# DTIC Subject Categorization Study

## Part I: SCG Uses and Suggested Field Changes

## Part II: Subject Categorization Methodology



A DTIC-O Study Project(Revised Apr 1998)

James Adkins

Final Copy

Acknowledgment

Many individuals were involved in this study and their support and contributions were crucial to the data support and verifications involving indexed terminology. My thanks go out to the individual indexers and retrievers in DTIC-OCS and DTIC-BRR for subject searching and analysis.

I find that the ensuing discussions seem to reside in two groups. One group, more conservative, wants very little change and strictly controlled subject categories with controlled indexing terminology. The other larger group seems to want more fields and groups with a significant increase in index terms.

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13. ABSTRACT *(Maximum 200 words)*

This study presents a least cost approach to revising and enhancing DTIC's Subject Categorization Guide for Defense Science and Technology dated Oct 1986. The research is presented in two parts: Part I is concerned with how the present Subject Categorization Guide is being utilized and offers some recommendations for other usages. Changes are suggested on restructuring portions of the Guide where existing terminology does not fully support large segments of incoming documents. The frequency distribution of DTIC documents, based on Fields and Groups that entered the database between 1960 and 1997, is given for the classified entries, document orders and the subject fields. This data graphically portrays the changes that have occurred in the subject fields and groups. Part II is concerned with information accessibility and communicability where the SCG has been used more or less as a technological tool for information management and control. A number of changes are suggested and reasons are given encouraging DTIC to adopt these changes. Conclusions are that the subject groupings of technical documents in a manner readily understood by DTIC's user community significantly contributes to database usage, customer satisfaction,and the efficiency of the total DTIC information network. DTIC is tasked by its mission to provide and maintain an efficient categorization scheme.

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**INTRODUCTION**

The Defense Technical Information Center (DTIC) is a major component of the DoD Scientific and Technical Information Program. It is the central point within the Department of Defense (DoD) for acquiring, storing, retrieving, and disseminating scientific and technical information(STI) to support the management and conduct of DoD research, development, engineering, acquisition planning, and studies programs. DTIC contributes by providing access to and transfer of scientific and technical information for DoD personnel, DoD contractors or potential contractors, and other U.S. Government agencies and their contractors. In 1998 DTIC began operating within the Defense Information Systems Agency(DISA). DTIC's mission remains unchanged.

Because of the need to categorize new areas (Fields)of scientific and technical interest DTIC replaced the COSATI Subject Category List(DoD-Modified), October 1965, AD624000, with the revised Subject Categorization Guide For Defense Science and Technology dated October 1986, ADA172650. Classification and categorization objectives are synonymous in meaning for purposes of this study. This study proposes to revise and update the 1986 Subject Categorization Guide (SCG).

During the 1970s the Defense Documentation Center (DDC-DTIC's predecessor) evaluated possible ways of using natural languages with computerized databases to provide classification information from keyword phrases. From a list of noteworthy elements a phrase is constructed to tag the idea of the document subject matter.

There are also recent studies using a statistical approach where the subject category assignments are mainly based on the frequencies of words found in documents and on statistical calculations with those word frequencies. Both approaches require significant human post review and there is no existing successful track record involving application to large databases. There are reasons to believe that the programming cost of these alternatives would far outweigh their usefulness. All of this could change with the development of a highly efficient, low cost, off-the-shelf package program. However, lack of a successful program package reverts attention back to the DTIC SCG. Without doubt the SCG, after decades of usage, has demonstrated that it is a useful tool in providing, establishing, and maintaining standardization, convertibility and transferability of all types of DoD information. So a favorable consensus exist for revising and enhancing the present SCG.

Participating agencies working with the Committee on Scientific and Technical Information (COSATI) Council in 1966 included the National Technical Information Service(NTIS), the Department of Energy (DoE), the Department of Defense(DoD), and the National Aeronautics and Space Administration(NASA). These agencies laid much of the groundwork for the first SCG. Since that time the CENDI Consortium, which includes the original COSATI participants(CENDI Cataloging Working Group), has proposed and accepted cataloging standards and made recommendations supporting use of DTIC's SCG.

Presently, DTIC has moved into the national and international arena regarding bibliographic, cataloging, and indexing standards by working more closely with the International Council for Scientific and Technical Information(ICSTI), the National Federation of Abstracting and Information Services(NFAIS), the National Information Standards Organization(NISO), the information arm of the American National Standards Institute(ANSI), the International Organization for Standardization(ISO), the European Space Agency (ESA), the International Nuclear Information System(INIS), the NATO Advisory Group for Aerospace Research(AGARD), and many others.

In 1986, there was a need for establishing clearer lines of demarcation among new and emerging technologies with sensitive military applications. There was also a continuing need to provide the basis for subject grouping scientific and technical reports. These groupings(sub-categories) defined the areas of need-to-know to facilitate distribution of information about DoD-developed and DoD-supported technologies.

Index terms appearing in the DTIC Thesaurus also appear in the Subject Categorization Guide (SCG) under the various fields and groups. All of the needs described above persist today.

Since 1986 development and expansion of Internet, Intranets, and other LAN-based systems has promoted sophisticated indexing and retrieval software that has contributed to an explosive growth of automated and machine-aided indexing methods. These methods have virtually replaced analytical review functions by humans. Consequently, DTIC finds its thesaurus-based controlled vocabulary developed for human indexing now primarily used by computers. The demand for large computer-based thesauri has raised a number of fundamental questions. First, how should the thesaurus be constructed by hand or automatically? Second, what kind of information should the thesaurus contain? Third, what should the design of the thesaurus be, that is, how should the contents be organized and made accessible to EDMS or internal servers? If the thesaurus is online in electronic format what should be the measure of control? How should the thesaurus-based recognition dictionary be constructed and maintained?

The SCG has been used primarily as a management and control tool by DTIC management to determine need-to-know and efficiently distribute information. But there are other uses. Many of them are considered in this study.

**Summary**

This study is presented in two parts. **Part I** is concerned with how the present Subject Categorization Guide is utilized and provides some recommendation for other uses. Changes are suggested on restructuring portions of the guide where existing terminology does not fully support categorization of a large segment of incoming documents. **Part II** reviews the methodology for change and the reasons for adopting the changes.

The Appendices presents a breakdown of three frequency distribution measurements: (1) the subject fields and groups as a percentage of the total Technical Reports database; (2) the document orders, by subject fields and groups, as a percentage of total document orders and the number of available documents; and (3) the classified portion of the database by fields and groups as a percentage of both the total classified and total database. Additional chart attachments provide a summary of these findings. The statistics are presented in 10-year increments from 1960 through 1997.

