

Emc

OFFICE OF TELECOMMUNICATIONS POLICY

INFORMATION MEMORANDUM

September 25, 1972

SUBJECT: Review and Analysis of Federal Telecommunications Systems for
Electromagnetic Compatibility (EMC)
TO: Tom Whitehead
FROM: Will Dean

BRIEF SUMMARY: The enclosure is the OMB response to our request for their comments on our newly proposed Systems Coordination Procedure within the Federal Government. Their suggestions, which are completely satisfactory so far as I am concerned, are being taken into account in the development of the final product which will be submitted shortly to you for signature. I met with Buck Bassett on this item on September 25 at which time it was agreed that his first point would be included in the OTP Directive, the second point would be met by the undersigned screening important issues which come up during the systems processing program -- bringing same to OMB examiners attention on a case-by-case basis. We agreed ~~that~~ the third point ("benefits") was difficult to handle and should be kept in mind as the process is implemented, noting that such information could be sought as a part of the foregoing case-by-case process. At the time of the meeting with Buck Bassett we presented and left a copy for his use of the briefing charts used in briefing you on the OTP/OT EMC Program Review on September 19.

WHY IT IS WORTHWHILE TO READ:

To keep abreast of developments in this area.

*Can I see the amended version?
Will OMB keep us informed of
major systems # decisions?*

Will

September 19, 1972

EST/Commerce Unit

Review and Analysis of Federal Telecommunications Systems for
Electromagnetic Compatibility (EMC)

Mr. Will Dean
Assistant Director, Office of
Telecommunications Policy

This is in response to your request for OMB comments on the review procedure you propose to institute on the above subject. I solicited comments from OMB examiners in the DOD, FAA, NASA, FCC, and Coast Guard areas and in OST.

Specifically, I have three comments:

1. I suggest the policy draft Section be amended to state:
"... no funds be obligated for procurement of communication-electronic systems..." This will permit consideration in the budget process but prevent contracting until the EMC review has been completed.
2. Regarding the joint directive question, it appears more appropriately to be an OTP matter. However, I would like to discuss with you establishing a communications channel with the appropriate OMB examiners on an information basis.
3. I would also like to explore with you the possibility of requiring the Spectrum Planning Subcommittee to review competing systems from a benefits standpoint as well as technical detail. It would be beneficial if this type of information could be available to the appropriate examiners during budget review.

Aside from these comments it appears that your efforts should yield positive results.

H. S. Bassett
Economics, Science, and
Technology Division

Log In No. _____

March 2, 1972

INFORMATION MEMORANDUM

To: Tom Whitehead

From: Will Dean

Brief Summary of the Material: On January 24 you requested me to prepare a recommended process and priorities for telecommunication standards in the areas of electromagnetic compatibility (EMC) and radiation hazards, and set a one-month deadline. You similarly tasked Walt Hinchman and Charlie Joyce for ~~similar~~ efforts in other areas. A summary of the attachment is as follows: Standards for side effects must await the outcome of ERMAC Program; present activities within the IRAC on spectrum-oriented standards should be continued and improved; more meaningful spectrum standards are dependent on the output of other efforts currently underway (spectrum dimensioning, economic trade-offs, etc.); an OTP economist should be tasked to prepare a cost-benefit analysis in connection with the application of telecommunication standards; to the maximum extent practicable, standards should be so postulated in such a manner as to be self-regulatory; a handbook of spectrum use characteristics for all pertinent C-E element types should be developed.

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OFFICE OF TELECOMMUNICATIONS POLICY
EXECUTIVE OFFICE OF THE PRESIDENT
WASHINGTON, D.C. 20504

February 25, 1972

To: Tom Whitehead
From: Will Dean
Subject: Telecommunications Spectrum Standards

At a 24 January 1972 OTP staff meeting you requested that I prepare a recommended process and priorities for telecommunications standards in the areas of electromagnetic compatibility (EMC) and radiation hazards.

Our responsibility is spectrum, its use and conservation, and its side effects. "EMC" is a way of saying what the conditions are (e.g., no harmful interference or effects) when an adequate system of standards or criteria have been fully employed throughout the evaluation of a spectrum-using system. This memorandum provides my conclusions and recommendations in the area of telecommunications spectrum standards, along with an attached view of the current situation, standards program deficiencies, and elements of rationale which lead me to these conclusions and recommendations.

