous section are not isolated events but rather, when applied properly, form a continuum. Planning and procurement documents are the logical vehicle for implementing EME effects control and provide the opportunity for CNM review. This section discusses the relationship between the pertinent documents and EME effects control planning and actions. It is presented in the context of a major system procurement; however, the principles and procedures are applicable to platforms and less than major procurements. For less than major procurements, the CNM review would be limited to those documents which normally require CNM approval, such as the T&E Master Plan. It is therefore mandatory that the SYSCOMs implement appropriate reviews for EME effects on the comparable internal SYSCOM documents. In particular, the SYSCOMs shall place adequate

emphasis on those items procured and approved for service use within the authority of the SYSCOMs, to assure that EM effects control has been achieved in each case. To provide an insight into the review process and for interim use, a set of review guidelines is provided in annex B. These guidelines will be incorporated into the EME Effects Guide.

3.3.1 Draft Operational Requirement (OR)

The OR must form the basis for EME effects control during the acquisition process. The general requirement for compatibility with the EME must be stated at the onset. In addition, unique goals related to EME effects must be specified, for example, ECCM and EMCON requirements. The target parameters and operational employment must be described sufficiently to permit definition of the anticipated EME. It is therefore necessary to review the draft OR to assure that sufficient information is provided.

3.3.2 Development Proposal (DP)

The DP presents the alternatives and trade-offs to achieve the required operational capability called for in the OR. EME effects ramifications for each alternative must be addressed. The DP must define the operational EME, the sensitivity of the alternatives to the EME and their impact on the ambient EME. The hardening alternatives must be described along with costs and risks. If the level of hardness is a major consideration, then the cost versus effect on the operational capability must be described. Plans for developmental and operational EME effects tests must be given, along with performance criteria and objectives. If special test facilities and equipment are required they should be described and cost estimates given. The DP review is required to ensure that the achievement of operational goals will not be unnecessarily restricted by the EME, that emission from the alternatives will not unacceptably degrade other friendly equipment and that appropriate steps are planned for dealing with high risk areas.

3.3.3 Draft Navy Decision Coordinating Paper (NDCP)

The NDCP is the basic Navy program approval and control document, as such it must include EME effects as related to performance parameters, risks and development alternatives and the EME effects control requirements. The draft NDCP needs to be reviewed for essentially the same considerations as the DP but in light of the EME effects control requirements and the CNO preferred alternative.

3.3.4 Procurement Plan (PP)

The procurement plan documents technical business, policy, operational and other procurement considerations portraying milestones to be met in achieving the goals of a specific program over its procurement life cycle. Since a PP is regularly updated, it will reflect changes in objectives or method of procurement. The discussion of program technical risks in the PP must include major EME effects risks and describe what efforts are planned or underway to reduce them. There should be a general discussion of EME effects including control and reporting plans, EME effects predictions, specifications and requirements, design disciplines and quality assurance. The test and evaluation approach should include EME effects DT&E by the contractor, and DT&E and OT&E by the government for each major phase. In view of the importance of the issues addressed in the PP it is necessary that the EME effects aspects be reviewed to assure that they are realistic and achievable.

3.3.5 Justification for Authority to Negotiate/Request for Authority to Negotiate (JAN/RAN)

For those procurements covered by an approved PP it is not necessary to address EM effects in the JAN/RAN. However, for those not covered by an approved PP, the technical brief should include comparable information to that described for the PP above and should be reviewed accordingly.

3.3.6 Request for Proposal (RFP)

The RFP advises prospective bidders of the government needs. The item to be procured is described by the applicable specifications or by a description containing the necessary requirements. Thus, the RFP must delineate for the prospective bidders the anticipated electromagnetic environment (EME), the performance requirements in the EME, limitation on intended and spurious emissions. Also, any EME effects test evaluation and data required of the contractor and any government test that the item must pass to be acceptable must be included. Sufficient detail must be provided to permit the bidder to address trade-offs for EME effects control. The role of the contractor in supporting an EMCAB and preparation of the control plan for EME effects must be defined if applicable. Since the RFP will be the basis for the contract the Navy must be assured that the item will meet the EME effects control goals without resorting to costly contract modifications. Because of the importance of the RFP and the deficiencies in formal standards it is vital that the RFP be reviewed for EME effects consideration.

3.3.7 Test and Evaluation Master Plan (TEMP)

The TEMP is the controlling management document which defines the test and evaluation for each new acquisition program. As such, it contains the integrated requirements for the developing agencies (for DT&E) and COMOPTEVFOR (for OT&E) and the schedules and resources required for accomplishment. The TEMP is prepared early in each new acquisition program and will be reviewed at least annually and will be updated as necessary to incorporate significant results achieved and changes in plans and milestones. The initial versions will lack many specifics, later revisions will add detail, as developed. DT&E relative to EME effects for the four major phases is as follows; (a) (DT-I) T&E may be required during the conceptual phase to support initiation decisions, (b) (DT-II) During validation phase to demonstrate that design risks are identified and minimized, (c) (DT-III) In the full scale development, it is crucial that tests demonstrate that the design meets the specified performance in the anticipated EME, (d) (DT-IV) After first major production decision, DT&E may be required to verify product improvement or correct deficiencies discovered during OPEVAL, FOT&E or Fleet employment. OT&E to independently address EME effects is not generally required. *However, any OT&E testing should be conducted in the most realistic* EME situation and have provisions for monitoring and reporting adverse EME effects. In the case of systems, PAT&E (production acceptance T&E) may be required to assure that the item meets requirements. For a platform (in particular ships) PAT&E is a vital part of the EME effects T&E because this may be the first time all the equipment and systems can be tested and evaluated as a unit. Since T&E provides the basis for key decision the TEMP must be reviewed to assure that the T&E is complete and comprehensive. For less than major programs, the T&E is governed by TEPs. The TEPs should cover the same aspects as the TEMP and be subject to the same review as TEMPS.

3.3.8 Request for Approval for Service Use (ASU)

The request for ASU states the results of T&E conducted and plans for correcting deficiencies identified in technical and operational evaluations. The request for ASU must document the basis for assuring that the requisite EME effects control has been achieved. As such it must be reviewed to insure that the item is in compliance with the provisions of the DP and NDCP.

3.4 Support in Documentation

3.4.1 Instructions

Documentation impacting on the inclusion of EME effects in acquisition ranges from general policy statements at the OSD-SECNAV level, through somewhat more specific requirements at the OPNAV-NAVMAT level, to the implementing directives at the SYSCOM-field activity level. Directives throughout the Navy have reflected the requirement for at least ten years that EME effects be addressed in acquisitions. These included DoD Directive 3222.3 of 5 July 1967, Subj: Department of Defense Electromagnetic Compatibility Program, SECNAV Instruction 2410.1B of 17 October 1967, Subj: Electromagnetic Compatibility within the Department of the Navy, OPNAV Instruction 2410.31 of 11 August 1966, Subj: Electromagnetic Compatibility within the Department of the Navy and NAVMAT Instruction 2410.1 of 21 June 1967, Subj: Electromagnetic Compatibility (EMC) within the Naval Material Command (NMC). Currently, effective editions of these directives retain the requirement for addressal of EME effects.