Some fields show enormous changes because of high interest or a lack of it over the 37-year period that was investigated while others remained stagnant with little activity. There are compelling reasons to meticulously examine the high growth fields to determine if the terminology is sufficient and appropriate. One is that new terms must be incorporated into the database to retrieve new and changing technical information. A dialogue must exist among the indexer, requester, and the system. They all must speak and be aware of the same terminology, and retrieval terminology should enter the database at the time the document is indexed, not two to five years later.

There are equally compelling reasons to examine fields and groups that have become stagnant or show little activity over decades of existence. Some of these fields have lost their significance because of advancement in research while others were merged or supplanted through technological innovations. These fields are no longer dominant areas for scientific investigations.

This study also provides information concerning what portions of the fields are classified and to what extent does classification stifle dissemination. The study targets fields whose classified portion is greater than 40% and compares them with fields whose classified portion is less than 10%. Each is then equated to the percentage of document orders for comparison. It was determined that classified documents were being disseminated at nearly the same rate as the unclassified if time is allowed for limited document processing. These facts speak well of the faith and trust the Defense Community has in the Defense Users Registration System (DURS), which pre-registers DTIC users according to a set of predetermined fields and groups.

Another reason for investigating the classified field structure is that DoD has been uncomfortable, for security reasons, with classified subject groupings exceeding 4% of the total database. **Navigation, Detection and Countermeasures, and Military Sciences**, are two fields that exceed the 4% DoD guidelines. Both fields contain approximately 50% classified documents.

The study of document orders in **Part I** gives some insight into which fields are popular, areas of sustained growth and possible areas for document procurement action. It makes sense for DTIC to concentrate its acquisition efforts in those fields where document popularity is the greatest. Some fields have consistently contributed to large orders over the entire period.

The study also focuses on several other areas of concern:

1. What are the dominant fields and/or groups and how is the activity in these fields changing over time and in which direction?
2. Is there a need to break-out or consolidate certain fields and groups?
3. Would these changes make a difference in accessing the database and improve the dialog with the system?
4. How would DTIC incorporate these changes into the present cataloging and indexing system and at what cost?
5. How will the proposed changes affect the users, DD 1540, and re-certification efforts? A discussion of these concerns are addressed in the section concerning justification for changes to the present fields.

The study also reviews the DTIC Contributors Guide on Technology Codes and provides some recommendations on correcting the deficiencies, standardizing the coding, scoping the fields, and establishing procedures and definitions.

**Part II** of the SCG review is more concerned with the methodology of change and reasons for adopting the changes. It is also concerned with information accessibility and communication. The SCG has become a technological tool: a means of information movement and management control. The indexing processes, MAI, vocabulary control, validation, document security and thesaurus management is inextricably bound to the SCG field and group terminology. The DTIC Thesaurus, primarily formulated for use by Indexers, is used as a thesaurus for databases searched by a computer. Significant changes have occurred based on the thesaurus application, and the automated posting of entry terms. How can these changes be handled and controlled without significant degradation of the indexing process? How are DTIC user being affected?

DTIC users are primarily interested in accessing the database and acquiring good information. They appreciate DTIC's indexing prowess, but the learning curve for communicating with the system is too high and is discouraging to most unfamiliar searchers. These users want their task made easier through computer graphic interfaces and

knowledge bases that tend to suggest other means of approaching the search question and acquiring needed data. They do not want the search engine to reject terms not part of the Inverted Files or Recognition Dictionary. But the Indexers are not entirely satisfied with the terminology either: they want more terms for indexing purposes.

This part of the study suggests several other areas where changes are needed:

1. Establish a hierarchically structured categorization system online to enable users to broaden or narrow searches at will,

2. Provide two distinct online thesauri: One for users, the other for indexers,

3. Incorporate thesauri from other organizations for Indexers online,

4. Incorporate all the generic terms into the categorization scheme,

5. Provide data support for intermingled research efforts, and

6. Provide data handling compatibility with international standards.

Finally, the SCG and all the ramifications of its strategic involvement with DTIC's information movement, management and control is presented through a strategy-formulation process called a **SWOT** analysis. This analysis considers DTIC's external **O**pportunities and **T**hreats and align these against internal **S**trengths and **W**eaknesses to formulate feasible alternative strategies. The SCG is referenced through the total (strategic) DTIC effort and strength.

## Part I: A. SCG Uses and Suggested Field Changes

### A.1 SCG Review: Objective, Purpose, and Authorization

**Objective:**

Provide the steps needed to improve the scope, completeness, currency, accuracy and usefulness of DTIC's Subject Categorization Guide(SCG). This can be accomplished by providing significant changes to the structure, scope notes, and field/group content of the SCG.

**Purpose:**

Review SCG to determine areas needing expansion, improvement or revision that support the interests and needs of individuals and organizations connected to DTIC's mission. Provisions include measures that:

1.) Enhance present customer needs and interests by making DoD information more accessible.

2.) Provide for future customer needs and interests by adequately identifying and categorizing new and changing subject areas based on evolving mission requirements.

3.) Present and support terminology that is readily communicated or easily understood by all parties.

**Authorization:**

DTIC is responsible for providing DoD agencies and its contractors the necessary support and indexing terminology for effectively exchanging scientific and technical information to satisfy evolving mission requirements. This responsibility is relayed in DoD Instruction 3200.12:

**DoD Instruction 3200.12 Rev 1996 "DoD Scientific and Technical Information Program."** DTIC shall:

1. Provide centralized operation of DoD services for the acquisition, storage, retrieval, and dissemination of STI to support DoD research, development, engineering and studies programs.

2. Specifically, DTIC is responsible for providing or executing the following function in support of STIP:

Maintains a system of document acquisition, storage, announcement, reproduction, and distribution methods in accordance with DoD security policies, standards, criteria, and procedures for classified, limited distribution, export control and company proprietary information entrusted to the Department of Defense by agreement.

## A.2 Subject Classification Guide Utilization

**Requirement: Determine how and in what ways elements of the present SCG is being utilized by DTIC and others.**

### A.2.1 DoD Non-security functions

**a.)** Sets up input categories for DTIC's Scientific and Technical areas,

**b.)** Promotes domestic and foreign document announcement,

**c.)** Helps generate Current Awareness Profiles,

**d.)** Provides the basis for subject groupings of S&T reports,

**e.)** Provides groupings for subject index terms appearing in the DTIC Thesaurus, (The subject fields and groups, as an aid to subject classifiers, provide the categories for subject index terms appearing in the DTIC thesaurus that are used for indexing the DTIC collections. There are presently 25 broad subject fields and 261 groups.)