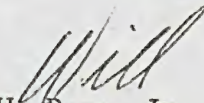
Conclusions and Recommendations

On the basis of the issues and considerations found to be involved with possible OTP courses of action in the area of spectrum-oriented standards, the following recommendations are offered:

- a. Standards for side effects, both biological and non-biological, are being dealt with via ERMAC review, and derivative program guidelines to the Federal community. No further action on our part is needed at this time--none is recommended save to ensure that our guidelines foretell the evolution of an appropriate data base from which technical derivation of standards can proceed.
- b. The Technical Subcommittee (TSC) of the IRAC now has, and will continue to have under proposed reconstitution, a responsibility for development and recommendation of spectrum-related criteria, standards, tolerances, etc., for use by the Federal Government. We should look first to the IRAC structure for coordination and increased focus with respect to spectrum-oriented standards, particularly as regards on-going activities. Any new measures which may be required

should be developed and incorporated in an evolutionary manner. OTP guidance to OT should reflect this policy, and reaffirm the desire to continue current efforts.

- c. The practicality of improved and more meaningful spectrum standards requirements, and thereby the utility of spectrum standards efforts, depends upon facts and considerations not now an integral part of the spectrum management process, e.g., spectrum dimensioning, economic tradeoffs, and the present and expected distribution of performance characteristics for spectrum use factors. Therefore, it is recommended that we defer the implementation of any major spectrum-oriented standards program until at least some of these facts and considerations become a reality under other programs currently underway.
- d. Validated economic benefits from the overall Federal telecommunications standards effort do not appear to be documented. In addition, the qualitative benefits usually discussed in justifying this effort appear to result from a narrow point of view which tends to exclude functional performance requirements, spectrum resource development and conservation, and opportunity costs as factors in the calculations. It is recommended that an OTP economist be tasked to prepare a tutorial, background paper on cost-benefit analysis for the interrelated areas in telecommunications standards.
- e. It is further recommended that we begin information retrieval to support concept development for standards which would, in the overall spectrum management system context, be partially self-regulatory. The cost-benefit paper in (d) above should indicate useful approaches to a system-of-standards basis which contains this most important attribute.
- f. The technical derivation of a spectrum standard requires a handbook of spectrum use characteristics for all element types to which such a standard would apply. Therefore, it is recommended that OT be requested to begin development of such handbook material, as a part of the OT program. Action has been initiated in this regard.


W. Dean, Jr.

cc: George F. Mansur
W. R. Hinchman
C. C. Joyce

Attachment: Current Situation, Deficiencies and Elements of Rationale
for Telecommunications Spectrum Standards

CURRENT SITUATION, DEFICIENCIES AND ELEMENTS OF RATIONALE
FOR TELECOMMUNICATIONS SPECTRUM STANDARDS

The following material highlights the present situation in the area of telecommunications standards, the need for guidelines and a process for standards development, and portions of rationale which have led to our current conclusions.

Current Situation and Deficiencies

There is much activity in the broad area of communications-electronics standards, both within the Government and without. No major group of users or developers is without some activity in "standards." However, it cannot be said that all of this effort is "coordinated," or that it is even "coordinatable." Involved in one way or another are many Federal agencies, the EIA, the IEEE, the AIAA, the ITU (CCIR, CCITT), USASI, ANSI, SAE, JTAC, etc. The problem is not primarily the coordination of these activities. Rather, it is the setting of guidelines for a process for the development of an adequate system of standards, which is needed.

Further insight to the current situation within OTP/OT may be gained from internal coorespondence on the subject of standards efforts. While OT has not responded directly to our expressed needs for standards activities, they have responded to a proposed designation of the NCS Executive Agent as responsible also for the development and coordination of Federal telecommunication standards. Spectrum-oriented standards play a very insignificant role in formal OT proposals to date. The FY 1973 OT budget contains no explicit support whatsoever, and concentrates upon effort for cable systems standards. It is not clear in the overall OT view of priorities, based upon inter-operability considerations alone, that spectrum use characteristics will be taken into account at all. In fact, it is possible that excessive concentration upon commonality of techniques and engineering may substantially prevent proper development of the spectrum resource, much of which would normally come about through incorporation of advanced technology (non-standard, by definition).

There is a lack of explicit justification for the benefits alleged to accrue from observance of those standards which do exist. Standards activity to date has largely been "reactive" rather than "active," although some cases exist to the contrary. In addition, the current standards "process" does not seem to proceed from appropriate objectives which include the development and conservation of the spectrum resource.