If, however, EME effects control is to be on an institutionalized basis it must be reflected in all documents governing acquisition, particularly those which provide for implementation, at the project manager and field activity level. This situation does not exist at present. Specific documents needing amendment are as follows:

OPNAVINST 5000.42A	- Weapon Systems Selection and Planning
OPNAVINST 5000.46	- Decision Coordinating Papers (DCPs) Program Memoranda, (PMs), and Navy Decision Coordinating Papers (NDCPs), Preparation and Processing of
OPNAVINST 3960.10	- Test and Evaluation
OPNAVINST 4720.9D	- Approval of Systems and Equipments for Service Use
NAVMATINST 5000.22A	- Weapon Systems Selection and Planning
NAVMATINST 3960.6A	- Test and Evaluation
NAVMATINST 4720.1	- Approval of Systems and Equipments for Service Use (ASU)
ASPR/NPD 1-2100	- Armed Services Procurement Regulation

The recommended changes to each document are provided in Annex A. In some instances, requests for changes have been initiated under the aegis of the TESS Action Council, in the past year. The status of such changes is indicated in Annex

A where applicable. There are several NAVMAT Instructions relating to EME effects, such as NAVMATINST 2410.1A, Subj: Electromagnetic Compatibility (EMC) within the Naval Material Command (NMC), NAVMATINST 2410.2, Subj: Electromagnetic Pulse (EMP) effects program, establishment of, NAVMATINST C3430.3, Subj: Electronic Counter-Countermeasures (ECCM) in Electronic Systems (U), NAVMATINST 5101.1A, Subj: Resolution of Electromagnetic Radiation (EMR) Hazard Problems, and NAVMATINST 10380.9A Subj: Electromagnetic Environment Considerations in the Life Cycle of Navy Electronic/Electrical Equipments. The principal NAVMAT directive governing EME effects control is NAVMATINST 2410.1A. A revision of this Instruction will be in order when CNM Director Tactical Electromagnetic Coordination and Support staff location and specific responsibilities are decided. At that time, these instructions should be incorporated into the NAVMATINST 2410.1 revision as appropriate.

3.4.2 Specifications and Standards

Since military specifications and standards are a tool used to control EME effects and impact the acquisition process, this section contains a brief discussion of their role, status and highlights efforts needed for their improvement.

Standards are the vehicle by which criteria are established in procurement. Specifications are used in procurement to clearly and accurately describe requirements and procedure to determine that requirements are met. Standards serve primarily to provide design characteristics and to control variety. As such, specifications and standards are a vital tool in the control of EME effects in procurements, as stated in the TESS Action Council Electromagnetic Environmental Summary Report of 30 September 1977. There are no specifications and standards which cover some aspects of EME effects such as EMP, EMV or ECCM nor ships as a whole. In addition, many existing EME effects specifications and standards are in continued need of review and update. There is considerable time lag in updates; thus, new types of equipment or new requirements are not reflected in current documents. For example, MIL-E-6051, Military Specification for Electromagnetic Compatibility Requirements for Systems, Aerospace and Associated Weapons was issued in 1967 and similarly MIL-STD-461A, Electromagnetic Interference Characteristics Requirements for Equipment, was issued in 1968, with the most recent change notice issued in 1973. Although the inadequacies in the military specifications and standards do not prohibit efforts to incorporate EME

effects control in acquisition, their limitations make it more difficult, in that some existing standards must be radically tailored. This not only places an added burden on the program office and also makes review of procurement documents more difficult, but increases the chances of not having adequately stated EME effects requirements. Some effort within the purview of the respective System Commands is underway to generate needed new specifications and standards, in addition to the continual review and update of those in existence.

3.5 Resources

3.5.1 General

Adequate attention to EME effects control will require resources at the NAVMAT and SYSCOMs headquarters, program manager offices and field activities levels. Procurement document reviews at NAVMAT headquarters will require staffing; and the workload of the tactical electromagnetic coordination and support functions within the Systems Commands, which will increase as more programs are addressed, will also need resources. The impact at the program level, where the primary responsibility for EME effects control lies will require budgeting for and directing necessary efforts. The field activities need to provide the necessary in-house technology base and facilities to support the PM/AM, and hence will also require adequate staffing and other resources. Generally, there is no well established procedure or organization to provide in-house support. There are exceptions, such as the HERO program, where one of the Navy laboratories has a well defined mission, is level-funded for general HERO work and to provide and maintain T&E facilities, funding for T&E that directly applies to a specific program is provided by that program.

3.5.2 Personnel

The personnel requirement at the NAVMAT headquarters level and for SYSCOM EME effects support and coordination is addressed in detail in the TESS Action Council Report of 1 March 1976, Analysis, Recommendations, plan of Action and Milestones, Part I, Tactical Electromagnetic Progams Offices. Implementation of the recommendations of that report as modified in subsequent correspondence between COMNAVELEX and the CNM would provide for the timely review of planning and procurement documents within the Directorate for Reliability and Engineering (MAT-08E), and for the required support at the SYSCOM staff level.

The requirements of this plan would have minimal impact on personnel requirements within the program offices since much of the effort will fall on activities in other organizations supporting the PM/AM. In the Navy laboratories and field activities, expertise, in sufficient depth and breadth, must be available to provide assistance in design reviews, engineering analysis, tests and evaluations to support PM/AMs as necessary throughout the entire acquisition cycle. As a result of the constraints of NIF funding and the draw down of personnel the capability that now exists is eroding.

3.5.3 Facilities

Facilities have been extensively assessed in the TESS Action Council EME Effects Summary Report to the CNM of 30 September 1977. That analysis sets forth the areas in which capabilities require expansion or additional emphasis. There is a continuing need to maintain and update Navy T&E facilities.

3.5.4 Funding

Direct funding for appropriate EME effects control efforts throughout acquisition must be an integral part of the acquisition cost. The PM/AM must accommodate these needs in their programming and funding documents. Funding for general update of facilities and the maintenance of a viable technology base within the Navy is the responsibility of the CNM Tactical Electromagnetic Coordination and Support office. The net result of a systematic approach to EME effects control will, in most instances, be less costly over the life cycle of the acquisition than the "discover problems and fix" approach.

4. IMPLEMENTATION

4.1 Policy

It is mandatory that EME effects be addressed as a major issue in the acquisition process, to accommodate the inseparable relationship between design and EME effects control. All planning and procurement documents shall fully reflect and provide for the implementation of necessary EME effects control. Developing agencies will take explicit actions necessary for early and continuous assessment and control of EME effects throughout the acquisition of platforms, systems and equipments. The CNM staff, in turn, will ensure compliance by review of appropriate planning and procurement documents.

4.2 Actions

4.2.1 General

Cognizant Commands, procurement managers and field activities are responsible for assuring that planning and procurement documents include provisions for initiation and continuous reflection of required EME controls in all such documents. The ADCNM for Reliability and Engineering is designated as the review authority to ensure compliance.

4.2.2 Developing Agencies Actions

SYSCOMs and CNM program managers will take explicit actions required for early and continuous application of EME effects controls as follows:

a. Define the operational EME and performance requirements therein.

b. Define constraints on EM emissions.

c. Include operational EME, performance requirements in the EME, and EM emission constraints in contractual documentation.

d. Conduct design reviews and test and evaluation to assure that requirements and constraints are incorporated.

4.2.3 Systems Commands Actions

a. For major acquisitions review procurement documents prior to forwarding to CNM. Assure that reviews are conducted for less than major acquisitions within the cognizant SYSCOM.

b. Promptly conduct a concerted effort to review and revise specifications and standards under their cognizance, ensuring current state-of-

technology, methodology and requirements are encompassed. Specifically, it is desired that COMNAVAIR, COMNAVSEA and COMNAVELEX revitalize their review programs to ensure currency and responsiveness of specifications and standards in accordance with DoD Directive 3222.3 and SECNAVINST 2410.1B, incorporating the following actions:

(1) Designate an office responsible for specifications and standards in relation to EME effects.

(2) Determine those specifications and standards to be reviewed and, if necessary, revised, and promptly commence review.

(3) Inform the CNM (ADCNM for Reliability and Engineering (MAT-08E) and CNM Director Tactical Electromagnetic Efforts) of plans and schedules for review, no later than April 30, 1978.

c. Revise directives and other documents under their cognizance as necessary to reflect the changes to directives of senior echelons as set forth in Annex A hereto when they are issued. Copies of revised directives and other documents shall be provided to the CNM (ADCNM for Reliability and Engineering (MAT-08E)).

d. Along with other Commands responsible for field activities, ensure that expertise and capabilities are developed and maintained to enable continued prosecution of a determined EME effects control program.