**f.)** Provides the basis for profiling and disseminating documents under the ADD program,

**g.)** Provides information on definitions and scope notes that covers the subject groupings of each field.

**h.) User Registration Systems**
F/G information residing in the Defense Users Registration System(DURS)facilitates actions needed to maintain management control over and accountability of DTIC products and services. DTIC receives, records, and maintains DoD authorizations to furnish information services and products to organizations and established individuals.

**i.) Interrogation of search files**
Process of using search terms against F/G to determine documents that satisfy search criteria.

**j.) Use of F/G in microfiche headers**
Use of F/G to identify microfiche targeted as part of the ADD Program.

**k.) Statistical Summary Output Preparation**
A process that provides statistical information concerning file usage, document collection input,

document F/G frequency variations, Inventory files, history files, etc.

**1.) Prior announcement and reference processes.**
Prior to 1990 F/G appeared in announcement products such as TAB and it's indexes, catalog cards and other reference tools.

### A.2.2 DoD Security Functions

Security at DTIC receives the highest priority that is accomplished through a complex and comprehensive security program. The recognition of the need for security permeates all aspects of DTIC's operations in order to safeguard the information it maintains against unauthorized release. User registration is only one part of the control process. Validation and release authority is built into the registration process in order to make STI available as expeditiously as possible. Changes in the registration process may cause re-certification of users and review of new fields by the monitoring activities in order to safeguard classified documents.

**The Registration System:**

a.) Enables selective dissemination of information products by defining the areas of need-to-know,

b.) Permits establishing access restrictions to more sensitive information,

c.) Provides access verification through the Online Dissemination Authority List (ODAL), a mechanism for defining areas of need-to-know for document dissemination,

d.) Provides the basis for user registration and validation by using the Defense Users Registration System(DURS),PCMUAC, and the DD1540 as the controlling instruments through:

**Validation** as the process of comparing requesters' authorization with F/G release criteria in DURS as applicable to requested products and services. Criteria include, as applicable, security classification, subject areas, need-to-know, provisions for payment, and the definition of the requester's access category in relation to any special release conditions. The outcome may result in rejection and a notice sent to the requester.

### A.3 Other Proposed Uses of The Subject Classification Guide:

1. The SCG can establish separate field(s) and group(s) for non-subject terms or abstract terminology identified in DTIC's Thesaurus that has provided qualification or modification to subject terms.

2. The SCG is used as a mechanism for defining the areas of

need-to-know in the distribution of NATO technical information.

3. F/G could be utilized for large scale automated dissemination of primary distributed documents to organizations based on need-to-know.

4. The SCG field/group combination that make up the S&T codes associated with DTIC WUIS and IR&D databases can become the basis for restricting the MAI term selections.

5. SCG field/group codes are used in many announcement bulletins, document and product catalogs, handbooks, and instruction manuals other than at DTIC, and several foreign publications, i.e., NATO, Canadian, Australian and Netherlands literature reviews and thesauri.

6. The Online Dissemination Authority List (ODAL), which utilizes the SCG fields and groups to certify need to know access to classified information, is employed by a number of DoD organizations to facilitate the distribution of their controlled documents. The ODAL is used for both primary and secondary distribution access verification.

7. Since the SCG provides additional information on the definitions of the fields and groups, many other organizations use the DTIC field/group structure and associate it with their subject areas and need-to-know criteria, i.e., NASA and DOE.

8. The SCG should promote communicability of information. It should facilitate communication between the requester, indexer, retriever, and provider. All should speak the same language without benefit of further interpretation.

9. The SCG permits online access with input and modification features. ADP software support is desired for input and maintenance of SCG that specifically identifies each scope note, field and group, and provides online prompting, editing, and spell checking. This includes:

   a) providing an intelligent Explorer or Road Map online to related terms that complies with ANSI/NISO standards,

   b) terminology from other technical dictionaries,

   c) field controlled computer aided associated terms,

   d) use references as appropriate,

   e) scope notes from drop menus on command, and

   f) enhancement of indexing, MAI, and online display functions.

10. New Fields and Groups, along with their associated or added terminology, should be fully identified and highlighted to facilitate usage. Additionally, all new terminology should be readily understood and communicable across the entire user community.

## B. Field and Group Frequency Distribution Study

### B.1 Subject Fields and Groups Data Set Limitations

The statistical data presented in this paper was furnished by DTIC-Z through automated programs already developed or modified. Data generated before 1960 was not included and this excluded data could involve a document accumulation exceeding 600k or more. The basic statistical data was obtained from the individual subject fields and groups from 1960-1997. The field ratios show the changes occurring in the document flow and the document collection over the last 37 years. While it is true that the collection is viewed from the field and group perspective, the reviewer should keep in mind that the field/group to document conversion ratio is approximately 2.28 per document for the subject fields and groups and approximately 1.5 per document for the classified entries. It appears that the database collection addressed by this study contains approximately 1.0 million documents.

### B.2 Analysis of Document Orders By Fields and Groups

The Document Order frequencies are obtained from the History Files matched with the fields and groups. This information creates summary statistics for what is of the most and least interest, and helps to establish guidelines for a proactive acquisition and distribution policy.

Field and group categories are being assigned to all DTIC documents upon entering the processing pipeline. Some of the Collection prior to 1960 does not contain fields and groups, and these documents are not included in the study. This study finds approximately 94% of the present document input is unclassified, and nearly 54% of the unclassified is public release documentation. This leaves approximately 40% that may be disseminated under field controlled distribution codes and an additional 6% under security control.

One consensus has portrayed the distribution and security limitation as preventing the maximum flow of information. Upon examining Field 17: Navigation, Detection and Countermeasures, which is 48% classified and 91% controlled, the data indicate that 30 times the aggregate field (154,652) has been ordered. It appears the time necessary to process the release limitations may be a major setback for classified and controlled distribution documents. This type of accessibility is compared to the Mathematical and Computer Sciences field where the field total in the aggregate amounts to nearly 40 times 143,098 field/documents, which is equal to 5,719,091 field orders. This field represents the highest document orders. This field also has a low percentage of controlled documents.

## B.3 Analysis of Classified Field and Groups Data

All 25 fields and 95% of the groups contain some classified documents. Field 17: Navigation, Detection and Countermeasures contains the highest portion of classified documents at 48%. The field containing the lowest: Environmental Pollution and Control, has less than 1% classified. There were 341,466 classified field entries, approximately 15.3% of the database total.

## B.4 Suggested Changes to the Subject Category Fields

Initiate or effect changes in the SCG to accommodate new and separate data areas and provide alternative mechanisms for entering and capturing the data elements. Provide the steps needed to improve the scope, completeness, currency, accuracy, and usefulness of the SCG.

The following recommendations and suggestions are made to improve the accessibility to DTIC documentation based on review of 37 years of statistical database information:

1. Field changes, merges, or modifications that are based, in part, on the analysis of the data as presented in the Subject Categories Field Ratio Chart are needed.

