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MIL-STD-1605A(SH)
08 October 2009

SUPERSEDING
MIL-STD-1605(SHIPS)
20 April 1973

DEPARTMENT OF DEFENSE
TEST METHOD STANDARD

PROCEDURES FOR CONDUCTING A SHIPBOARD ELECTROMAGNETIC INTERFERENCE (EMI) SURVEY (SURFACE SHIPS)

FOREWORD

1. This standard is approved for use by the Department of the Navy and is available for use by all Departments and Agencies of the Department of Defense.

2. The increased use of electrical and electronic equipments and sensors aboard Naval ships introduces risk of Electromagnetic Interference (EMI) that can impact compliance with the ships Electromagnetic Environmental Effects (E3) performance requirements specified in MIL-STD-464.

3. This revision of MIL-STD-1605 has been expanded to provide the procedures and techniques for assessing compliance with the intra and inter-system Electromagnetic Compatibility (EMC) and Intermodulation Interference (IMI) requirements of MIL-STD-464 for naval surface ships. However, adherence to the procedures contained herein does not relieve the contractor from meeting the ship's operational performance requirements specified in the contract.

4. Comments, suggestions, or questions on this document should be addressed to: Commander, Naval Sea Systems Command, ATTN: SEA 05M2, 1333 Isaac Hull Avenue, SE, Stop 5160, Washington Navy Yard DC 20376-5160 or emailed to CommandStandards@navy.mil, with the subject line "Document Comment". Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at http://assist.daps.dla.mil.

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1. SCOPE

1.1 Scope. This standard provides the procedures for demonstrating compliance with the intra and inter-system electromagnetic compatibility (EMC), hull-generated Intermodulation Interference (IMI), and electrical bonding requirements of MIL-STD-464 for naval surface ships. In addition, an EMI survey is required for new construction ships and ships receiving overhauls or other major repair work that changes the ships electromagnetic configuration.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4, or 5 of this standard. This section does not include documents cited in other sections of this standard or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections 3, 4, or 5 of this standard, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-464	-	Electromagnetic Environmental Effects Requirements for Systems
MIL-STD-1310	-	Shipboard Bonding, Grounding, and Other Techniques for Electromagnetic Compatibility, Electromagnetic Pulse (EMP) Mitigation, and Safety

(Copies of these documents are available online at http://assist.daps.dla.mil/quicksearch/ or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.2.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

DEPARTMENT OF DEFENSE DOCUMENTS

JCS Pub 1-02	-	DOD Dictionary of Military and Associated Terms

(Copies of this document are available online at www.dtic.mil/doctrine/doctrine.htm.)

NAVAL SEA SYSTEMS COMMAND

DRAWING STANDARD

NAVSEA Drawing STD-407-5291780, Volume 1	-	Standard Electromagnetic Interference (EMI) Survey Procedures

(Copies of this document are available from the Naval Sea Systems Command, ATTN: SEA 05H3, 1333 Isaac Hull Avenue, SE, Stop 5011, Washington Navy Yard DC 20376-5011 or online at www.nde.navy.mil.)

TECHNICAL MANUALS

NAVSEA OP 3565/NAVAIR 16-1-529	-	Electromagnetic Radiation Hazards (U) Hazards to Personnel, Fuel and Other Flammable Material, Volume 1

(Copies of this document are available from the Naval Logistics Library, 5450 Carlisle Pike, Mechanicsburg, PA 17055 or online at http://nll.ahf.nmci.navy.mil.)

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of documents are those specified in the solicitation or contract.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI/IEEE C63.14	-	American National Standard Dictionary for Technologies of Electromagnetic Compatibility (EMC), Electromagnetic Pulse (EMP), and Electrostatic Discharge (ESD)

(Copies of this document are available from the American National Standards Institute, 25 W. 43rd St, 4th Floor, New York, NY 10036 or online at http://webstore.ansi.org/.)

2.4 Order of precedence. Unless otherwise noted herein or in the contract, in the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. DEFINITIONS

The terms used that are not unique to this document are defined in ANSI Standard C63.14, Joint Pub 1-02, MIL-STD-464, MIL-HDBK-237, and MIL-STD-1310. The following definitions are included herein for ready reference and are applicable for the purpose of this standard.