4.2.4 CNM Director Tactical Electromagnetic Coordination and Support Actions (Proposed in MAT-08 Organization)

a. Conduct reviews of planning and programming documents to ensure technical and funding provision for EME effects controls, under guidance of the ADCNM for Reliability and Engineering.

b. Revise policy directives to clarity and stress the importance of considering the EME in acquisition cycle. Prosecute recommendations for document changes set forth in Annex A.

c. In coordination with SYSCOMs propose the laboratory responsibilities for EME effects addressal, by disciplines, (EMC, EMV, ECCM, etc.) and/or by product (ship, aircraft, weapons, C^3, etc.) and make recommendations to the Director of Navy Laboratories for his review and implementation.

d. Originate funding requirements for general update of facilities and to maintain a viable EME effects technology base in the Navy.

e. Prepare a comprehensive NAVMATINST concerning all aspects of EME effects controls, as discussed in paragraph 3.4.1 of this plan.

ANNEX A

CHANGES TO INSTRUCTIONS

Applicable DoD and Department of the Navy directives have been reviewed to determine requirements for EME effects control throughout the acquisition process. There are primarily three sets of documents applicable to this effort:

1. Policy directives for EME effects control.
2. Instructions which govern the acquisition process.
3. Instructions which provide procedures for implementing policy and guidelines for the preparation of various documents to support the acquisition process.

In view of their more direct applicability, discussions of the OPNAV and NAVMAT instructions form the body of this annex.

An EMC policy was established by DoD Directive 3222.3 in 1967 and promulgated by implementing OPNAV and NAVMAT Directives. This directive states that one of its objectives is the "Achievement of electromagnetic compatibility of all electronic and electrical equipments, subsystems and systems, produced and operated by components of the Department of Defense, in any electromagnetic environment. Operational compatibility is part of and the paramount focus of, this objective." Although DoD Directive 3222.3 primarily addresses EMC, the authority and policy related to establishing EME effects control efforts in the Navy are adequately conveyed by the intent and wording of this directive.

The documents that state acquisition policy are general in nature and as such do not need to specifically address EME effects. However, instructions that provide procedures for implementing policy need to address EME effects. These documents have been reviewed to determine where changes would have to be made to ensure that EME effects are adequately addressed and to provide adequate information of review. These documents are discussed in Appendices 1 through 8 of this annex and where applicable, specific changes are delineated. Implementing actions for most of the recommended changes have already been taken as a result of TESS Action Council actions. These will be described in the status section of each enclosure. Although NAVMATINST 2410.1A is in need of revision, it is beyond the scope of this document, as discussed in section 3.4.1.

LIST OF APPENDICES TO ANNEX A

APPENDIX 1

OPNAV INSTRUCTION 3960.10 OF 22 OCTOBER 1975 (SUBJ: TEST AND EVALUATION)

Background

This instruction implements DoD Directive 5000.3 (Subj: Test and Evaluation within the Navy), establishes policy for T&E in Navy acquisitions programs, defines responsibilities, establishes procedures for planning, conducting and reporting T&E, delineates relationship of development T&E and operational T&E phases throughout the life of a program, establishes procedures and format for test and evaluation master plans (TEMPs). Currently, this instruction does not specifically require that EME effects be addressed.

Recommended Changes

A. Ref: Certification of Readiness for OPEVAL, enclosure (2), paragraph 2.c, line four, after ". . . maintainability . . ."

Add: "effects on/from the electromagnetic environment"

Rationale: This will ensure EME is listed in the criteria for full certification of Readiness for OPEVAL.

B. Ref: Test and Evaluation Master Plan (TEMP), enclosure (3), Tab A, page II-2, paragraph 5.b.

Add: "(8) Effects on/from the electromagnetic environment."

Rationale: To ensure the operational suitability requirements include tests for effects on/from EME.

Status

CNM ltr 095/JWA of 20 December 1976 to CNO, subject, "OPNAV Instruction 3960.10, recommended revision", recommended that OPNAVINST 3960.10 be revised as indicated.

The changes have been incorporated into the draft of the new OPNAVINST which will be issued in the near future as 3960.10A.

APPENDIX 2

OPNAV INSTRUCTION 4720.9D OF 23 AUGUST 1974
(SUBJ: APPROVAL OF SYSTEMS AND EQUIPMENT FOR SERVICE USE)

Background

This instruction establishes policy and uniform procedures for approval of systems and equipments for service use.

Current OPNAV Instruction 4720.9D does not require that the electromagnetic environment be considered or addressed.

Recommended Changes

A. Ref: Page 4, paragraph 6.a (Approval for Service Use), subparagraph (1), third line, after ". . . environment."

Add: "(including electromagnetic environment)"

Rationale: The fact that the electromagnetic environment is a part of the operational environment is not always clear or recognized. The intent is to emphasize by definition that it is part of the operational environment.

B. Ref: Page 4, paragraph 6.b (Provisional Approval for Service Use), subparagraph (1), third line between ". . . environment" and "is . . .".

Add: "(Including the electromagnetic environment)"

Rationale: Same as A. above.

C. Ref: Page 6, paragraph 7 (Policy), sixth line between ". . . suitable" and "and . . ."

Add: "(including in its intended electromagnetic environment)"

Rationale: For emphasis.

D. Ref: Page 7, paragraph 9.(1) (c), second line between ". . . evaluations" and "conducted . . ."

Add: "(including intra and intersystem deficiencies identified due to effects on/from the operational electromagnetic environment)"

Rationale: For emphasis and clarification.

E. Ref: Page 8, paragraph 9.b (1) (c), second line between ". . . evaluations" and "conducted . . ."

Add: "(including intra and intersystem deficiencies identified due to effect on/from the operational electromagnetic environment)"

Rational: Emphasis and clarity.

F. Ref: Page 9, paragraph 9.b (3) (c), third line, between ". . . testing" and "should . . ."

Add: "(including testing in the intended operational electromagnetic environment)"

Rationale: Emphasis and clarity.

Status

CNM ltr 095/JWA of 7 April 1977, Subject, "OPNAVINST 4720.9D (Subj: Approval of Systems and Equipment for Service Use)", to CNO recommended that these changes be made to OPNAVINST 4720.9D. The above changes have been incorporated into the draft of the new OPNAVINST which will be issued in the near future as 4720.9E.

APPENDIX 3

OPNAV INSTRUCTION 5000.42A OF 3 MARCH 1976 (SUBJ: WEAPON SYSTEMS SELECTION AND PLANNING)

Background

This instruction amplifies policy set forth in SECNAVINST 5000.1 (Subj: System Acquisition in the Department of the Navy), establishes revised R&D planning procedures and establishes procedures for identifying operational requirements and for conducting management reviews during system acquisition.

Enclosures (2) and (3), among other things, establish the procedures and content requirements for CNO Operational Requirements (OR) and for NMC prepared Development Proposals (DPs). Currently this instruction does not specifically require that EME effects be considered or addressed.

CNO ltr ser 987P6/89884 of 25 November 1975, subject, "System Mission Survivability/Operability in the Electromagnetic Environment, policy statement for", promulgated the policy that in the development and improvement of Naval ships, aircraft, C^3 elements and other components/subsystems/systems, consideration will be made of total system mission, survivability/operability in the electromagnetic environment (EME). It also directs that EME be addressed in DPs, and NDCPs.

Recommended Changes

A. Ref: Enclosure (2) (OR), page 5, paragraph III.A(3), line 3, after ". . . environmental"

Add: "(including electromagnetic environment)"

Rationale: Clarity - to ensure that in an Operational Requirement (OR) the term environmental conditions clearly includes electromagnetic environment conditions.

B. Ref: Enclosure (3) (DP), page 2 paragraph VIII, first sentence.

Change: Whole sentence to read, "Indicate other factors which will impact on the effective introduction of this system, i.e., logistics, training, support, environmental impact (including electromagnetic environment), likelihood of national and international electromagnetic spectrum supportability approval, human resources, etc."

Rationale: To implement the EME policy aspects in Development Proposals (DPs).

Status

As a result of informal communications between TESS Action Council representatives and OP-941, the recommended changes have been incorporated into the draft of the next issue of OPNAVINST 5000.42.