2. Document orders frequencies based on Field and Groups reviews suggest areas of document popularity and the need for subsequent acquisition activities.

3. Although classified data appears in every field and 95% of the groups, it does not appear to stifle dissemination.

4. User interviews and comments insist that DTIC terminology is out of step with ongoing research efforts. Some users say that DTIC speaks a different language than they and DTIC still uses many connotations common 30 years ago. Many also expressed difficulty in retrieving information concerning, acquisition reports, administrative directives, management and technology planning documents, and mission planning and requirements documents to name a few. Changes in the Subject Categories will effect changes in several other areas:

1. Customer Service
2. Revised Subject Fields
3. Term Anachronism
4. Improved Accessibility and Communicability
5. Distribution and Need-to-Know

**B.4.1. Customer Service Survey.**
Information from User Survey conducted in 1996 by DTIC-B and DTIC-E shows customers want changes in the Thesaurus to:

a. provide for rapid acceptance of new terms,
b. update the Thesaurus at least quarterly,
c. set up more detail/specific terms in Thesaurus,

d. assign all Thesaurus terms to appropriate subject fields,
e. include more Identifiers-type terms in the Thesaurus, and
f. set up a Microthesaurus of sub-language terms.

**B.4.2. Revising Subject Fields.**

An analysis of certain field statistical data over time is made through a number of DROLS searches. These searches show what other terminology is also connected with these fields and how much of this terminology appears outside of the prescribed field. These search results support splitting or merging certain subject fields. Some examples are: marriage of computer technology with semi-conducting technology and information handling technology. Another could be Radar with Electronics, Detection and Counter-detection.

**B.4.3. Term Anachronism.**

While studying index terms as applied by both MAI and the indexers, one will find there is a need to consider incorporating newer terms while deleting obsolete terms. The Thesaurus should reveal the date that the new or replacement term is established if the database contains the previous term as well as the newer term. The newer terms most acceptable to the information community should prevail throughout the thesaurus.

**B.4.4 Accessibility and Communicability.**

Although various other reasons were considered as influencing the direction of research and the changes that occurred in the document collection, they were beyond this effort. The major concern of this research is whether or not the subject categories are sufficient to accommodate present and future DTIC users' needs of improving accessibility and communicability of DoD information. One major concern is that DTIC's DROLS cannot provide equal search access to all three databases simultaneously.

**B.4.5 Distribution and Need-to-Know**

While considering improvements in access and communication, it was noted that changes in the categorization scheme and subject categories may cause changes to some of the ways in which SCG is being utilized. If these changes are numerous they will necessitate a review of the monitoring organization's policies and procedures that concerns distribution limitations or need-to-know. Because of the proposed new fields, searches or profiles-based products that are contingent on fields and groups may need to be reviewed and restructured. Changes will also occur in the DD 1540 that may require re-certification of users. And all of this may require approval of OSD.

Perhaps DTIC-Z should consider whether some other means can be employed to control the distribution of limited documents instead of by subject category fields and groups. However,

the validation process requiring field/group access limitations appears to be working smoothly and does not require fixing.

## C. Proposed Subject Category Changes

Not everyone will agree with the proposed changes given in this study, but they do offer a myriad of excellent alternatives in which to start the process of change and revision. The need for corporate direction and strategic philosophy was never more urgent than it is today.

**Why Change is Needed**

The greatest changes occurring in DoD at this time is in the acquisition workforce. In the near term, certain actions will be taken to accelerate the movement to the new workforce vision. A great deal of restructuring, reengineering, and re-focusing needs to be accomplished in order to provide the best possible support for the warfighter. Activities organized along functional lines will become organized along product and service lines. This will cause DoD personnel to become more involved with activities such as financial management and contracting rather than with broad functional organizations like maintenance and distribution. Significant progress in educating the acquisition workforce has already been accomplished under the Defense Acquisition Workforce Improvement Act(DAWIA). Future requirements will intensify the need to maintain information service access online in real time.

In order to facilitate training provisions the Defense Acquisition University (DAU) has established 81 courses with over 1200 offerings in educating approximately 35,000 workforce members annually. Communicating with this acquisition workforce in aiding their request for information should be a major DTIC concern. Needed terminology for acquisition data retrieval should already be a part of DTIC's Thesaurus structure.

DTIC is presently fully equipped to handle, but unprepared to intellectually transfer information technology to aid DoD efforts to improve responsiveness, reduce inventories, or make technical information assistance quickly and easily available. Failure to provide adequate subject categorization and perform thesaurus structure and maintenance tasks will erode the ability to intellectually respond in critical situations. Included in Appendix 5 is a list of mostly acquisition technology terms DTIC should consider including in its Thesaurus structure. Incorporating these types of terms will help tremendously in retrieving acquisition reports. There are many others not listed so the list should remain active.

The proposed subject category changes are also submitted in chart form and are attached to this document as Appendix #4. But keep in mind these changes are submitted only as guides and need not deter one from the final objective.....a viable, mission encompassing subject categorization scheme.

C.1 Category Listings

| Category | Field | Database Totals | (%) | Create/Change/Merge |
|---|---|---|---|---|
| **Agriculture** | 2 | 9,318 | 0.4% | Merge w/ Fld 8 |
| **Astronomy & Astrophysics** | 3 | 11,253 | 0.5% | Merge w/Fld 20<br>Merge w/ Fld 22 |
| **Atmospheric Sciences** | 4 | 35,975 | 1.6% | Ocean Sciences<br>Merge w/**Oceanography** |
| **Behavior & Social Sciences** | 5 | 149,989 | 6.7% | Expand **Behavior** Sci<br>Chg to **Social Sci and Psychology**<br>Add Humanities & Hist<br>Add Sociology & Law<br>Add Gov't & Political Science |
| **Military Sciences and Technology (Revised)** | 15 | 157,928 | 7.1% | Incl Mission Areas<br>Mission Plans<br>Military Technologies<br>Functional Analysis |
| **Management Sciences & Technology (New Field)** | | | | (See Scope Notes Below)<br>Establish **Mgt Sci** Fld<br>Add Pers Mgt & Labor Rel<br>Add Econ & Cost Data |
| **Information Science (New Allied Field)** | | | | Allied W/ **Computer Science**<br>Add Linguistics<br>Add Information Resources<br>Add Information Technology<br>ADD Information Management |
| **Earth Sciences And Oceanography (Revise Field)** | 8 | 164,951 | 7.3% | Add **Agriculture**<br>Remove **Oceanography and**<br>Add to **Atmospheric Sci** |
| **Atmospheric Sciences & Oceanography) (Combined)** | | | | **A**dd Meteorology<br>Combined with<br>**Atmospheric Sciences** |
| **Mathematical & Computer Sciences** | | | | Remove **Computer Sci** |