3.1 Acronyms used in this standard. The acronyms used in this standard are defined as follows:

BBA	-	Broadband Antenna
DID	-	Data Item Description
EMC	-	Electromagnetic Compatibility
E3	-	Electromagnetic Environmental Effects
EMI	-	Electromagnetic Interference
EMISTP	-	Electromagnetic Interference Survey (Surface Ship) Test Procedure
EMISTR	-	Electromagnetic Interference Survey (Surface Ship) Test Report
EMP	-	Electromagnetic Pulse
ESD	-	Electrostatic Discharge
HF	-	High Frequency
IEEE	-	Institute of Electrical and Electronic Engineers
IF	-	Intermediate Frequency
IMI	-	Intermodulation Interference
JCS	-	Joint Chiefs of Staff
LNA	-	Low Noise Amplifier
MF	-	Medium Frequency
NBN	-	Narrowband Noise
TACAN	-	Tactical Air Navigation
RF	-	Radio Frequency
RFID	-	Radio Frequency Identification Device
RBW	-	Resolution Bandwidth
UHF	-	Ultrahigh Frequency
VHF	-	Very High Frequency
VBW	-	Video Bandwidth

3.2 Below deck. An area on ships which is surrounded or partially surrounded by a metallic structure, or an area which provides adequate attenuation to electromagnetic (EM) radiation, such as the metal hull or superstructure of a surface ship, and the screened rooms in non-metallic ships.

3.3 Broadband antenna. An antenna that has a relatively constant gain, and that functions satisfactorily, over a wide range of frequencies (2:1 or greater bandwidth range), such as a log periodic or horn antenna.

3.4 Electromagnetic compatibility. The ability of electrical and electronic systems, equipment, and devices to operate in their intended operational environments without suffering unacceptable degradation or causing unintentional degradation because of electromagnetic radiation or response. It involves the application of sound electromagnetic spectrum management; system, equipment, and device design configuration that ensures interference-free operation; and clear concepts and doctrines that maximize operational effectiveness.

3.5 Electromagnetic interference. Any electromagnetic disturbance that interrupts, obstructs, or otherwise degrades or limits the effective performance of electronics/electrical equipment. EMI can be induced intentionally, as in some forms of electronic warfare, or unintentionally, as a result of spurious emissions and responses, intermodulation products, and the like.

3.6 Equipment, electrical. Equipment, other than electronic equipment, designed to generate, convert, distribute, control, or utilize electrical energy. Examples are generators, power switchboards, motor controls, motors, lighting fixtures, and electrical appliances.

3.7 Equipment, electronic. Equipment designed to generate, transmit, convey, receive, store, process, or otherwise use electronic/digital signals. Examples are oscillator equipments, transmitters (sonar, communication transmitters, and radar), amplifiers, sensing devices, receivers, digital equipment, underwater detection equipment, fire control equipment, drone control equipment, and associated test equipment.

3.8 Intermodulation. The production in a nonlinear element of frequencies equal to the sums and differences of integral multiples of two or more frequency sources.

3.9 Phase I tests. That part of the EMI survey, specified herein, that is conducted dockside for the purpose of keeping the Phase II (underway) test time to a minimum. Phase I tests measure the impact from unintentional electromagnetic emissions of installed electrical/electronic equipment on wireless radio frequency (RF) sensor type electrical/electronic equipment. This requires the measurement of the emissions received by RF sensors to determine whether these unintentional electromagnetic emissions are a potential source of interference. In addition, Phase I tests determine the susceptibility of equipment/systems to ships portable communication transmitters by keying the portable units within 18-inches of equipment/systems.

3.10 Phase II tests. That part of the EMI survey, specified herein, that determines the EMC of the ships electrical/electronic systems. Phase II tests are conducted while the ship is underway and in a typical operating configuration with all below deck and topside emitters on and operational. Emission and susceptibility tests not able to be performed during Phase I should be completed at the beginning of Phase II.

3.11 Susceptibility. The inability of an item to perform its function without degradation while in the presence of an EM disturbance. EM disturbances can be in the form of either radiated or conducted emissions.

