6.6 The requirements specified herein include inter-action of electronic equipments due to harmonic or spurious radiations and susceptibility of receivers to strong R.F. signals at frequencies outside the pass-band of the receiver. Examples of this are local oscillator radiation from receivers, malfunctioning of an absolute altimeter due to a strong fundamental which is above or below the pass-band of the altimeter receiver. Operation of those equipments which produce malfunctioning and which constitute a flight hazard will be so stated in the instructions for operating personnel instruction manual relating to that "weapons system".

(As an alternative to the paragraph 6.6, if it is determined that the information contained therein, is not suitable for inclusion in the operating personnel instruction manual, then the contractor should be required to placard those equipments which cannot be safely operated in conjunction with other equipments. These placards can then be removed when the discrepancies are corrected.)

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MILITARY SPECIFICATION

INTERFERENCE LIMITS AND METHODS
OF MEASUREMENTS, ELECTRICAL AND ELECTRONIC
INSTALLATION IN AIRBORNE WEAPONS SYSTEMS AND ASSOCIATED EQUIPMENT

1. SCOPE

1.1 Scope.- This specification covers interference limits applicable to electrical and electronic items in experimental, electronic-test and production elements of each military "weapons system."

1.2 Classification.- The installation of electrical and electronic items apply to the following types and classes of elements of the weapons system as they may functionally apply.

Type I Aircraft
Class 1. piloted
Class 2. pilotless
Type II All necessary complementary and supporting elements of the weapons system.
Type III Combination and integration of Types I and II to make up the complete weapons system.

2. APPLICABLE SPECIFICATIONS AND DRAWINGS

2.1 There are no other specifications or drawings applicable to this specification.

(Copies of specifications, standards, and drawings required by contractors in connection with specific procurement functions should be obtained from the procuring agency or as directed by the contracting officer).

3. REQUIREMENTS

3.1 General.- There shall be no "undesirable response" from any of the installed electronic receivers above the area noise level, nor "malfunctioning" of any part of the system due to radio interference produced by any or all of the installed electrical, electronic, and other equipment of the "weapons system" when tested as specified herein. This requirement applies to the entire frequency range of all installed electronic equipment and to those for which complete installation provisions have been made.

3.1.1 An understanding of the key words defined in Section 6 is essential to the understanding of this specification.

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3.2 Undesirable transient responses are exempted from the requirements specified herein if they cause no "malfunction" and occur only during ground engine starting, or if they cause no "malfunction", are less than one second duration, and do not reoccur during normal operation more frequently than once every three minutes. Undesirable aural transient responses are further exempted if their duration is less than three seconds and do not occur more than five times per flight or check out; and, they cause no "malfunction".

3.3 Method and Material.- The method and material used to accomplish suppression or elimination of radio interference, such as the installation of filtering, bonding, and shielding, shall be in accordance with good engineering practice and approved by the procuring service. Where a proposed method or material has not been previously approved, the contractor shall forward, with the proposal, substantiating engineering data for its use.

4. SAMPLING, INSPECTION, AND TEST PROCEDURES

4.1 Classification of Tests.- The two tests outlined herein are classified as follows:

4.1.1 Interference Compliance Test.- An interference compliance test is a detailed and complete interference test performed in accordance with 4.2.

4.1.2 General Acceptance Test.- A general acceptance test is a general test performed in accordance with 4.3 and is essentially a quality control type of test for monitoring the acceptance of the equipment.

4.2 Interference Compliance Test.-

4.2.1 Test Equipment.-

4.2.1.2 Electronic Receivers.- Electronic receivers for conducting tests under this specification, shall meet the sensitivity requirements for the individual equipment, and shall be acceptable to the Procuring Service.

4.2.1.3 Output Meter.- An alternating-current output meter of at least 1000 ohms/volt input impedance, with a damping factor not more than 0.7 (critical) and capable of measuring audio outputs at 10 db below the reference level of one milliwatt at 600 ohms shall be used for measuring audio outputs of receivers when conducting radio interference tests on weapons system elements specified herein.