The lack of "proof" of the effectiveness of standards for EMC and hazards underscores a related deficiency of economic considerations

(already recognized and being treated under other requirements) applied to the spectrum management and policy process.

Elements of Rationale for Telecommunications Spectrum Standards

- a. Effective use of the spectrum resource should underly the standards process for EMC and hazards.
- b. A system of standards should evolve in an orderly development process, properly anticipating both technical and economic factors which play a part in efficient use of the spectrum.
- c. If the standards evolved are important to telecommunication systems effectiveness, then they should, of course, be enforced. The preferred process for enforcement would at least be partially self-regulating, e.g., it should be to the direct interest of most parties involved to see that the standards were observed in the spirit and letter.
- d. If we are successful in establishing some preliminary procedures for economic considerations in the spectrum management process, the resulting information developed should be useful support for OTP decisions in the standards area. Perhaps an OTP economist should be tasked with cost-benefit analysis for telecommunication standards of all kinds, with a mandate to consider explicitly the indirect effects of thorough imposition of "commonality" requirements across-the-board in Federal systems.
- e. Where possible, we should use present or planned spectrum management tools to analyze and evaluate spectrum-oriented standards. Such analysis should include consideration of fundamental limits to spectral efficiency and communications efficiency. Systems analyses should be carried to the point (of spectrum use) where the overriding limitation arises from mutual interference within the overall systems.
- f. As a long range goal, we should apply the "spectrum denial" idea to generate criteria which closely approximate the limits imposed by operational state-of-the-art. An example of this process would be basing "occupied bandwidth" upon any energy emitted which is detectable (at realistic separation and coupling) by any service in any band, within its necessary bandwidth (e.g. excluding non-linear response due to high power overload from the necessary band of the subject emitter). This approach properly introduces receivers into the spectrum standards and management process.

- g. Quality data on the state-of-the-art itself should be obtained for all major elements of telecommunications systems which influence the amount of spectrum used. Definitions of use should derive from thorough "dimensioning" of the spectrum.
Similar spectrum use characteristics are probably also necessary for non-telecommunications systems, equipments, devices, etc. which contribute to or are affected by the electromagnetic environment. This overall information describes the things to which spectrum standards may be applied.
- h. Standards will not, in general, "fall out" of other EMC work (as byproducts) unless explicitly required. However, such a requirement is an option which could assure that standards activity is focussed upon current problem areas. For example, when new procedures for pre-assignment analysis are instituted, criteria which might lead to standards could be an integral part of our output to the various agencies.
- i. The technical derivation for a spectrum standard may be envisioned as a process which first converts performance data into "criteria" for feasible characteristics, and then further converts these criteria into "standards" for acceptable characteristics.
- j. The administrative derivation for a spectrum standard may be envisioned as a process which secures necessary performance data on a continual basis, conducts the technical derivation of (i.) above, and places the results in a time-phased perspective for decision-making. Technology advances are what necessitate the time-phased point-of-view in the administration of a standards program. The actual feasibility and acceptability of new criteria and standards could change very rapidly from year to year, depending upon the type of technology employed and its stages of growth toward inherent limits for that technology.
- k. The derivation of spectrum standards priorities may be envisioned as starting with those spectrum-using services which exhibit the greatest ratio of actual spectrum used (denied) to that necessary for the function performed--followed by various adjustments (time-varying) based upon all the other considerations which impinge upon the likelihood of implementing effective standards for those services. A more organized basis for priorities adjustment should follow from experience with the pre-assignment analysis process, the adoption of flexible parametric analysis capabilities, and the incorporation of economic considerations (and attendant spectrum dimensioning) within the overall spectrum management process.

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- m. The related matter of electronics side effects (beyond simple interference) involving permanent or semi-permanent change in communications-electronics components, circuits, and systems, will be investigated by the ERMAC. We would expect that the ERMAC deliberations might follow a course similar to that for review of biological effects. If a basis for standards activity is found, appropriate criteria would be recommended. Thus, what might be called "reliability side effects" from spectrum use is a part of an ongoing OTP program, and we expect to take advantage of information developed to date, mainly from Defense RDT&E effort.

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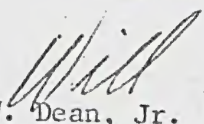
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Emc

June 22, 1971

Major General Anthony T. Shtogren
Director for Communications-
Electronics (J6)
Organization of the Joint Chiefs
of Staff
Washington, D.C. 20301

Dear General Shtogren:

I have just read your letter to Mr. Dean of June 10, 1971, concerning support and consultative assistance for the development of an electromagnetic compatibility (EMC) analysis capability by our support organization in the Department of Commerce, Office of Telecommunications.