| | | | | |
|---|---|---|---|---|
| | 12 | 143,098 | 6.4% | Merge w/ Infor Sci |
| **Computer and Information Sciences** | | | | (Revised & New Field) |
| | | | | Allied w/Information Sci<br>Add Computer Prog<br>and Software<br>Add Computer Sys Mgt<br>and Standards<br>Add Cybernetics<br>Add Computer Hardware |
| **Navigation, Detection, and Countermeasures** | 17 | 154,652 | 6.9% | Requires **breakout** classified exceed 4% security guidelines |
| **Navigation, Guidance and Vehicle Control** | | | | **Breakout field** |
| **Physics** | 20 | 226,350 | 10.1% | (Combined w/ **Astrophysics)** |
| | | | | Combined With **Astrophysics**<br>Sep Theoretical Physics<br>from Applied Physics |
| **Biological and Medical Sciences ( Separation)** | 6 | 133,503 | 6.0% | Sep BioSci from Medical Sci |
| **Biological Sciences** | | | | **Breakout Field(Revisions)** |
| **Medical And Pharmaceutical Sciences (Allied)** | | | | (New Field-Pharmaceutical Sci)<br>Allied w/ fld Pharmaceuticals |
| **Mechanical, Industrial, Civil & Marine Engineering (Changed)** | 13 | 118,979 | 5.3% | Add Systems Engineering<br>Sep Indus, Engr, & Production<br>Equip Constr Equip Material,<br>Supplies, Containers & Packaging<br>Couplers, Fasteners, Joints<br>Hydraulic & Pneumatic Equip<br>Machinery & Tools<br>Pumps, Filters, Pipes, Tubing, & |
| **Machinery, Tooling and Packaging Technology (New Field)** | | | | Incl Equip & Supplies, Mach<br>New Field to accept<br>Equipment taken from<br>field 13. |

## D. Other Reasons For Adopting Changes

Government agencies whose committees were involved with the development of the original COSATI Subject Category List, First Edition, December 1964 provided the basis for uniform subject arrangement of scientific and technical reports for announcement and distribution purposes as well as management reporting. For DoD documents this included consideration for and establishment of security guidelines. It was determined, as a rule of thumb, that the subject breakdown on which to base release of classified information should be no more than 4% of any agency's holdings under any single category. If this rule is followed then fields 15 and 17 should be revised since they each make up about 7% of the DTIC database. It would be advisable to separate portions of field **15, Military Sciences, and field 17, Navigation, Detection, and Countermeasures.** Changes in some other fields are also needed.

### D.1 Computer and Information Sciences

This field will continue to be a high growth area for the next 20-30 years. Terminology in this area is rapidly changing because of technology growth. Over 70% of the documentation that resides in the **Mathematical and Computer Sciences** field during the last 20 years is concerned with computer technology. Computer Technology is the leading edge in providing the apparatus for harnessing information technology. This role will greatly expand well into the next millennium and presently accounts for more than one of every 10 documents that have been sold by DTIC. Documents reproduced in this field equal 40 times their number. From the growth ratio alone, computer technology deserves to be an inclusive portion of the classification scheme and DTIC needs to provide more direct access to this information.

Scope Notes:
Information Systems Technology:

computing machinery technology
command, control, communication, and network integration
computing intelligence and information systems
computer aided design and computer aided manufacturing
high performance computing technology
human factors and systems interfaces
information security and secure data systems
intelligence data handling systems
computer modeling and simulation
computer networking and data switching technology

### D.2 Astronomy and Astrophysics

The archaic meanings associated with celestial observations and

positioning calculations changed with the advent of 'Sputnik' in 1958. Measuring instruments, mathematical calculations and celestial observations today are more or less associated with space technology, roving space vehicles, electronic technology and computing machinery than with observers, theory and physics. Documents applied to this field represent less than one half of 1% of the total document fields. These documents could be more beneficial to individuals whose interest is mainly in space technology. The associated field 'Astrophysics' would be more beneficial to individuals involved with the physics of space and should be grouped more appropriately under physics.

**D.3 AGRICULTURE (Alignment)**

The agriculture field makes up less than four tenths (.4%) of 1 percent of the total fields and during the last 7 years average about 80 postings a year. The decline of activity in this area should continue in the future, mainly because of the continuing demise of the small farmer and the growth of agri-business conglomerates. Activity in this area could be grouped under either the Earth Sciences or the Biological Sciences field. Major DoD activity in this area was concerned with anti-crop agents and defoliants that were used during the Vietnam War and the after effects of these defoliants on U.S. troops.

**D.4 ATMOSPHERIC SCIENCES (Alignment)**

The atmospheric sciences field has undergone significant changes since the 1960's with the advent of meteorological satellites, high resolution weather radar, and computing machinery replacing the data generated by thousands of dispersed weather stations, weather balloons, sounding rockets and weather maps. Some of the previous research is being superseded by advances in other fields, i.e., electronics (especially radar), space technology(satellites), and computer technology(real time data processing). However, there is still significant activity and interest to continue the present field, but interest in this area is closely allied with oceanography. Since research in these two fields is closely related, merging them should facilitate better access by research personnel and scientists who favor the 'one stop shopping concept' that promotes easier accessibility. Oceanography should be changed to the broader field "Ocean Sciences."

**D.5 BEHAVIOR AND SOCIAL SCIENCES (Realignment)**

Portions of the behavior and social sciences field has experienced tremendous **growth** over the last decades, especially in the areas of administration, management and the information sciences. This field contain the fifth largest data category for DTIC. It has already been suggested that within this field the elements dealing with the information and management sciences be separated from the sociological and psychological elements to promote better access to the management-type information. Major criticism concerning communicability is voiced by individuals attempting to extract information buried within this field.

Dr. Milstead, in her "Indexing Studies" of DTIC, voiced major concerns about the groupings of this field. A minimum corrective effort should remove the administrative and management data from the behavioral information.

### D.6 Machinery, Tooling, and Packaging Technology (NEW)

This information has been a part of the engineering field since first conceived by Central Air Document Organization (CADO) at WPAFB, Ohio during the early 1950s. Much of documentation deals with test results, the effectiveness of the packing materials or component machine shop practices, etc. Tens of thousands of IDEP type data exchange documents have diluted the engineering documentation, making retrieval more difficult by precipitating false drops. This type of documentation is more concerned with test results than with engineering applications. Many requesters who seek information in this field are looking for manufacturing practices and test results of nuts & bolts technology. It needs to be separated from engineering design and applications.