4.2.1.4 Headsets.- Headsets of the proper impedance shall be used for detecting "radio interference" in the audio output of receivers. When special headsets are required for a special equipment, they shall be used with that equipment when conducting these tests.

4.2.2 Test Conditions and Procedures.-

4.2.2.1 All electrical and electronic equipment included in the applicable "weapons system" detail specification and changes thereto shall be installed in the "weapons system" and shall be in normal operating condition as determined by the test procedures and techniques specified by the Procuring Services.

4.2.2.2 For all tests, locations shall be chosen where "area noise level" is at a minimum and in no case produces an output exceeding 8 decibels above the "receiver-system background level" of any installed receiver.

4.2.2.3 During all tests bus voltages shall be maintained within the limits specified in the detail specification for the particular "weapons system".

4.2.2.4 All electronic receivers for conducting tests shall be adjusted for maximum performance with antenna connected. Where provided, external gain controls shall be "full on", squelch circuits inoperative, modulated continuous wave (MCW) reception employed, and all external antenna trimmers adjusted for maximum sensitivity at a mid-frequency of the range covered. No internal adjustment shall be made unless specified by the procuring Service.

4.2.2.5 Tests for the presence of "radio interference" in the output of each electronic receiver shall be made at a representative number of frequencies within the range of the equipment while all other equipments and systems which are potential sources of radio interference are operated. The output of each electronic receiver shall be monitored in such a manner as to indicate the presence of "radio interference". Whenever possible, test frequencies shall be selected on the basis of listening tests covering the entire frequency range. Acceptable demonstration by the contractor at a limited number of frequencies shall not be construed as a waiver of the requirements for interference free operation throughout the frequency range.

4.2.2.6 Electronic equipment which provides an aural output shall be monitored by a headset and an output meter connected in parallel at the normal operating positions. The jack box gain control shall be "full on", and all other jack boxes shall be set on a position other than the position on which the test is being accomplished. Where in an electronic system, any receiver output is normally fed into a radio-interphone amplifier, the headset and output meter shall be connected in the amplifier output circuit. The controls for the radio-interphone amplifier shall be adjusted for the conditions of normal system operation.

4.2.3 Weapons System Elements to be Tested.-

4.2.3.1 Aircraft (Type I); Complementary and Supporting Elements (Type II); and Combination and Integration of Aircraft and Complementary and Supporting Elements of the Weapons System (Type III).-

4.2.3.1.1 Each experimental, preproduction or "electronic-test article" of the weapons system having installed electrical or electronic items shall be submitted to an interference compliance test.

4.2.3.1.2 Each "article" produced after the preproduction or "electronic-test article" shall be given a complete interference compliance test until a minimum of two consecutive "articles" have passed Government inspection without "rework".

4.2.3.1.3 The Government Inspector shall cause an interference compliance test to be performed on any "article" whenever inspection indicates a deviation from normal workmanship, material, or arrangement which might effect conformance with the requirements of this specification.

4.2.3.1.4 If any modification or relocation of the installed radio, electrical, or electronic equipment is incorporated in production "article", the first two consecutive articles shall be required to pass successfully an interference compliance test on such modification or alternate installation.

4.2.3.1.5 Whenever an "article" does not meet the requirements of an interference compliance test without "rework", an interference compliance test shall be made on the unsatisfactory items of the reworked "article" and each "article" thereafter until two consecutive articles have passed without "rework".

4.2.3.1.6 The interference compliance tests for all combinations of the weapons system elements into a complete weapons system shall follow the pattern setforth above.

4.3 General Acceptance Test.-

4.3.1 A general acceptance test shall be conducted on all piloted aircraft on which an interference compliance test is not made.