Since Mr. Dean is in Geneva attending the World Administrative Radio Conference on Space Telecommunications (WARC-ST), I would like to express appreciation without delay for your positive response to our request of May 27, 1971. Arrangements are being made now for Commerce representatives to meet with personnel of the ECAC to get on with our program. Also I have asked that the data you have requested with regard to FY 1972 and FY 1973 planning be assembled with the view of forwarding it to you shortly.

Thank you for making all these fine arrangements possible.

Sincerely,



Clay T. Whitehead

LRRaish/dtb/ June 21, 1971
cc: FM/OTP/Reading



THE JOINT CHIEFS OF STAFF
WASHINGTON, D.C. 20301

THE JOINT STAFF

Communications-Electronics
Directorate (J-6)

J6M 425-71

10 JUN 1971

Mr. W. Dean, Jr.
Director, Frequency Management
Office of Telecommunications Policy
Executive Office of the President
Washington, D. C. 20504

Dear Mr. Dean:

This is in response to your letter, dated 27 May 1971, which requested certain support be provided your office by the Department of Defense (DOD).

I am pleased to hear of the emerging electromagnetic compatibility (EMC) analysis capability of the Department of Commerce (DOC), and look forward to the development of a government-wide addressal of the increasing problems wrought by a crowded radio frequency spectrum. We are pleased to assist in every way possible in the establishment of this capability.

In reference to the specific support requested, authorization is granted for consultation between personnel of the Electromagnetic Compatibility Analysis Center (ECAC), as designated by the Director, ECAC, and appropriate DOC and DOC contractor personnel, provided such consultation does not interfere with the manpower commitments of the ECAC to currently scheduled and funded projects. Available documentation on ECAC mathematical models, data bases, and procedures may be released by the Director, ECAC, as they are requested, subject to the restrictions imposed by applicable security regulations. The documents requested in subparagraph c of your letter, except for item c.iv., are being forwarded to the DOC (Office of Telecommunications) under separate cover. Item c.iv.,

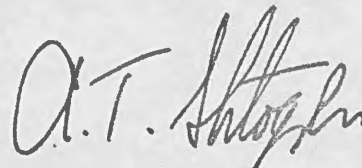
the Communications-Electronics Equipment Directory, is an eight-volume compilation of data extracted from the ECAC Nominal Characteristic File and contains classified information which the military departments may not desire to release to a contractor without prior referral to them. Accordingly, provision of that document is withheld while clearance for release of the data is coordinated. I am certain that the document, or a satisfactory extract, can be released without undue delay.

With regard to the overall subject of continuing support by the DOD to the development of a government EMC analysis capability, I anticipate that more extensive support than the provision of documentation will be requested. In this likely event, ECAC resources may be overtaxed unless such support is identified early and adequately planned and programmed. At this time, ECAC resources are fully committed to the DOD-approved, customer-funded, FY 1972 program. This program will require a substantial increase in manning to the extent that present physical facilities will approach saturation. Additionally, the computer processing capability of the Center will be fully utilized in accomplishing the FY 1972 program tasks. It is essential, therefore, that any substantive support that would impact on the FY 1972 program of the Center be identified at the earliest, so that an assessment may be made of resource and funding requirements. Also, to the extent that they can be foreseen, FY 1973 requirements should be made known to permit their consideration as that program is assembled.

Another subject which should be addressed early is that of release of any classified ECAC documents or data base files/extracts which one or more of the military departments might consider proprietary. Because most data base outputs would contain information supplied by all of the military departments, formal coordination would, in most cases, be required to determine releasability. Also, in the event of a request for a complete file or files, should release of such be obtained, the feasibility of subsequent and frequent updates must be considered.

In view of the foregoing, it is requested that a statement of anticipated DOD/ECAC support desired for the next two fiscal years be provided to permit timely assessment of the level of effort and coordination required to provide such support in furtherance of the development of the government

EMC analysis capability. I believe that this mutually desirable achievement can best be attained in a timely, efficient manner by the orderly planning and programming of the experience, knowledge, and capabilities of the DOD which may be lent to the task.

A handwritten signature in dark ink, appearing to read "A. T. Shtogren". The signature is fluid and cursive, with the first letters of the first and last names being capitalized and prominent.