APPENDIX 4

OPNAV INSTRUCTION 5000.46 OF 10 MARCH 1976 (SUBJ: DECISION COORDINATING PAPERS (DCPs), PROGRAM MEMORANDA (PMs), AND NAVY DECISION COORDINATING PAPERS (NDCPs), PREPARATION OF)

Background

This Instruction supplements the weapon system acquisition policies of SECNAVINST 5000.1 (Subj: System Acquisition in the Department of the Navy), OPNAVINST 5000.42A, (Subj: Weapon Systems Selection and Planning), and SECNAVINST 5200.30 (Subj: Management of Decision Coordinating Papers (DCPs) and Program Memoranda (PMs) within the Department of the Navy) by establishing procedural guidelines governing the preparation and processing of Decision Coordinating Papers (DCPs), Program Memoranda (PMs), and Navy Decision Coordinating Papers. Enclosure (1) of this instruction shows the general desired format for DCPs, PMs and NDCPs. The current instruction does not specifically require that EME effects be addressed.

Recommended Change

A. Ref: Enclosure (1) page 3, paragraph (V) (Other factors), fifth line, after ". . . Interoperability"

Add: "Operational Electromagnetic Environment"

Rationale: To bring to the attention of all involved the need to consider operational electromagnetic environment in the DCP.

Status

To ensure electromagnetic environment is addressed in this instruction, CNM ltr of 24 November 1976 to CNO (signed by MAT-036B), subject, "OPNAVINST 5000.46A; revision of", recommended the above change. The essence of the above change has been incorporated into the draft of the new OPNAVINST which will be issued as 5000.46A.

NOTE: If issue is reopened, statement requiring EME effects goals should be added to Enclosure (1), paragraph II, page 2.

APPENDIX 5

NAVMAT INSTRUCTION 3960.6A OF MAY 1976 (SUBJ: TEST AND EVALUATION)

Background

This instruction implements OPNAVINST 3960.10 (Subj: Test and Evaluation) within the Naval Material Command (NMC) and establishes policy guidelines for test and evaluation (T&E) for acquisition category IV (ACAT IV) programs.

Recommended Changes

A. Ref: Page 3, paragraph 8.b(s), after ". . . matters"

Add: "and effects on/from the electromagnetic environment (EME)."

Rationale: Designate a specific NAVMAT code responsible for EME in the review of the TEMPs.

B. Ref: Enclosure (1), page 3, paragraph (10), line 3, after "vulnerability,"

Add: "effects on/from the EME,"

Rationale: Ensure EME is a documented requirement and is included in the review of all TEPs.

Status

NAVELEX by his memorandum 095:JWA:cag M115-095 of 21 December 1976 to CNM (NAVMAT-036) recommended the above change based on the old NAVMAT organization. In his memorandum 036/JS of 28 December 1976 to COMNAVELEX, CNM concurred with the recommendations. These changes have been incorporated in the draft of the new NAVMAT Instruction to be issued in the near future as 3960.6B. In view of the new organization, the specified code would be 08E.

APPENDIX 6

NAVMAT INSTRUCTION 4720.1 OF 13 DECEMBER 1974
(SUBJ: APPROVAL OF SYSTEMS AND EQUIPMENTS FOR SERVICE USE (ASU))

Background

This Instruction implements OPNAV INSTRUCTION 4720.9D within the Naval Material Command. Currently, NAVMATINST 4720.1 does not specifically require that electromagnetic environment be addressed.

Recommended Changes

A. Ref: Page 4, paragraph 9.a.(1) after ". . . environment"

Add: "including the electromagnetic environment"

B. Ref: Page 4, paragraph 9.b.(1) after ". . . environment"

Add: "including the electromagnetic environment"

C. Ref: Page 8, paragraph 12

Add: paragraph 12.a. "Electromagnetic Effects: Full ASU will not be granted until there is assurance that the equipment or systems will meet performance requirements in the anticipated electromagnetic environment."

D. Ref: Enclosure (2)

Add: h.9. "Capability to meet performance goals in the anticipated electromagnetic environment has been established"

Rationale: To give proper emphasis to consideration of adverse electromagnetic effects.

Status

No action taken to date to implement changes.

APPENDIX 7

NAVMAT INSTRUCTION 5000.22A OF 14 JULY 1977 (SUBJ: WEAPON SYSTEMS SELECTION AND PLANNING)

This instruction amplifies the guidance in OPNAVINST 5000.42A of 3 March 1976 (Subj: Weapon Systems Selection and Planning) and establishes, where necessary, revised NAVMAT R&D planning and review procedures. In particular, this document provides NAVMAT direction for the preparation, format and content of DPS and provides a DP checklist. As a result of TESS Action Council recommendations, appropriate changes to include EME effects have been incorporated in the latest issue. The changes called attention to the need to address EME effects and add its consideration as an item in the checklist.

Status

Changes made - no action required.

APPENDIX 8

DOCUMENTS GOVERNING PROCUREMENT PLANS (PP), REQUESTS FOR PROPOSALS (RFP) AND JUSTIFICATION FOR AUTHORITY TO NEGOTIATE/REQUEST FOR AUTHORITY TO NEGOTIATE (JAN/RAN)

Background

The Procurement Plan (PP), Request for Proposal (RFP) and Justification for Authority to Negotiate/Request for Authority to Negotiate (JAN/RAN) are vital links in assuring that EME effects are adequately addressed in the acquisition process. Therefore, it is necessary that they reflect EME effects.

If the JAN/RAN is supported by an approved Procurement Plan, then the JAN/RAN need not include further EME effects information. However, if an approved PP is not available or if additions or changes regarding EME effects considerations have been required, EME effects information shall be included in the JAN/RAN. In either case, the RFP represents the practical application of these considerations and must effectively convey EME effects control requirements to the contractor.

The basic governing document for preparation of the PP, RFP and JAN/RAN is the Armed Services Procurement Regulation. Applicable paragraphs are ASPR 1-2100, ASPR 3-500 and ASPR Appendix J respectively. Navy Procurement Directives (NPDs) are used to supplement the ASPR. CNM Procurement Policy Memoranda (PPM) govern procurement in NAVMAT until NPDs are issued. It is therefore recommended that a PPM be issued to direct that EME effects be addressed in the PPs, and RFPs and RANs.

Proposed Procurement Policy Memorandum (PPM)

Subj: Electromagnetic Environment (EME) Effects Control Requirements in Navy Contracts for platforms, and all electrical/electronic systems, subsystems and equipments

Ref: (a) DoD Directive 3222.3 of 5 July 1967
(b) OPNAVINST 2410.31C of 19 May 1977

1. Reference (a) establishes policy with regard to electromagnetic compatibility in DoD. Reference (b) implements EMC policy established by the Secretary of the Navy and assigns CNM the responsibility for achievement of electromagnetic compatibility in the material phases of development and procurement of platforms and telecommunication equipments in the Navy. In this context, EMC refers to all EME effects. Further, CNM is directed to ensure that EMC is a mandatory programming item in the development and procurement of platforms and all electrical/electronic systems, subsystems and equipments.

2. Effective immediately all Procurement Plans (PPs) and Requests for Proposals (RFPs) which cover development or production of platforms and electrical/electronic systems, subsystems, and equipment, or the modification or product improvement thereof, shall include a statement of plans and requirements to meet applicable Electromagnetic Environment (EME) effects control. As utilized herein, EME effects includes the adverse effects on or from the operational electromagnetic environment. In the event EME effects is determined to be inappropriate for application, a narrative justification supporting such determination will be included in the PP and JAN/RAN.

3. The Procurement Plan shall contain EME effects control information, as appropriate, in those paragraphs related to Technical Risks and Test and Evaluation. In addition, further information shall be included in a separate paragraph entitled "Consideration of EME Effects Control." With reference to the illustrative format for Procurement Plans contained in ASPR 1-2102, this paragraph should be located after item 15. "Application of Should Cost" and prior to 16. "Milestone Chart." The contents of this paragraph should discuss predicted EME, emission characteristics, performance requirements in EME, design reviews and T&E for EME effects.

4. If an approved Procurement Plan is not available, include a separate paragraph in the JAN/RAN entitled "Considerations of EME Effects Control." This paragraph should contain, as appropriate, a narrative discussion describing the EME, potential EME problems, associated risks, possible solutions, test methodology, evaluation approach, facility and personnel requirements and projected costs, schedules and milestones.