4.3.2 The test conditions and procedures for the general acceptance test shall be as specified for the interference compliance test, except that no output meter need be used, and quantitative measurements are not required.

4.3.3 Whenever a piloted aircraft does not meet the requirements of a general acceptance test without "rework", an interference compliance test shall be made on the unsatisfactory items of the reworked aircraft and each aircraft thereafter until two consecutive aircrafts have passed without "rework".

5. PREPARATION FOR DELIVERY

5.1 Not applicable to this specification.

6. NOTES

6.1 Purpose.- The purpose of this specification is to obtain radio-interference-free performance of electronic installations in the various weapons systems.

6.2 Definitions.-

6.2.1 A "Weapons System" is defined as those technical and logistic elements that must be associated to provide a final, operational, military weapons system. The individual system elements shall be so designed and mutually interrelated as to constitute in combination a resulting system of maximum military effectiveness.

6.2.2 "Article" is defined as an aircraft or complamentary and supporting elements of the weapons system or both, which incorporates the complete installation of a particular complement of electrical and electronic equipment.

6.2.3 "Electronic-Test Article" is defined as an early production aircraft or weapons system element or both, mutually selected by the contractor and the Government Inspector, which incorporates the complete installation of a particular complement of electrical and electronic equipment.

6.2.4 "Radio Interference" to any electronic equipment is defined as any disturbance or disturbances which cause an "undesirable response" or "malfunction" of any electronic equipment.

6.2.5 "Malfunction" is defined as that type of output which departs from normal, due to interference, in such manner that the operator or actuating mechanism is unable to differentiate operationally between desired and undesired signals. Examples are the undesired actuating of an auto-pilot, and the introduction of a fixed target on a radar scope.

6.2.6 "Undesirable Response" is defined as a recognizable interruption to normal output which introduces no malfunctioning. Examples are snow on a radar scope, and static in headsets.

6.2.7 "Receiver-System Background Noise Level" is defined as that output obtained at the test position, with controls adjusted as described for the interference compliance test, with all sources of interference associated with the "weapons system" silenced, with the antenna disconnected at the equipment terminal, and with the equipment antenna input terminal terminated by a suitable dummy antenna.

6.2.8 "Area Noise Level" is defined as that output obtained at the test position, with controls adjusted as described for the interference compliance test, with all sources of interference associated with the "weapons system" silenced, and with the antenna connected.

6.2.9 "Rework" is defined as any modification or change in the "weapons system" or its components, or in assembly procedure, other than the replacement of defective parts, performed as a result of the "weapons system" failing to meet any test specified herein.

6.3 Equipment Source.- Where Government furnished property is needed to complete a system for which installation provisions have been made by the contractor, the Procuring Service, upon request, will supply such equipment or waive the tests involved.

6.4 Phantom Antennas.- Ground tests facilitate the locating of the interference sources in the "weapons system" and the coupling paths into receivers. For such tests, usual area interference and other interference externally coupled via the antenna may be eliminated by terminating receiver antenna lead-ins at the skin of the "weapons system", using suitable phantom antennas.

6.5 The contractor is responsible for the proper installation engineering of all equipment to achieve an interference-free installation. Where it can be demonstrated that interference caused by government furnished property cannot be eliminated by means within the contractor's control, including reasonable application of shielding, bonding and filtering, the Procuring Service may waive the requirements of this specification applicable to the particular equipment upon formal request from the contractor.

6.6 The requirements specified herein include inter-action of electronic equipments due to harmonic or spurious radiations and susceptibility of receivers to strong R.F. signals at frequencies outside the pass-band of the receiver. Examples of this are local oscillator radiation from receivers, malfunctioning of an absolute altimeter due to a strong fundamental which is above or below the pass-band of the altimeter receiver. Operation of those equipments which produce malfunctioning and which constitute a flight hazard will be so stated in the instructions for operating personnel instruction manual relating to that "weapons system".

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NOTICE: When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

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