A. T. SHTOGREN
Major General, USAF
Director for
COMMUNICATIONS-ELECTRONICS

Copy to: _____
DDR&E
ATSD (T)

EMC

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF TELECOMMUNICATIONS POLICY
WASHINGTON, D.C. 20504

May 27, 1971

Major General Anthony T. Shtogren
Director for Communications-
Electronics (J6)
Organization of the Joint Chiefs
of Staff
Washington, D.C. 20301

Dear General Shtogren:

As you may recall, the forerunner (OTM) to this Office and cognizant DOD interests coordinated in 1968/69 in the development of a concept for an analysis capability to cope primarily with Government electromagnetic compatibility problems other than those involving strictly DOD. This concept was outlined in OTM letter of June 18, 1969.

With the establishment of this Office, pursuant to Reorganization Plan No. 1 of 1970 and the issuance of E. O. 11556, we have tasked the Department of Commerce for certain support in the frequency management area. In this regard, the Department, using the resources of their Office of Telecommunications and the Institute of Telecommunications Sciences (Boulder), is developing an EMC analysis capability and treating certain pressing problems.

During the foregoing DOD/OTM deliberations, it was envisaged that the new EMC analysis capability responsive to our Office would, in the interest of efficiency and economy, draw heavily upon the expertise and resources of ECAC in such areas as mathematical models, equipment characteristics, and topographical information.

This is to request that support of this Office be rendered by DOD as follows:

- a. Concurrence for the Department of Commerce (Office of Telecommunications) and, as deemed appropriate by DOC, their contractor (Sachs-Freeman) to consult with ECAC personnel and obtain documentation on mathematical models, data bases, and procedures associated with ECAC capabilities.

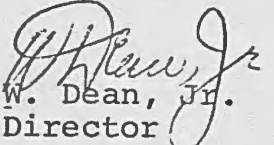
b. Agreement in principal to the subsequent release of the information in (a) above to the extent necessary to support OTP programs and within the boundaries of security regulations as regards the release of classified information; specific data to be the subject of separate requests by this Office.

c. Provision of the following specific information at this time;

- i. - the On-Line Nominal Characteristics File Notebook.
- ii. - TN71-8, On-Line Nominal Characteristics File/Standard Equipment Reference File.
- iii. - TN007-224, dated May 1970, Improved Frequency Allocation Application File System.
- iv. - Communications-Electronics Equipment Directory or an unclassified extract thereof, together with such releasable military information as deemed appropriate by DOD.
- v. - Catalogue of Computer Program Abstracts.
- vi. - Information on the format and structure of the Frequency Resources Record System.

Your cooperation with respect to the foregoing would be appreciated.

Sincerely,


W. Dean, Jr.
Director
Frequency Management

cc: Dr. H. L. Yudkin, DDR&E

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF TELECOMMUNICATIONS POLICY
WASHINGTON, D.C. 20504

EMC

Date: February 11, 1971

Rel'd to Will Dean
3/3/71

Subject: Sachs/Freeman Report

To: Mr. Whitehead

Attached is Volume 1 (Summary and Conclusions) of a contract study made by Sachs/Freeman Associates, Inc. for this office. The report addresses the problem of what information and techniques are required and available to solve electromagnetic compatibility (EMC) problems, and develops an approach on how we get from where we are to where we would like to be.

The report, consisting of four volumes, provides a comprehensive listing and description of available data sources and mathematical models along with techniques for solving specific as well as general classes of EMC problems. The recommendations provide time phased courses of action with respect to data/model acquisition and implementation.

This study report offers an excellent point of departure for the Department of Commerce in developing an electromagnetic compatibility analysis capability in support of this office. Efforts are already under way with OT to implement some of Sachs/Freeman recommendations.

W. Dean, Jr.
W. Dean, Jr.

cc. G.F. Mansur



IDENTIFICATION OF INFORMATION AND ASSOCIATED
ANALYTICAL TECHNIQUES FOR THE SOLUTION
OF FREQUENCY MANAGEMENT PROBLEMS

VOLUME I—SUMMARY AND RECOMMENDATIONS

CONTRACT OEP-RE-70-101
FOR
OFFICE OF TELECOMMUNICATIONS POLICY

FEBRUARY 1971

SACHS/FREEMAN ASSOCIATES, Inc.

7515 ANNAPOLIS RD.

HYATTSVILLE, MARYLAND 20784