## E. Handling Defense Planning, Requirements and Acquisition Information

### E.1 Management Sciences & Technology (New Field)

Requirement: Provide the basis for capturing information concerning future management objectives to ensure that DTIC remains capable of acquiring, categorizing and identifying relevant STI to be included in its databases that helps fulfill mission requirements. Changes in the acquisition work-force vision necessitates vigorous term identification in this area.

Scope:

DTIC needs to create a new groups to include categories on functional analysis, mission analysis, studies and analysis, and fully integrate other documentation involved with management, administrative, technological and acquisition type studies. Please review the definitions for these terms in the following sections. Documentation targeted would include policies, regulations, decision support, and programming, planning and budgeting type reports.

#### E.1.1 Procurement and Acquisition Terminology

DoD STIP Instructions specifically relate to acquisition and planning document handling and dissemination under the following paragraph:

**DoDI 3200.xx, Sec 1, C-9 Policy Concepts and Principle Functions of the DoD STIP: The operation of programs to effect exchange of Defense technical planning, requirement, and acquisition information with industrial or other organizations.**

### E.1.2 Military Critical Technology List(MCTL)

**Purpose:**
MCTL is a reference tool for use by individuals who are evaluating technology transfers through technical reports and scientific papers (by various means) to potential adversaries who may use the information to obtain a competitive advantage or present a military threat to the United States.

**Definition:**
MCTL is a collection of militarily significant critical developing technologies which covers the development, production and utilization of approximately 10 percent of the advanced technologies in the United States.

**Scope:**
MCTL is compiled by 15 Technology Working Groups(TWG) who present summaries containing an Overview, Rationale, and a Foreign Technology Assessment for each of 18 sections and their subsections. Several military organizations have adopted these sectional formats and constructed technology codes in an effort to categorize their research technologies around the same parameters or what the TWG considers as critical technologies.

### E.1.3 Mission Area Studies

Mission area studies can be grouped in field 15, Military Science or in the new field Management Sciences and Technology as appropriate or aligned according to security guidelines in effect.

**Mission (Definition)**
Any particular business, service or duty assigned to be accomplished by a person, organization, office, detachment, or the like, with the objective of contributing functionally to an overall objective.

**Mission Area (Analysis) Codes**
Continuous analysis of assigned mission responsibilities in the several mission areas to identify deficiencies in the current and projected capabilities to meet essential mission needs, and to identify opportunities for the enhancement of capability through more effective systems and less costly methods. Documentation would include **Mission Needs(statement)** and **Mission Elements.**

### E.1.4 Functional Analysis Studies

Documentation concerning functional analysis studies can be placed in field 15, Military Sciences, if classified, or the new field, Management Sciences and Technology.

**Functional (Analysis) Codes**

An approach to the solution to a problem in which the problem is broken down into its component functions, such as intelligence, firepower, or mobility. Each relevant function is then further analyzed and broken down into smaller functional components until a level of molecularity suitable for solution of the problem is attained. Documentation would include Functional Support.

## E.2 Technology Research and Planning Strategies

Documentation falling in this area could be entered under **field 15, Military Sciences**, or the new field **Management Sciences and Technology**. But some of documentation entering this field is concerned with military technologies and technology planning that cannot be adequately described under the present **Military Science** categories. There appears to be a need to broaden this field to include **Military Sciences and Technology.**

### E.2.1 Technology Areas:

That covers documentation related to the management, planning, programming, budgeting, assessing, and controlling technology transfer that would include:

Technology Research & Planning Strategies
- DoD Science and Technology Planning
- Defense Technology Objectives
- Joint Warfighting S&T Plan
- Defense Technology Area Plans

Basic Research Plan
- Includes areas presenting DoD S&T vision, formulated broadly, and subjected to evolutionary and sometimes abrupt changes over time.

Basic Research Strategies
- Strategic Research Objectives
  - Objectives that define expanding research fronts with high potential military benefit that offer scientific opportunities to cross-cut multiple fields of science.

### E.2.2 Ongoing Effort to Establish Technology Codes:

The Military Critical Technology(MCTL) Codes, Mission Area Codes, Functional Analysis Codes and Defense Technology Area Planning Codes are attempts to numerically categorize specific subject areas of interest to the controlling work groups. In some cases the attempts point to deficiencies in the DTIC Subject Categorization effort that failed to address these concerns.

One example is the so called technology codes that are not really related to documentation or any research base designations but rather on the critical technology areas

considered by the Technology Working Group(TWG). Each of these sectional areas convey broad or general terminology for spectrum coverage, and the sections and subsections designations may change between each publication.

However, some of the sections and subsections of the MCTL could be considered as candidate groups in the DTIC Subject Categorization Guide if DTIC would set up a separate field such as Management Sciences and Technology. There would be no need to establish and maintain separate technology codes.

### E.2.3 Code Mapping to COSATI Fields and Groups

DTIC-OCC and OCS personnel have attempted to map IR&D technology codes to COSATI Fields and Groups codes and Defense Technology Area Plan(DTAP)codes. It appears that the IR&D Technology Codes and the DTAP codes are task and project oriented rather than subject area oriented. These sub-areas closely resemble tasks associated with early Program Element descriptions. Consequently, some of the COSATI Subject Fields and Groups Codes are too broad to accommodate useful mapping. The mapping process would be helped if and when DTIC either incorporates sub-languages into the COSATI Fields and Groups infrastructure or provide a micro-thesaurus of domain-specific terms for each general subject heading.

## E.3. DTIC Contributors Guide:

If one was to carefully review the Contributors Guide on setting up and using the proposed technology codes it would be found that the numerous "technology" phrases or headings contain no basis for subject indexing and retrieval. Basic rules for abstracting and indexing are ignored. For example, Space Platforms with sub-areas like Space +Propulsion. Contrary to established rules, the guide pre-supposes that the documentation already has been subjected to an indexing scheme similar to MAI and some type of categorization has previously taken place that addresses definitions, scope notes, meta rules, index term assignments and phrase structures. This seemingly, has not occurred.

But what if organizations insist on establishing separate coding for the information under their control? And just suppose these organizations' (technology)codes have provided a method of information collection, processing, retrieval, analysis, and dissemination, then there would have been adequate efforts expended toward achieving standardization, convertibility and transferability. This also has not occurred. Even within the controlling organizations themselves, retrieval is difficult or impossible.

Searchers who are trying to retrieve information under

the "supposed technology codes" usually end up saying, "It's not what they say it is--the data just isn't there!" Terminology must be entered into a database system in a manner that the computer is able to later recognize before it is considered to be retrievable.

The failure of the "technology code" effort emphasizes the widespread lack of familiarity with DTIC's indexing policies and rules. It also points up the lack of familiarity with DTIC services, sources, procedures and techniques for acquiring and handling DoD information. DTIC is somewhat the blame for this ignorance because most of the knowledge concerning its specialized database indexing and retrieval operations reside inhouse. Therefore, DTIC should provide specialized training to external organizations who are required or want to use its information services.