3.12 Topside areas. An area on ships, which is directly exposed to the external electromagnetic environment, and is not considered to be below deck as defined herein.

3.13 Unintentional emissions. An emission from a device that generates RF energy for use within the device, and sends RF signals by radiation to other devices nearby or by conduction to associated equipment via connected wiring, despite the fact that it is not intended to emit RF energy by radiation or conduction.

4. GENERAL REQUIREMENTS

4.1 General. MIL-STD-464 requires that a ship shall be self compatible. This standard requires that a ship meets its operational performance requirements when all of the ship's equipment/systems are operating together at their designed level of efficiency or their designed capability. All tests specified in this standard are to demonstrate EMC between shipboard systems/equipment/sensors.

4.1.1 System/sensors/receivers. System/sensors being measured shall not be adversely affected by unintentional emissions. Topside Medium Frequency (MF), High Frequency (HF), Very High Frequency (VHF) and Ultra High Frequency (UHF) receive systems shall not be degraded by ownship unintentional emissions. Electrical/electronic equipment/sensors shall not be susceptible to own ship portable or fixed intentional radiating equipment/systems, or unintentional emitters (equipment/systems).

4.1.2 Hull generated IMI. MIL-STD-464 specifies the applicable requirements for hull-generated IMI. IMI tests shall be conducted on ships that contain HF broadband antennas, and/or ships that contain two or more HF narrow band transmit antennas. When HF narrow band antennas are tested for IMI all possible antenna combinations shall be tested. IMI products above the 19th order shall be located and mitigated.

4.1.3 All up system to system test. To assess compliance with MIL-STD-464, "All Up Systems to Systems Test" shall be conducted by evaluating systems interaction and/or compatibility with other ship systems, and identifying EMI victim systems when all ship systems are functioning simultaneously.

4.1.4 Portable transmitters. Tests shall also determine whether emissions from portable transmitters adversely affect the operation of the ship's below deck electrical/electronic equipments/systems.

4.2 Test planning. A detailed EMISTP shall be developed in accordance with DI-EMCS-81782 and approved by the procuring activity. The EMI survey shall be well planned and coordinated with the ship, appropriate activities and all participating personnel to ensure optimum utilization of dockside and underway test time. The specific equipments to be tested shall be identified by nomenclature and location. The number of equipments and monitoring positions can then be determined and a required test time can be affixed to the total survey.

4.2.1 Phase I and II testing. Phase I and II testing (see 5) shall be in accordance with an approved EMISTP. Portions of the Phase I tests may be scheduled to coincide with load testing or other check-out tests of deck machinery, providing the Phase I test results are not impaired. Upon completion of the testing a detailed EMISTR shall be developed in accordance with DI-EMCS-81777 and forwarded to the procuring activity

5. DETAILED REQUIREMENTS

5.1 Phase I tests. Phase I tests shall be performed at a time and location when the external local man-made electrical and natural RF ambient environment does not exceed the levels in figure 1 over the frequency range of 2 MHz to 460 MHz using table I bandwidths. When the unintentional emissions exceed 10 dB to the sensors receiver noise floor, source location techniques shall be used to isolate and ultimately mitigate the excessive emissions. Phase I tests shall be conducted with electrical electronic equipment/systems turned on, in accordance with 5.1.3.

