

**MILITARY STANDARDS AND SCATHA PROGRAM
UPDATE OF MIL-STD-1541**

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SUMMARY

MIL-STD-1541 (USAF), Electromagnetic Compatibility Requirements for Space Systems, 15 October 1973, establishes requirements for Electro-magnetic compatibility to be met by Industry Contractors for Spacecraft Launch Vehicles and other special space systems. Some technical deficiencies exist in the present issue with respect to spacecraft charge and discharge phenomena in space. The SCATHA Program will produce technical requirements applicable to space systems subjected to space plasma environment(s). The format and subject matter supplied as a result of the SCATHA Program effort must satisfy DOD and AFSD requirements for technical standards as specified in MIL-STD-962, Outline of Forms & Instructions for the Preparation of Military Standards and Handbooks.

INTRODUCTION

The DOD Standardization Program impact on new or revised standards provides for two basic kinds of standards; namely, management and technical standards.

A management standard is contractor task oriented. In simplistic terms "the contractor shall ..." e.g. "the contractor shall generate and submit an EMC Control Plan". Additionally, a Data Item Description (DID) would be supplied to describe the contents and a data submittal requirement in the form of a Contract Data Requirements List (CDRL) line item would be imposed. A technical standard is equipment oriented; again, in simplistic terms "the equipment shall ..." e.g. "the equipment shall comply with the emission and susceptibility limits of MIL-STD-461B for conducted and radiated Electromagnetic Interference (EMI)". Within the established DOD framework, management standards require an extensive approval chain because of their widespread application; whereas, technical standards can be cycled through AFSD for approval because of their limited useage on space systems.

This paper is intended to indicate the technical ramifications for generating a new standard and, in particular, describe how MIL-STD-1541 will be upgraded with requirements supplied as a result of the SCATHA Program effort related to electrical charge and discharge phenomena due to space plasma.

STRUCTURE OF TECHNICAL STANDARDS

Air Force Space Division Regulation, SD 5-6 (5 Dec 1979) establishes the definition of a technical standard as "Establishes Engineering & Technical Limitations for Items, Materials, Processes, Methods, Designs and Engineering Practices". SD 5-6 also establishes a policy paraphrased as "The format and content of MIL Standards and Space Division Standards will be in accordance with MIL-STD-962". The format and contents of a technical standard per MIL-STD-962 is delineated as follows:

- Section 1. SCOPE
- Contains a principal statement: a clear concise delineation of the extent or range of technical content.
- Section 2. REFERENCE DOCUMENTS
- Government specifications, standards, drawings and publications may be referenced (do not reference higher tier documents)
- Non-government documents (Industry Organizations and Technical Societies may also be referenced).
- NOTE: The number of references should be kept to a minimum so the standard can stand alone as much as possible.
- Section 3. DEFINITIONS
- Define key terms in detail for clarity. Definitions may be included by reference to documents in Section 2.
- Where standard definitions exist in DOD documents, do not use different definitions.
- Section 4. GENERAL STATEMENTS OF REQUIREMENTS
- Requirements include characteristics common to the area covered.
- Section 5. DETAILED STATEMENTS OF REQUIREMENTS
- Only state characteristics that can be confirmed by reliable quality criteria or test equipment.

APPENDICES:

Shall be within scope of the standard and not be inconsistent.

Reference the Appendix and the extent of applicability within the standard.

At the beginning of the Appendix, indicate if the contents are mandatory.

Caption and number sections in multiples of 10.

SCATHA PROGRAM INPUT TO UPDATE MIL-STD-1541

Proper consideration must be given to the technical output of the SCATHA Program effort with respect to its use and usefulness when incorporated into the standard and levied on a Contractor. Not only should the updated standard be technical in nature, but, it must also be presented properly to prevent incorrect interpretation by a contractor. The Contractor must clearly be able to understand the requirements so he can define, schedule and cost work effort to implement the requirements of the standard for bidding in response to an RFP (Request For Proposal).

It is highly desirable to establish both system and equipment level requirements, where applicable, for control of spacecraft charging and to eliminate deleterious effects of discharges, be they performance degradation, malfunction or damage. SCATHA Program data permitting, system and equipment requirements should be specified for design, test and test methods appropriate to controlling charge and eliminating discharge effects. It is recognized that, to date, the information base provided by the SCATHA Program effort is limited and does not include all the subject matter desired for updating MIL-STD-1541. However, what is available will be utilized in the scheduled update of the standard.

To minimize the potential for duplication of effort, the ground rules for the format and content of the SCATHA Program material supplied include 1) generate an Appendix per MIL-STD-962 as discussed earlier, 2) stipulate the applicability of the Appendix and 3) for Section 50 in the Appendix, generate specific system and equipment level requirements for design, test and test methods where the SCATHA Program information base dictates/justifies.

UPDATING EXISTING OR GENERATING NEW STANDARDS

The process for issuing an updated/upgraded standard or a new one is the same. It is an extensive effort and, in the time domain, is quite lengthy. It incorporates many "checks and balances" including several review cycles via AFSD, Government Agencies and Industry Groups. To better understand how the "system" works, the key milestones for this process are enumerated:

- 1) Rough draft by technical personnel.
- 2) Statement of objective letter to SD/AQ per SD Regulation 5-6.
- 3) Project coordination conference per SD Regulation 5-6.
- 4) Project number assigned when approved.
- 5) Draft in correct format and language.
- 6) "In-House" informal coordination, several cycles.
- 7) Complete draft for review and informal coordination with selected industry and government experts.
- 8) Revise draft based on above; proposed draft printed for formal coordination.
- 9) Coordination request and draft to SD and selected government offices, Industry Groups and Aerospace Corporation.
- 10) Revision per comments received; resolve outstanding serious non-concurrences.
- 11) Final copy prepared (camera ready); approved by SD/AQ.
- 12) Initial printing and distribution by SD.