**E.4 Providing Information Service Training:**

As a minimum, DTIC should establish a school or provide an extensive systematic training program in information services that would include indexing, retrieval, and thesaurus development courses. It should be offered or designed with distributed learning technologies that use an innovative Web-based learning technique. The Web environment guides and supports the students through the learning processes. DTIC instructors can track progress and provide individual assistance when the need arises. Students should be able to interact online with the instructor and other students. This type of training is faster, cheaper, and better than onsite training.

The school should develop specialized, in-depth courses in specific problem areas and emphasize special retrieval and reference services that would help alleviate problems like those occurring with the technology codes. It would certainly help in providing more complete, timely, and less costly information transfer and result in more satisfied DTIC customers.

# Part II: A. SUBJECT CATEGORIZATION METHODOLOGY

## A.1 SCG: An Information movement and management Tool

The Subject Categorization Guide(**SCG**) has evolved into more than a means of providing subject categorization schemes by becoming a technological tool used to access, move, store, and manage DTIC information products in all their various forms. It is inextricably bound to the fields and groups (F/G) terminology that provides the basis for the Machine Aided Indexing(MAI) processes, DTIC's vocabulary control, and thesaurus management requirements.

## A.2 Information Access, Indexing and Vocabulary Control

The SCG performs a very useful categorization function that permits cataloging all documents according to prescribed fields and groups. Presently there are 25 fields and 261 groups.

The entire purpose of indexing reports is to classify, group and store the information for later retrieval or whenever needed. The DTIC Indexing Systems consists of all the processes used to input the document into the appropriate database.

The DTIC Indexing System:

1.Places all controlled subject terms into two online fields, and in the WUIS database, put identifier terms and author submitted terms in a separate field.

2.Permit weighting by using value judgment of Indexers or statistical processing software, if available.

The Thesaurus Management System:

1. Establishes and preserves a semantic relationship between terms through thesaurus management.

2. Develop and structure index terms hierarchically for online displays.

The DTIC indexing system has already accomplished the (4) needs cited above, but other improvements beyond these basic requirements are needed.

## A.3 Field/Group Selections and Machine Aided Indexing(MAI)

### A.3.1 Problems With MAI Term Selections

Because MAI cannot conceptualize the contents of documents, nor discern the multiple meanings in sentences or grammatical phrases, it is not suitable for automatic indexing without human review or a companion expert system knowledge base. This could be because MAI is not linked to any semantic relations that determine word definitions based on a sense element from the parts of speech. But DTIC could establish some sort of selection mechanism for application within its multi-disciplined databases. One method proposed using the F/G as automated syntactical data switches that controls MAI term selection. This method appears feasible, but all the Thesaurus terms will need to be assign to a F/G and the F/G selection must be done prior to processing, either by an analyst or through statistical means. It will also need to be extensively tested.

### A.3.2 Enhanced Indexing of Document "Aboutness."

If at all possible, DTIC should MAI terms from the table of contents as well as the title and abstract. But there should be a limit on the number of pages referenced through the table of contents. The table of contents often provides more concise topical headings than the abstract. It is better at portraying document "aboutness." The necessary program changes to effect this improvement is minimal compared with the enormous benefits that could be derived.

### A.3.3 Overhauling Phrase Selection Software

MAI should omit words from phrases during the phrase selection routine if they are not content-bearing or essential to the meaning of the phrase. A recent study has suggested that MAI selections may contain up to 50 percent of these non-essential terms. Omissions may be accomplished by limiting the prescribed subject fields and groups.

### A.3.4 Establishing System to Handle Lexical Variants

Lexical variants are different word forms for the same expressions. Some of these forms are derived from spelling and grammatical variations, but many are captured from acronyms or abbreviations. These unwanted terms cause significant amounts of database clutter. Many of these variants can be eliminated by restricting the Fields MAI can access for posting terms.

### A.3.5 Subject Access By Structured Categorization:

DTIC fields and groups should be linked into a hierarchically-structured categorization system. This would

enable users to explode headings online to broaden or narrow searches at will. It should be possible to access the system at different levels of specificity. The user should be able to sort retrieved sets online by field and groups and determine the distribution of the items or select a subset.

## B. DTIC Thesaurus Management

### B.1 Thesaurus Utilization by Online Indexers

Nearly all DTIC indexers utilize the online Thesaurus rather than the printed version. The electronic version is more accessible and facilitate usage. Changes and revisions can occur more rapidly and maintenance is easier. However some improvements are needed:

1. Establish essential navigational(GUI)devices to permit better access to:
   a. Field/Group codes
   b. Scientific & Technical Area Codes
   c. Related Terms and other online Thesauri
   d. Identifier Type Terms
   f. Use For Reference Terms
   g. Associated Terms
   h. Technical Dictionary Access

DTIC should discontinue the paper-based thesaurus that is costly to complete, print and maintain. The entire thesaurus revision should be accomplished electronically. A complete digital environment(paperless) is mandated for DoD by the year 2002. DTIC thesaurus managers will need to accomplished this task as soon as possible. The same data should not have to be entered and re-entered. The savings from adopting electronic data handling will significantly increase the productivity of the subject specialist and lexicographical personnel maintaining the thesaurus. This task should also help reduce the amount of reference material at various locations within the branches.

### B.2 Constructing a Microthesaurus of Sub-language Terms

Provide for a Microthesaurus of sub-language and technical terms: include technical languages as a part of sub-fields or groups. Address the feasibility of incorporating Sub-language Terms and Domain Specific(technical) Language as a means of improving communicability between the databases and its users. Sub-language terminology is readily available in literature at the laboratory or unit level.

### B.3 User Access Thesaurus

DTIC should provide two distinct online Thesauri: one for end users that would provide a dense semantic network with a large entry vocabulary, and the other for indexers that is mapped to the more controlled vocabulary and categorization scheme. Also acceptable would be a knowledge-based user interface that converts natural languages or use references into controlled vocabulary terms. Online users need not be concerned with term selections based on a controlled vocabulary.

## B.4 REVIEW OF OTHER THESAURUS DEVELOPMENT

DTIC's Thesaurus management should follow the prescribed equivalence, homographic, hierarchical, and associative relationships displayed among terms identified by the National Information Standards Organization(NISO).

Thesauri developed by other organizations appear to be limited or confined to their specific missions. The National Institutes of Health (NIH) has a well-developed National Library of Medicine (NLM)Thesaurus concerning medicine, pharmacy, biology, and drugs. NLM maintains Medical Subject Headings (MeSH) on the Internet. There are over 18,000 terms used to index MEDLINE and MEDLARS and other databases.