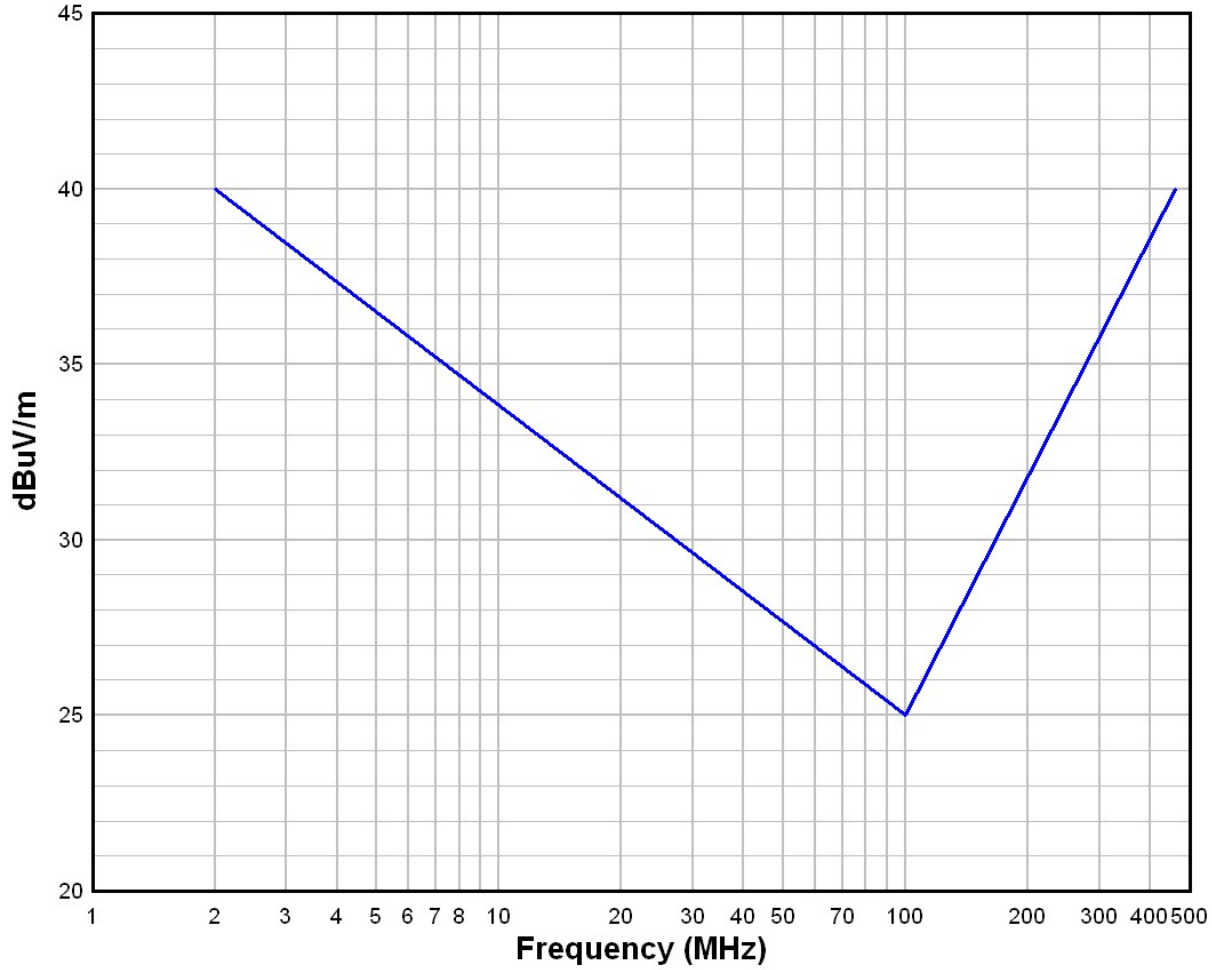

FIGURE 1. Phase I test limit for topside ambient RF environment.

5.1.1 Phase I preliminary examination. Prior to executing the Phase I measurements an examination shall confirm that:

a. Bonding, grounding, and other techniques for EMC and safety have been accomplished in accordance with MIL-STD-1310 and/or other contractual documents;

b. Applicable multi-couplers, filters, and blankers are installed and operating; and

c. There are no missing or visibly defective electronic equipments or broken or missing antennas/transmission lines.

Deficiencies discovered during the examination shall be corrected prior to starting Phase I measurement testing.

5.1.2 RF sensor-type equipments requiring testing. RF sensor-type equipments are any device that senses or receives the electromagnetic spectrum from 2 MHz to 460 MHz topside (MF, HF, VHF, UHF) and 2 MHz to 6 GHz below deck, which includes receivers in fixed and mobile devices below deck, mobile wireless systems, Radio Frequency Identification Devices (RFID) readers/transceivers (except those attached to ordnance), wireless data links, all of which may be susceptible to unintentional RF emissions from electrical/electronic equipment and systems. For ships undergoing a modernization/overhaul, only those sensors that may be impacted by changes affected during the modernization/overhaul need be measured.