5. In each of the appropriate sections of the RFP (for example, Background, Statement of Work, or Evaluation Criteria) include a separate paragraph relating to EME effects control.

6. This PPM is cancelled when the above provisions are incorporated into the NPD.

ANNEX B

GUIDELINES FOR ENSURING EME EFFECTS CONTROLS IN REVIEWS

As indicated in the basic plan, regularized review of programming and planning documents will be a key step in ensuring adequate control of EME effects. The actual implementation of reviews, however - their extent and technical analysis - will be the determining factor as to whether they will accomplish their purpose. To provide an insight of the review process and for interim use, a sample set of review guides is provided in this annex. These guidelines will be incorporated in the electromagnetic effects guide currently in preparation.

LIST OF APPENDICES TO ANNEX B

APPENDIX I

REVIEW GUIDELINES FOR DRAFT OPERATIONAL REQUIREMENTS (OR) (SYSTEMS AND PLATFORMS)

Questions	Considerations
System Parameters (III.a. (1))* 1. Have particular goals related to EME effects control been addressed, if applicable?	1. If the item being considered involves the use of electrical circuits or electronics the general requirement for compatibility with the EME must be stated. 2. Goals for ECCM performance in a hostile ECM environment should be stated if system is to operate in such an environment. 3. EMCON requirements in terms of time for achieving EMCON, emissions level, and recovery time at conclusion of EMCON should be defined. 4. Special hardening requirements which would result in either an increase or decrease in hardening should be stated; i.e., item is required to operate/ survive in an EMP environment, etc.
Target Parameters (II.a. (2)) 1. Has target been sufficiently defined to determine the threat EME including those that are generated by target ECM?	
Operational Employment (III.a. (3)) 1. Has the operational employment been described sufficiently to permit definition of the EME?	1. Importance of item being able to operate in total EME should be stated.

* This and subsequent roman numerals refer to outline format for OR in OPNAV Instruction 5000.42A.

Questions	Considerations
	2. If utilization on different platforms or against additional classes of targets is possible, the rationale for including or not including these additional utilization scenarios into the EME definition should be addressed.

APPENDIX 2

REVIEW GUIDELINES FOR DEVELOPMENT PROPOSALS (DP) AND NAVAL DECISION COORDINATIONAL PAPERS (NDCP) (SYSTEMS AND PLATFORMS)

Questions	Considerations
Effectiveness and Cost Comparison of Alternatives (V)*, (III.)** 1. Has EME effects control been discussed with respect to the various alternatives?	1. For each design alternative, what are the significant alternatives for achieving the desired level of E^3 control? 2. For each of the risks related to achievement of EME effects control identified in section VI. "Risks", design alternatives should be identified. 3. If a telecommunication equipment is being procured, have alternatives been considered for accomplishing the same purpose which do not utilize the electromagnetic spectrum? 4. What has been the rationale for selection of proposed frequency bands or ranges? 5. Are unique spectrum utilization techniques required to support telecommunication requirements? 6. Have the criteria for frequency tunability been considered in terms of co-channel interference? 7. What are the configuration management plans to assure that design factors related to EME effects control are achieved in final product?

* This first and subsequent first roman numerals refer to outline format for DP as in OPNAV Instruction 5000.42A, enclosure (3).

** This second and subsequent second roman numerals refer to outline format for NDCP as in OPNAV Instruction 5000.46, enclosure (1).

Questions	Considerations
	8. Radiation from receivers shall be suppressed.
	Platform Particular 1. In general, what are characteristics of projected receiver suites for the platform in terms of sensitivity, bandwidth, frequency range and antenna performance?
	2. For each of the projected electronic suites (including ECM equipments), what are the projected problems for intended and unintended receivers?
	3. What is projected EME at planned ordnance locations and how does EME relate to ordnance susceptibility?
	4. At what locations does the projected EME exceed personnel safety criteria and what protective measures have been planned?
	5. What is hardening philosophy in terms of controlling potential EME effects problems in electronics/ordnance?
Risks (VI.), (IV.) 1. Have major technical risks been identified?	1. General a. Does projected EME present special hardening problems? Have alternative solutions been provided for each of these problems?
	2. Does achievement of proposed characteristic of transmitters or receivers require advancing state-of-the-art?
	3. Transmitters a. Do transmitter output characteristics pose unique threat to susceptibility of existing equipment/systems/personnel/ordnance?
	b. Has the likelihood of national and international spectrum support approval been addressed (Compliance with OPNAVINST 2400.2B)?

Questions	Considerations
	4. Receivers Are proposed operational characteristics of receiver consistent with expected performance in projected EME?
	Platform Particular 1. What design philosophy will be employed to assure that the different systems and subsystems will operate together effectively without degrading another?
Test and Evaluation (VII.), (IX.) 1. Have adequate types of EME effects T&E been planned throughout acquisition process?	1. General a. EMC tests as indicated in MIL-STD-461A. b. If an electronic/electrical item is to be utilized in locations where it will be subjected to EM environments such as weather decks or when exposed to mainbeam. EMV tests shall be performed. c. EMP T&E should be conducted when the operational requirement (OR) states that the item is to survive/operate in a nuclear environment. d. For those platforms, systems or subsystems that interface with auxiliary support equipment (such as an aircraft interfaces with GSE), the interface of the platform with the support equipment as well as the support equipment will require T&E. 2. Transmitters a. Spectrum characteristics of transmitter per MIL-STD-449/469 as well as MIL-STD-461A. b. Antenna characteristics per MIL-STD-449/469. c. EMCON effectiveness and recovery. d. What is status of frequency support for T&E?

Questions	Considerations
	3. Receivers a. Spectrum receiving characteristics per MIL-STD-449/469 as well as MIL-STD-461A. b. Antenna characteristics per MIL-STD-449/469. c. ECCM capabilities. d. Has radiation from receivers been suppressed? 4. Ordnance a. Have HERO tests been planned for those items containing electroexplosive devices (EEDs) or some other type of electronically/electrically initiated/controlled explosive train? Platform Particular 1. For System, subsystem or equipment being considered for utilization, are sufficient data available in terms of their EMC, EMV, EMP and ECCM characteristics to perform any detailed analyses that may be required? 3. Are development tests planned to gather data in terms of cable shielding, cable routing, intermodulation products caused by the "rusty bolt" phenomenon or other design/installation/maintenance factors? 4. What are plans along with rationale for inter-platform and intra-platform T&E?
2. Is T&E plan adequately supported?	1. Will operational or simulated tests be performed? 2. Has adequate hardware been allocated for test? 3. Have support equipments and unique test equipments been planned? 4. Have requirements to develop unique facility capabilities been identified?

Questions	Considerations
	5. Have plans been made to train personnel to achieve maximum effectiveness from built-in EMC and ECM measures?
3. Has adequate funding been planned for performing tests and analyzing data?	1. Costs for analysis of T&E results in terms of expected operational performance is often equivalent in scope to the data collection effort itself. Any observed deficiencies in EME effects control efforts must be weighed against operational performance in terms of need, urgency, risk and worth.
Other Factors (VIII.), (V. or II.) 1. Has realistic operational EME been defined?	1. If item will be utilized in different locations (transportation, check-out areas, weather decks, main beam, etc.) and/or different configurations (i.e., a missile being transported, on an aircraft, in free-flight undergoing VERTREP, etc.), has EME been defined for each combination? 2. If multi-platform and/or multi-service requirements are contemplated has above been accomplished for these applications? 3. Are operate/survive requirements clearly stated for each location? 4. Does EME include all possible sources applicable to this procurement such as own-neutral- and hostile-force transmitters (communications, radar, ECM, etc.), spurious emissions (motors, generators, etc.), EMP, and statics? 5. Have threat emissions, including ECM, been projected far enough into the future to cover the time span as it will exist during the operational life of the system? 6. Is EME comparable to that provided in MIL-HNDBK-235 for EMV for deck items? 7. Has the EMP environment been defined?