5.1.3 Testing for unintentional electromagnetic emissions. Unintentional electromagnetic emissions from electrical/electronic equipments shall be measured from all electrical/electronic equipment. Electrical/electronic equipment shall be turned on but not placed in transmit mode during Phase I testing. Communications equipment shall be on and not keyed. Radars shall have antennas rotating but not radiating. Other ship electronic systems will be activated to mode which does not cause them to radiate out the antenna.

5.1.3.1 Unintentional emissions test method.

a. Select receiver. Select a sensitive scanning receiver, such as a spectrum analyzer so that the complete test configuration shall have an equivalent noise figure of no more than 30dB at 25 degrees centigrade for bandwidth and frequency(s) defined in table I. The analyzer will interface with the sensor type equipment/systems to measure RF equipment/systems unintentional received emissions. Table I specifies the resolution bandwidth (RBW) and sweep rate to be used over each frequency range to measure the select sensors.

TABLE I. Measurement bandwidth settings.

Frequency Range	6 dB Resolution Bandwidth (RBW)	Minimum Sweep Time (Seconds)
2 MHz – 30 MHz	10 kHz	150*Span / RBW * VBW
30 MHz – 1 GHz	100 kHz	
1 GHz – 6 GHz	1 MHz	

b. Selected RF sensors. With the unit under test de-energized disconnect the selected sensor antenna from the equipment/system and patch into the sensor antenna with the input lead to the test equipment to measure the reception of unintentional RF emissions on the selected receiver (see figure 2). If a sensor cannot be monitored, the procedures of 5.1.3.1.g shall be used to evaluate the RF ambient in the area of the sensor in question. Connect the test equipment to each sensor antenna prior to any couplers, filters, attenuators and etc, but after any matching units.