Questions	Considerations
	8. Have lightning and static been addressed for items intended for airborne applications?
	Platform Particular 1. How close will platform be located to other platforms, especially sister platforms utilizing sister transmitting equipment employing the same or adjacent channel?
	2. What are the characteristics of alternative intra-platform transmitter suites in terms of power outputs, antenna performance and spectrum characteristics?
The Development Plan(s) Achievement Milestones and Threshholds (IX.), (VI.) 1. Have major milestones with respect to EME effects control been indicated on the master schedule?	1. Have spectrum support milestones been designated?
	2. Has the date for resolution of any major risks associated with EME effects control been indicated?
	3. Have major EME effects control T&E milestones been identified?

APPENDIX 3

REVIEW GUIDELINES FOR PROCUREMENT PLAN (PP)
(SYSTEMS AND PLATFORMS)

Questions	Considerations
Description of Item or System (1.)* 1. Is system and its mission described adequately to determine the need for various EME effects considerations and tests?	1. How close will platform be located to other platforms, especially platforms utilizing sister transmitting equipments employing the same or adjacent channel?
Discussion of Program Risk (6.) 1. Have major technical risks been identified?	1. Transmitters Do transmitted output characteristics pose unique threat to susceptibility of existing electronics? 2. Receivers Are proposed operational characteristics of receiver consistent with expected performance in projected EME? Platform Particular 1. What design philosophy will be employed to assure that the different systems and subsystems will operate together effectively without degrading one another?
2. Have difficult design requirements been identified?	1. Does projected EME present especially difficult hardening problems associated with EMC, EMV, EMP, ECCM? 2. Are EMCON requirements or requirements for recovery from power loss difficult to meet?
Integrated Logistics Support (7.) 1. Are in-service checks required to maintain EME effects control?	1. Have the necessary procedures and training been planned?

* This and subsequent numbers refer to Illustrative Procurement Plan Format as in ASPR 1-2102.

Questions	Considerations
	2. Are maintenance and checkout procedures based on system or piecepart (shielded cables, filters, etc.) basis?
	3. Have necessary specialized test equipment(s) been programmed?
Test and Evaluation Approach (11.) 1. Have adequate types of EME effects T&E been planned?	1. DT&E shall be planned to resolve EME effects control risks, evaluate alternative design approaches and assist in selection of hardening components such as shielded cables, filters, etc.
	2. General Have appropriate system DT&E and OT&E tests been planned such as: a. EMC tests as indicated in MIL-STD-461A.
	b. If an electronic/electrical item is to be utilized in locations where it will be subjected to EM environments such as weather decks or when exposed to mainbeam, EMV tests shall be performed.
	c. EMP T&E should be conducted when the operational requirement (OR) states that the item is to survive/operate in a nuclear environment.
	d. Adequate tests should be planned to verify effectiveness of proposed spectrum control and utilization techniques.
	e. Development tests may also be conducted on piecepart items such as shielded cables, filters, gaskets, etc., to evaluate their suitability for design.
	2. Transmitters a. Spectrum characteristics of transmitter per MIL-STD-449/469 as well as MIL-STD-461A.
	b. Antenna characteristics per MIL-STD-449/469 as well as MIL-STD-461A.

Questions	Considerations
	c. EMCON effectiveness and recovery. 3. Receivers a. Spectrum receiving characteristics per MIL-STD-449/469. b. Antenna characteristics per MIL-STD-449/469. c. ECCM d. Emission 4. Ordnance a. Have HERO tests been planned for those items containing electroexplosive devices (EEDs) or some other type of electronically/electrically iniated/controlled explosive train? Platform Particular 1. For system, subsystem or equipment being considered for utilization, are sufficient data available to assess their compatibility? If not, is DT&E planned to acquire such data? 2. If available data are insufficient, have the required tests been planned to obtain that data? 3. Are development tests planned to gather data in terms of cable shielding, cable routing, intermodulation products caused by the "rusty bolt" phenomena or other installation maintenance practices? 4. What are plans along with rationale for inter-platform and intra-platform T&E?
2. Is there a plan to establish relationships between test data and operational effectiveness?	1. Vulnerability analyses shall be presented in terms of operational performance parameters such as time between false alarms, detection ranges, CEP, PK, etc.

Questions	Considerations
	2. Will test results provide sufficient information to perform above analysis? This may be established by having rationale which relates specific test data required to the various steps in process.
3. Are OT&E tests being planned to evaluate item under most realistic condition possible?	1. Items should be tested with all transmitters and receivers normally required for simultaneous operation being operated. This includes all receivers and transmitters on the item as well as those on the same or nearby platforms.
	2. For those EME effects which cannot be hardened to all operational environments, OT&E tests shall be performed to exercise the item in that environment to determine if performance is acceptable. For example, ECM tests shall be performed against those items which ECM could be employed by having a missile attack a target with ECM, etc. Channelization concepts should be evaluated under operational conditions.
4. Will those systems that have targets be tested with various target parameters?	1. What measurements will be made with different target intensities (e.g., source strength for an IR type missile), contrast ratios (for a TV type missile) or signal level (for a RF type missile) as related to the EME?
	2. Are adequate facilities available?
	3. Will targets employ ECM?
	4. Have support equipments and unique test equipments been planned?
	5. Have long-lead support equipments been properly scheduled?
	6. Do test personnel require special training in regards to operation of test item or support equipment?
	7. Are adequate number of test items provided?

Questions	Considerations
5. Have plans been made to train observers and OT&E participants to recognize adverse EME effects?	1. Special training is required to distinguish EM effects from other operational problems. Such training should include all EM effects being evaluated during OT&E.
6. Has adequate funding been planned for performing tests and analyzing data?	1. Costs for analysis of test results in terms of expected operational performance is often equivalent in scope to the data collection effort itself. 2. Any observed deficiencies in EME effects control efforts must be weighed against operational performance in terms of need, urgency, risk and worth. If there is a need for more effective EME effects control, then the application of alternative hardening techniques will require additional T&E.
Considerations of EME Effects Control (15A.)** 1. Has realistic operational EME been adequately defined?	1. If item is expected to be utilized in different locations (transportation, checkout areas, weather decks, mainbeam, etc.) and/or different configurations (i.e., a missile being transported, loaded on an aircraft, in free-flight, undergoing VERTREP, etc.), has EME been defined for each combination? 2. Does EME include all possible sources applicable to this procurement such as own-neutral- and hostile-force transmitters (communications, radar, ECM, etc.), spurious emissions (motors, generators, etc.), and statics? 3. Are threat capabilities projected far enough into the future to cover the time span as it will exist during the operational life of the system? 4. Do characteristics include peak and average levels as well as modulations and pertinent pulse shapes? 5. Are operate/survive requirements clearly stated for each location in which the item will be utilized?

** Paragraph 15A. is a proposed new paragraph to be inserted after existing Paragraph 15.

Questions	Considerations
	1. Is there some indication that the projected interplatform above deck EME is comparable to those provided in MIL-HNBK-235 for EMV?
	2. Has the EMP environment been adequately defined? (In the case of systems or modules EMP environment may be defined in terms of currents or voltages.)
	3. Has the projected ECM environment been updated and included?
	4. What are the characteristics of alternative intra-platform transmitter suites in terms of power outputs, antenna performance and spectrum characteristics?
	5. Have lightning and static been addressed?
2. Will evaluation criteria be contained in RFP to inform contractor of minimum EME effects control requirements for his proposal to be considered acceptable?	1. The Procurement Plan should define minimum criteria for a proposal to be acceptable; these criteria must be provided to contractor in the RFP.
3. Has EME effects control during development been addressed?	1. Is an EMC control plan called for?
	2. Will an EMCAB function be performed?
4. Have any required tests been bypassed as a result of waivers?	1. If waiver was granted, who approved waivers?
	2. What was rationale for granting waivers?
	3. What is potential operational impact of not having test data?
5. Has there been any evidence of EM susceptibility?	1. Have all tests planned to date been performed?
	2. Have susceptibilities been properly evaluated in terms of operational performance according to evaluation criteria provided in TEMP?

Questions	Considerations
Procurement Approach (19.) 1. Will considerations of EME effects control influence contractor selection.	1. What are the minimum EME effects control requirements that must be met for a proposal to be considered acceptable?
	2. Although contractor approaches to implementing EME effects control will be different how will alternative approaches be evaluated?
2. Have major milestones with respect to control been indicated on the master schedule?	

APPENDIX 4

REVIEW GUIDELINES FOR TEST AND EVALUATION MASTER PLAN (TEMP) (SYSTEMS AND PLATFORMS)

Questions	Considerations
System Description and Mission (II.1.)* 1. Is system and its mission described adequately to determine the need for various tests?	1. All electronic/electrical equipments, subsystems, systems and platforms must be subjected to EMC T&E. 2. If an electronic/electrical item is to be utilized in locations where it will be subjected to EME environments such as encountered on weather decks or when exposed to mainbeam, EMV T&E shall be performed. 3. If the operational requirement (OR) states that the item is to survive/operate in a nuclear environment, then EMP T&E is required. 4. If the item could be subjected to ECM, ECCM tests shall be conducted. 5. If the item will be deployed where EMCON radiation levels and EMCON recovery time are important, EMCON tests shall be performed. 6. Does item contain EEDs or some other type of electronically/electrically initiated explosive train initiation that would require HERO and/or statics tests? 7. If item is to be utilized for an airborne application, lightning and static effects should be investigated. 8. If any of the above requirements are waived, what is the rationale for waiver?

* This and subsequent roman numerals refer to outline format for TEMP as in OPNAV Instruction 3960.10, Enclosure (3), Tab A.

Questions	Considerations
Critical T&E Issue (II.2.)	
1. Has T&E been planned to evaluate risks associated with EME effects control?	1. Documents such as the DP and NDCP shall be reviewed to assure that T&E is included to resolve EME effects control risks.
	2. Provide rationale if T&E is not required for resolution of risks.
Operational Suitability: Effects on/ from the Electromagnetic Environment (EME) ((II.5.b(8))**	
1. Has the required degree of immunity to interference been specified along with acceptance criteria?	1. What is criteria for acceptable performance when item is exposed to EME?
	2. Will test results provide sufficient information to relate EME effects to operational suitability?
	3. Will adequate tests be performed to demonstrate effectiveness of the spectrum control and utilization techniques to be incorporated into receivers or transmitters?
	4. If T&E for EME effects control will not be conducted on production item, provide rationale for assuring that production item will have the same EME effects characteristics as the tested item.
2. Is there a plan to establish relationship between test data and operational effectiveness?	1. Vulnerability analyses shall be presented in terms of operational performance parameters such as degradation of time between false alarms, detection ranges, CEP, PK, etc.
DT&E to Date (IV.1.)***	
1. Have any required tests been bypassed as a result of waivers?	1. What was rationale for granting waivers?
	2. What is potential operational impact of not having test data?
2. Has there been any evidence of RF susceptibility?	1. Have all tests planned to date been performed?

**This addition has been requested to OPNAV Instruction 3960.10, Enclosure (3), Tab A.

***Applicable to TEMP update.

Questions	Considerations
	2. Have susceptibilities been properly evaluated in terms of operational performance according to evaluation criteria provided in TEMP?
3. Have systems been modified for any reason from configuration on which EME effects control T&E was performed?	1. Does modification require T&E?
	2. If required, has modified system been retested?
	3. Has modified system successfully passed tests?
	4. Have tests been performed to evaluate possible changes in other operational parameters that could have been changed by modification?
Future DT&E (IV.2.) 1. Have required types of T&E been addressed in TEMP?	1. If item is a platform, system or subsystem which utilized various auxiliary support equipment (such as an aircraft with GSE), it should be tested with and without support equipment attached with equipment and platform in various modes of operation.
	2. To maximum extent possible, laboratory bench tests shall be utilized in support of TECHEVAL and OPEVAL by providing information related to grounding, leakage paths and relative effects of various modulation parameters, etc.
	3. Piecepart tests on cables, filters, shields, etc., may be required to obtain data to assist in analysis of trade-offs related to EM hardening.
2. Has EME simulation been adequately addressed?	1. Full threat-level facilities are necessary for investigating highly nonlinear EME effects responses such as occur with EMV. For those disciplines such as EMP and HERO, however, extrapolation to some extent is possible. If full threat-level testing will not be performed, is the rationale available for this decision?

Questions	Considerations
3. Will those systems that have targets be tested with various target parameters?	1. What measurements will be made with different target intensities (e.g., source strength for an IR type item) contrast ratios (for a TV type) or signal levels (for a RF type item missile or radar receiver)?
Critical Items (IV.3.) 1. Has the availability of test equipment facilities, and trained support personnel been determined?	1. Are adequate facilities available?
	2. Can full threat levels, as required, be achieved at available facilities?
	3. Are facilities with deficiencies being upgraded and/or tailored to these particular test requirements?
	4. Have long-lead support equipments been properly scheduled?
	5. Has special training been planned for test personnel in regards to operation of test item or support equipment?
	6. Are adequate number of test items provided?
	7. Are test item and test facility schedules sufficiently flexible to allow contingencies based on test results?
OT&E to Date (V.1.) 1. Have any desired tests been bypassed as a result of test limitations or schedule conflicts?	1. What is possible operational impact of not having test data?
	2. What is rationale for not performing tests?
2. Has there been any evidence of RF susceptibility?	1. Have susceptibilities been properly evaluated in terms of operational performance according to evaluation criteria provided in TEMP?
Future OT&E (V.2.) 1. Are tests being planned to evaluate item under most realistic conditions possible?	1. Items should be tested with all transmitters and receivers normally required for simultaneous operation being operated. This includes all receivers and transmitters on the item as well as those on the same or nearby platforms.

Questions	Considerations
	2. Unless previously checked, platforms, systems or subsystems which utilize auxiliary support equipment shall be tested with and without equipments attached with equipments and platform in various modes of operation.
	3. For those EME effects which cannot be hardened to all operational environments, tests shall be performed to exercise the item in that environment. For example, ECM tests shall be performed against those items against which ECM could be employed by having a missile attack a target with ECM, etc. Similarly, channelization concepts should be evaluated under operational conditions.
	4. What rationale has been utilized for the selection of ECM parameters during OT&E?
2. Have results of DT&E been utilized for planning OT&E?	1. If DT&E has revealed potentially troublesome areas related to EME effects, has OT&E been planned to evaluate operational impact?
Critical Items (V.3.) 1. Has availability of specialized test equipment and facilities been programmed?	1. Equipments such as those required for implementing ECM on target are long lead times.
2. Have plans been made to train personnel to recognize adverse EME effects?	1. Have arrangements been made, as applicable, to monitor EMCON effectiveness?
	2. Special training is required to distinguish EME effects from other operational problems. Such training should include all EM effects being evaluated during OT&E.
PAT&E (VI.1.) 1. Has evaluation of intrasystem compatibility for platforms been addressed?	1. Operate transmitters and receivers on adjacent channels to identify potential problem areas.
	2. Simultaneously operate receivers and transmitters to demonstrate total platform compatibility.

Questions	Considerations
	3. Identify intermod products generated from various transmitter-receiver interactions or resulting from the rusty-bolt phenomenon.
3. Include T&E for EME effects control in TSTP-SP (Total Ship Test Program for Ship Production).	1. Review prior considerations of TEMP to determine those applicable to ship acquisitions.

APPENDIX 5

REVIEW GUIDELINE FOR REQUEST FOR PROPOSAL (RFP) (SYSTEMS AND PLATFORMS)

Questions	Considerations
1. Do evaluation criteria contained in RFP inform contractor of minimum EME effects control requirements for his proposal to be considered acceptable?	1. The RFP should include minimum criteria for a proposal to be acceptable.
2. Has realistic operational EME been defined and performance requirement provided?	1. If item is expected to be utilized in different locations (transportation, checkout areas, weather decks, mainbeam, etc.) and/or different configurations (e.g., a missile being transported, loaded on an aircraft, in free-flight, undergoing VERTREP, etc.), has EME been defined for each combination? 2. If multi-platform or multi-service requirements are proposed, the EME should also be defined for these applications. 3. Are operate/survive requirements clearly stated for each application? 4. Are above deck EME's comparable to those provided in MIL-HNDBK-235? 5. Does EME include all possible sources such as own-neutral- and hostile-force transmitters (communications, radar, ECM, etc.), spurious emissions (motors, generators, etc.), EMP lightning and statics? 6. Do characteristics include peak and average levels as well as modulations and pertinent pulse shapes?