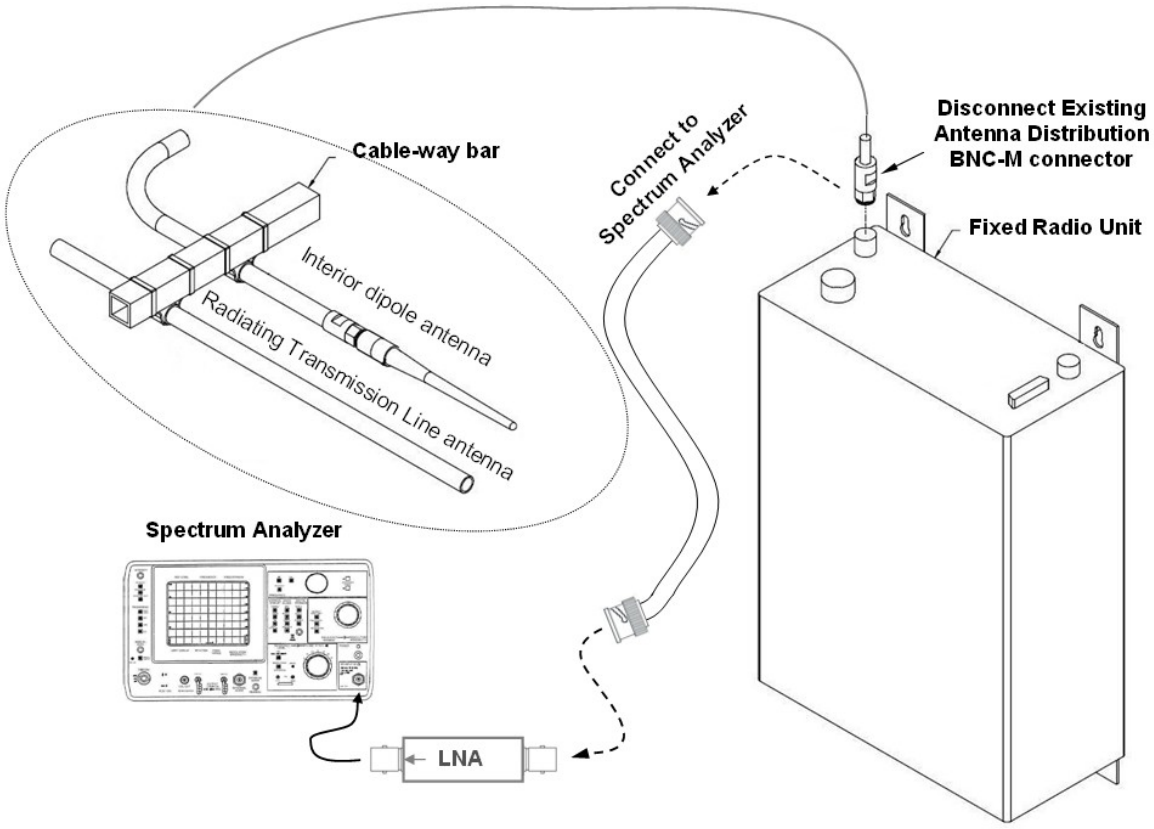

FIGURE 2. Sensing HYDRA or similar RF sensor for unintentional emissions.

c. Test equipment set-up. Set the test equipment utilized for test so the scanning receiver utilized has the same or greater sensitivity as the system under test, with the span of the scanning receiver set to no greater than (200 x RBW), set for peak detection mode, and sweep time as indicated in table I. Video filtering shall not be used to bandwidth limit the receiver response. If a controlled VBW is available on the measurement receiver, it shall be set to its greatest value. The use of Low Noise Amplifiers (LNA) is acceptable to obtain the required dynamic range of test receiver utilized. Change equipment settings as necessary to enhance test equipment selectivity in such a manner that it will improve the ability to resolve the source of potential interfering signals from unintentional emissions. Record data for both the new test configuration, as well as the initial test configuration. The use of 'Peak Hold' on the test equipment ensures collection of transient signals and ensures a more thorough analysis. Save the data for analysis and classification.

d. Analysis of data. Analyze and classify the data collected.

(1) Analyze data for indications of unintentional emissions.

(a) When an interfering signal is detected during testing, indicate in the Phase I data sheets whether a system filter or coupler would remove the detected interfering signal.

(b) Harmonic emissions and emissions at specific frequencies shall be noted for classification.

(2) Classify unintentional RF equipment/system. Table II lists the classifying categories of potential degradation measured by the test equipment. All unintentional emissions shall be located, documented and evaluated during testing to determine their impact on the equipment's operational performance. All test equipment displays and readings shall be saved in a format which is compatible with common government word processing and spreadsheet software to enhance analysis and distribution of information. Analyzer trace data shall be saved in a format which will allow import into spreadsheets and contain both analyzer configuration and trace data. The test data sheets shall include clear and concise description of equipment under test, the jack or circuit where test equipment was connected, sketches of test equipment configurations and file names of the data collected during the testing of individual systems.

TABLE II. Unintentional emissions classification.

Detected Noise Level (Unintentional Emissions)	Classification	Category
<10 dB	Mild 1/	III
10-20 dB	Medium 2/	II
> 20 dB	Severe	I

NOTES:

1/ Unintentional emissions must not impact more than 10% of channels or frequency range of selected equipment. If it does, it is considered Medium.

2/ Unintentional emissions must not impact more than 50% of channels or frequency range of selected equipment. If it does, it is considered Severe.

e. Continuation of tests. Repeat steps 5.1.3.1.b through 5.1.3.1.d for each RF sensor equipment/system installed in the frequency range as in accordance with 5.1. Once completed, documented, and classified, source location shall be carried out for any Category I or II unintentional emissions detected.

f. Source location. Isolate the offending equipment(s)/system(s) in the frequency range which contained medium to severe RF noise using one or more of the following methods**.**

(1) Monitor the affected RF sensor with test equipment and sequentially switch suspected equipment/systems on/off, observing the unintentional emissions measurements. If unintentional emissions drops significantly when an equipment/system is shut down, the equipment/system should be noted in the test report for further analysis/action.

(2) Place a receiver antenna in suspected spaces in order to localize the offending spectrum resulting in unintentional emissions observed as medium to severe. In each of the select spaces, the nomenclature/model of the antenna and receiver utilized to measure the spectrum shall be noted, whether or not unintentional emissions was detected.

(3) For locating equipment/systems/cables in spaces where similar unintentional emissions**,** as detected in 5.1.3.1.c, is found, a near field probe can be used to scan equipments/cables in select spaces. The near field probe should have adequate sensitivity to find the source of highest emissions that resembles the characteristics of the medium to severe unintentional emissions. The nomenclature/make and model of the receiver, near field probe and offending emissions shall be recorded.

(4) If other techniques of source location are used, provide sufficient documentation and reporting to permit others to duplicate the test.

g. Alternative RF sensor measurement. When an RF sensor cannot be directly monitored, as in a hard wired sensor to equipment or integrated antenna that cannot be disconnected, the ambient level maybe monitored in the RF sensors location. The RF sensor system shall be shut down when performing this test, and all other below deck equipment must be energized. The test set up shall be configured to have the same sensitivity as the system under test. Using the calibrated antenna in the RF sensors frequency band, and polarization identical to RF sensors, place the antenna in close proximity (≤1 meter) from the sensor, and using the same analyzer outlined in 5.1.3.1.a, along with table I bandwidth and settings, measure the RF ambient over the sensors required bandwidth plus and minus one bandwidth. If the test antennas directivity is less than the RF sensor antennas directivity then the test antenna shall be moved in increments of its beam width to cover the same beam width of the RF sensor antenna. Document the results in the test report noting antenna used, RF sensor location relative to antenna, and unintentional emissions evaluation criteria, 5.1.3.1.e. If unintentional emissions is detected, source location in accordance with 5.1.3.1.f shall be used to isolate the offending equipment/system causing excessive emissions.

5.1.4 Testing susceptibility of installed equipment/systems to portable RF transmitters.

a. Identification of non-operational equipment. Note the nomenclature/model of any equipment/system in the space that is not operational.

b. Transmitting RF. Key own ship portable radio(s) at its maximum operational power level, within 18-inches of the specific electrical/electronic equipment/system/sensor being evaluated, while the electrical/electronic equipment/system/sensor is in its normal operational condition. For large equipments, move the radio across the entire surface and rotate the radio to apply both horizontal and vertical polarities.

c. Identify results. If no susceptibility is noted return to 5.1.4.b until all electrical/electronic equipment/system/sensors have been tested in each space aboard the ship where the portable RF transmitter/transceiver will be utilized.

d. Action required. If susceptibility is identified, move the transceiver away from the victim equipment/ system/sensor until there is no susceptibility or reduce the transmitted power of the transceiver until there is no indication of susceptibility. Record the susceptibility indication and the distance/power level where susceptibility is eliminated. Return to 5.1.4.b until all electrical/electronic equipment/system have been tested.

5.2 Phase II tests. All topside and below deck transmitters and receivers shall be operated during Phase II testing to present the normal operational electromagnetic environment when the ship is at least 50nm from shore. Also, IMI testing shall be conducted on HF systems.

5.2.1 Phase II planning. Planning for system-to-system EMI testing shall begin well before the testing commences and shall include identifying the ship's topside antenna arrangement, ship's electronic system inventory, and the operating and intermediate frequencies of all installed RF transmitter and receiver systems. Verify prior to Phase II testing that the systems to be tested meet minimum operational specifications. If the system does not meet its operational specifications then the test director shall document in his report that system was not available for test and that Phase II testing could not be completed as required. Testing shall not be reported as completed until all systems are tested.

a. Transmitter frequencies. Well in advance of conducting the test, sufficient frequencies to cover all communication transmitter frequencies, in approximately 10 percent steps, for Phase II testing shall be requested from the area frequency coordinator. Transmitter test frequencies for HF IMI testing shall be used for system-to-system testing. Radar, Tactical Air Navigation (TACAN), and weapons systems shall be operated on their normal frequencies, while multi-channel system transmitters shall be operated at frequencies that are selected neither to minimize nor to intensify interference to other systems. If a change in transmit frequency changes the interference situation, this condition shall be noted. Two HF receivers and at least one UHF receiver, respectively, shall be selected to monitor HF and UHF ranges during transmitter tests to include harmonics of selected frequencies.

b. Radar receivers. Radar receivers shall be operated with normal gain control, video selection, processing mode, and receiver bandwidth settings. While most radars have digital video signal processing, the raw video signal of the radar shall be monitored while radiating HF, VHF, and UHF at the IF frequency of the radar receiver.