Questions	Considerations
	7. Threat capabilities should be projected far enough into the future to cover the time span as it will exist during the operational life of the system.
4. Have difficult design requirements been identified and alternatives requested.	1. Does projected EME present especially difficult hardening problems associated wtih EMC, EMV, EMP, ECCM? Are these highlighted? 2. Are EMCON requirements or requirements for recovery from power loss critical? If so, are they so indicated?
5. Have contractor EME effects DT&E been defined?	1. General a. EMC tests as indicated in MIL-STD-461A. b. Subsystem and equipment EM effects tests. c. Piecepart tests on cables, filters, shields, etc. 2. Transmitters a. Spectrum characteristics of transmitter per MIL-STD-449/469 as well as MIL-STD-461A. b. Antenna characteristics per MIL-STD-449/469 as well as MIL-STD-461A. c. EMCON effectiveness and recovery. 3. Receivers a. Spectrum receiving characteristics per MIL-STD-449/469. b. Antenna characteristics per MIL-STD-449/469. c. ECCM 4. Review TEMP for additional tests to be performed by contractor.

Questions	Considerations
6. Has contractor support of NT&E been incorporated in contract requirements?	1. Have a number of required test items been designated? 2. Have requirements for support equipments and unique test equipments been specified? 3. Has extent of contractor participation in NT&E been indicated?
7. Have included specifications been tailored to reflect characteristics of particular item being procured?	
8. Has sufficient detail been provided to guide the contractor in developing trade-offs for EME effects control?	1. Have sources of detailed EME effects information been supplied to contractor: a. List of knowledgable activities. b. Design guides and handbooks such as MIL-HNDBK-235, 237, 238, MIL-STD-461, 463, 1605, 6051 and AD 1115, AFSC, DH 1-4, etc.
9. Have requirements to meet frequency supportability criteria been included?	
10. Is an EMC control plan required?	1. Is it clear that EMC is used generically here and includes EMV, EMP, ECCM, EMCON, HERO, lightning, man-made EMEs and statics? 2. Will high risk areas be identified along with alternative solutions? 3. Will control plan be updated as design progresses? 4. How does control plan address correcting deficiencies in failed items? To what extent will they be retested? 5. What grounding philosophy will be employed and how will this approach integrate with co-functional equipments, subsystems, systems and platforms?

Questions	Considerations
	6. How will EME effects control measures requirements be passed on to subcontractors?
11. Is a detailed EMC Test Plan to be generated by contractor?	1. As required by DID, test plans should contain a description of each test to be performed on each of various pieceparts and items at each stage of development.
	2. Test plan should be updated as design progresses; rationale should be provided for each change.
12. Is documentation of test data required by CDRL?	1. Has rationale for requiring data along with projected use for data been provided?
	2. Will data be sufficient to design OPEVAL or NTEs?
	3. Will data provide necessary information for design decisions?
	4. Will data provide design insights that could be applied to future procurements?
	5. If none of the above, what is stated rationale for requesting data?
13. Is there a format for requested data as required by DID?	1. Will format of requested data satisfy above requirements without being too voluminous to be of use?
14. As required by Statement of Work, will contractor perform data analysis?	1. Data analysis should compare test results to specification requirements.
	2. Failed items shall be specifically designated.
	3. A checklist of failed items describing necessary corrective actions shall be prepared to assist AM/PM in monitoring corrective process.
15. Are progress reports required to contain updated EME effects control information?	1. In large system/platform procurements, these could be separate reports to be reviewed by EMCAB participants.

Questions	Considerations
16. Have other controls been placed on contractor to assure that EME effects control has been achieved?	1. How often will design reviews be conducted? 2. How many design reviews will be in plant? 3. How many in-plant inspections will be conducted and how often?

APPENDIX 6

REVIEW GUIDELINE FOR APPROVAL FOR SERVICE USE (ASU) (SYSTEMS AND PLATFORMS)

Questions	Considerations
NAVMAT Approval decision (Part II.b.)*	
1. Have any required T&E been bypassed as a result of waivers?	1. What was rationale for granting waiver?
	2. What is potential operational impact of not having test data?
2. Has there been any evidence of RF susceptibility?	1. Has all planned T&E been performed?
	2. Have susceptibilities been properly evaluated in terms of operational performance according to evaluation criteria provided in TEMP?
	3. Have observed deficiencies been weighted against operational performance, need, urgency, risk and worth?
	4. Is operational performance degraded to an extent that only provisional ASU be granted or ASU withheld?

* Refers to approval for Service Use, NAVMAT form number 4000/1A contained in NAMAT Instruction 4720.1, enclosure (2).

ANNEX C

REFERENCES

1. TESS Action Council Report, 1 March 1976, Analysis, Recommendations, Plan of Action and Milestones, Part I, Tactical Electromagnetic Program Office.

2. CNM letter MAT-034:RBB/ELEX-095:RCW of 12 April 1976, Subj: TESS Action Council Report.

3. TESS Action Council Report, 30 September 1977, Electromagnetic Environment Effects Summary Report to the CNM.

4. CNO letter Ser 987P6/69884 of 25 November 1975, Subj: System Mission Survivability/Operability in the Electromagnetic (EM) Environment; policy statement for.

5. DoD Directive 3222.3, Subj: DoD Electromagnetic Compatibility Program.

6. SECNAVINST 2410.1B, Subj: Electromagnetic Compatibility Program within the Department of the Navy, Policy Directive.

7. OPNAVINST 2410.31C, Subj: Electromagnetic Compatibility within the Department of the Navy.

8. NAVMATINST 2410.1A, Subj: Electromagnetic Compatibility (EMC) within the Naval Material Command (NMC).

9. NAVMATINST 2410.2; Subj: Electromagnetic Pulse (EMP) Effects Program.

10. OPNAVINST 3960.10, Subj: Test and Evaluation.

11. OPNAVINST 4720.9D, Subj: Approval of Systems and Equipment for Service Use.

12. OPNAVINST 5000.42A, Subj: Weapon Systems Selection and Planning.

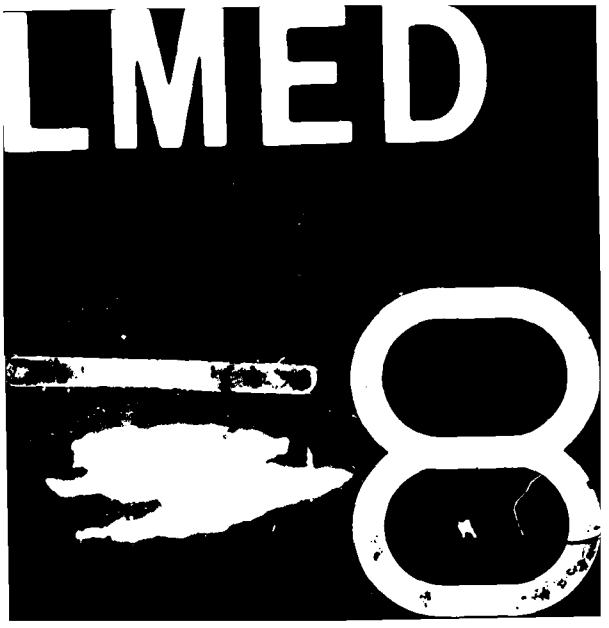
13. OPNAVINST 5000.46, Subj: Decision Coordinating Papers (DCPs), Program Memoranda (PMs), and Navy Decision Coordinating Papers (NDCPs), Preparation and processing of.

14. NAVMATINST 3960.6A, Subj: Test and Evaluation.

REFERENCES (Continued)

15. NAVMATINST 5000.22A, Subj: Weapon Systems Selection and Planning.

16. NAVMATINST 4720.1, Subj: Approval of Systems and Equipments for Service Use.


LMED
8