c. Monitor ship control systems. Monitor ship control systems during normal underway operations while electrical machinery, such as fuel/lube oil pumps, cooling fans, fire pumps, motor controllers, contact relays, and air compressors are being operated and cycled. Functions to be monitored shall include, but not limited to:

(1) Alarm Panels

(2) Tank Level Indicators

(3) Pressure Indicators

(4) Flow Rate Indicators

(5) Interior Voice Communications

(6) Video Monitors

(7) Below Deck Wireless Sensors

(8) Other Suspected Victim Equipment

It is particularly important that the specific ship's operating evolutions and transmitter status at the time EMI is noted be fully documented.

d. Interference from the ship's superstructure. All false targets shall be documented by recording their range and bearing as observed on the indicator display, and any unintentional emissions interference effects shall be documented by describing the observed interference effects.

5.2.2 Phase II preliminary examination. A visual examination shall be made sufficiently in advance of Phase II tests to permit correction of conditions that are likely to adversely affect the test results. The examination shall confirm that:

a. Bonding, grounding, and other techniques for EMC and safety have been accomplished in accordance with MIL-STD-1310.

b. Multicouplers, filters, and blankers are installed and operating

c. There are no missing or visibly defective electronic equipments or broken or missing antennas/transmission lines.

d. All loose metallic items that are not a normal part of the ship have been removed from the topside areas.

Deficiencies discovered during the examination shall be corrected prior to starting Phase II interference tests.

5.2.3 Phase II test method.

5.2.3.1 All up system-to-system EMI testing. All up system-to-system EMI testing involves sequentially radiating all ship's transmitters starting from the highest frequencies while monitoring all ship's electrical/electronic systems to identify changes in system performance caused by EMI. After a transmitter is sequentially radiated, the equipment shall remain in the radiate condition until the end of the test. The transmitters shall be operated at maximum rated power and shall be exercised in each expected operational mode, channel or frequencies to explore victim vulnerability. Particular emphasis shall be placed on potential source/victim combinations identified during test planning. When EMI is noted, shut down or secure the specific transmitter to verify the EMI disappears, allowing a determination (tentative) of the potential EMI source.

5.2.3.2 Hull generated intermodulation. Testing for hull generated intermodulation interference shall be accomplished utilizing an appropriate Navy Standard intermodulation interference test from NAVSEA Drawing STD-407-5291780.

5.2.4 Personnel safety. The safety precautions and operating procedures of NAVSEA OP 3565/NAVAIR 16-1-529 and ship and shipyard safety guidance shall be adhered to at all times.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. The requirements and test methods covered by this standard are intended to determine the EMC posture of the interface between shipboard equipments and the operational electromagnetic environment. Copies of the completed Data Item Descriptions (DIDs) should be forwarded to the contracting entity and cognizant program manager.

6.2 Acquisition requirements. Acquisition documents should specify the following:

a. Title, number, and date of this standard.

6.3 Associated Data Item Descriptions (DIDs). This standard has been assigned an Acquisition Management Systems Control (AMSC) number authorizing it as the source document for the following DIDs. When it is necessary to obtain the data, the applicable DIDs must be listed on the Contract Data Requirements List (DD Form 1423).

DID Number	DID Title
DI-EMCS-81782	Electromagnetic Interference Survey Test Procedure (EMISTP)
DI-EMCS-81777	Electromagnetic Interference Survey Test Report (EMISTR)

The above DIDs were current as of the date of this standard. The ASSIST database should be researched at http://assist.daps.dla.mil/quicksearch/ to ensure that only current and approved DIDs are cited on the DD Form 1423.

6.4 Test equipment. All test equipment utilized should have valid calibration certificates/stickers. Near field probes generally do not have certificates and, therefore, model numbers can be provided. The scanning receiver, or spectrum analyzer, should be capable of a frequency range of 100 kHz to 6 GHz, with a combined input Noise Figure (NF) of 30 dB or less.

6.5 Subject term (key word) listing.

E3

Electrical Bonding

EMC

Grounding

IMI

System

6.6 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extent of the changes.

Preparing activity:
Navy – SH
(Project EMCS-2006-002)

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at http://assist.daps.dla.mil.