American Petroleum Institute(API) Thesaurus is well endowed with terminology expressing geology, mining, oceanology, and other earth sciences.

Although the National Aeronautics and Space Administration (NASA) Thesaurus is more complete than most other Thesauri it still emphasizes aeronautics, space technology, atmospherics, guided missiles and rocket technology, ergonomics, materials, mathematics and astronautics as well as sub-languages, identifiers and generic terms. NASA also maintains an electronic version on the Internet.

The Department of Energy(DOE) thesaurus is mostly devoted to physics, atomic energy regulatory terms, nuclear weapons and weapon testing, radiation effect, and energy utilization.

The Library of Congress maintains several online Thesauri, among them are Thesauri of Graphic Materials (TGM I & TGM II), Global Legal Information Network (GLIN), Legislative Indexing Vocabulary (LIV), and a Universal Decimal Classification system.

Although cooperative agreements may occur between various agencies regarding Thesaurus utilization, it is doubtful whether these or other organizations will maintain interest in developments beyond their mission requirements.

### B.4.1 Thesaurus Management System and NISO Standards

DTIC's thesaurus should follow the standards recommended by the National Information Standards Organization(NISO) in regard to maintenance and management procedures.

## C. Effects of Indexing Constraints on User Requests

DTIC deals with complex multifaceted user requests. These multifaceted requests are subjected to the constraints identified by the MAI software and subroutines, and by the definitions and scope notes accompanying the SCG. The SCG provides F/G definitions where certain basic principles or axioms can be encoded as metarules(generalizations based on experiences). These

rules can serve as constraints on the indexing system where the subject analyst is concerned with key features in related fields and groups.

These features can be extracted and then matched against a given search pattern in order to make a positive identification. Setting up constraints on possible combinations can provide significant help in obtaining good information and/or in eliminating areas of unlikely possibilities. But exceptions to these rules may occur and this effort could be influenced by the analyst's judgment.

One example is where basic research involving biochemicals used in biological warfare agents is under field 15, Military Sciences, instead of field 6, Biological and Medical Sciences. The reason for this is based on security precautions rather than subject access.

Another example would be where long phrases occur and MAI software may discern only key portions of the phrase, but enough data could be extracted to enable positive identification. However, restraints in the selection process subroutine with respect to the number of accepted words in the phrase can cause the whole phrase to be rejected. The whole phrase need not be discarded just because the phrase exceeds the term limit.

## D. The Categorization Scheme

Use of the term categorization is interchangeable with the term Classification. In this report categorization is the preferred term. There appears to be no problem with the categorization scheme except those induced by benign neglect. Regular maintenance and review is required on a much broader scale than has been scheduled in the past. This small effort alone will alleviate much of the criticism connected with the terminology.

### D.1 Categorization Schemes for Generic Terms:

There is a need to recognize a large number of terms and determine wnere they fit in the categories or groups provided by the subject categorization scheme in use. The jargon must be familiar to the disciplines of the user population. In this category there are many generic terms that are equally applicable to many fields and groups. These generic terms may be placed into separate fields and groups and their application or selection can be subjected to a judgment call by the indexer or the MAI system. This new field could become the most important portion of the categorization scheme. Many generic terms are part of the low-information-content word group.

#### D.1.1 Objective of Categorization Scheme

Of course, it is important for both the users and experts in the field to understand and agree with the scheme. The optimum objective is to provide subject access at the chapter level, thereby greatly increasing the specificity of the vocabulary. One means, discussed earlier, of increasing specificity is to index the table of contents as well as the title and abstract. Changing

the categorization scheme, revising or increasing the fields and groups, adding sub-language terms, and accepting selective keywords all tend to increase accessibility to the document collection and promote better communications between users and the system.

### D.2 Changes to Categorization Scheme

Although no DTIC automated method exists to introduce change in the categorization scheme one should be implemented. The DTIC scheme is based on more than a half century of input, from shelf lists of ASTIA subject headings and automated decimal coding of the older punched cards collating systems to the present day computer resident diversified databases. Even with the present diversified databases the need still exists to preserve access to those older records. DTIC should update its present thesaurus by incorporating terminology from other thesauri and maintain its own categorization scheme that is configured to its original diversified databases. Any new field entries should follow the old categorization scheme's structure.

## E. DTIC's Diversified Databases

DTIC, a more pronounced organization with large diversified databases, requires significant multi-disciplined thesaurus structuring-including scope notes, category assignments, hierarchical relationships, and cross references if appropriate. Any new subject category assignments will necessitate significant changes in the thesaurus structure. Constraints on how the subject terms are applied to indexing is required by the definitions.

No other organization with such large highly diversified databases depends on terminology confined to one thesaurus. One approach by The National Technical Information Service(NTIS) conveniently uses several thesauri from other organizations such as DTIC to extract terminology if there are insufficient indexing terms. Such an approach for DTIC is worth considering.

Another method could be to break-up large document collections into several smaller collections and use one thesaurus for subject terms, and keep the collections segregated. The difficulty here is knowing which collection(s) to search.

This method would not only extend the learning curve for data searching and acquisition, but also increase the time required for searching if the information one seeks is in more than one collection and the searcher is unsure of which ones are applicable. A user interface would be helpful but may not fully compensate for the additional time required. It is also conceivable to index the databases with several macro-thesauri, especially if employed with automatic retrieval capability. In either method, if automatic indexing is applied, problems will occur with the selection of variants and generic terms not conducive to retrieval. DTIC is currently experiencing this problem with

Machine-Aided Indexing(MAI). Of course, one solution here would be Machine-Aided Retrieval(MAR) utilizing an online user's thesaurus with a natural language processor. If the thesaurus existed only online in electronic form it could contain several thesauri from various other organizations as well as significant natural languages: English as well as foreign. Unlike a printed volume, such a tool would not become too unwieldy.

**F. Index Enhancement and Technological Change**

The solution to inaccessible documentation can be as simple and low-tech as enhanced indexing. DTIC needs to re-examine all the processes connected to the indexing and categorization scheme in light of what the new technology can make possible toward enabling greater access and easier communication between the DTIC databases and its users. Just improving incrementally the older technology to make obsolete tasks a little easier is no longer supported by the technology conscience users and others who have experienced Web browsing, hypertext linking, and other sophisticated GUIs.

**F.1 DTIC Should Initiate Changes**

DTIC, as the major stakeholder and document custodian of computerized DoD information, should take the initiative in making the necessary changes and encourage sufficient dialogue to perceive user satisfaction. No other entity has as much at stake as DTIC. Consequently, any changes may be seen more as a DTIC fiduciary requirement for the benefit of its customers. DTIC will need to bear the initial costs with portions passed on to the customers in higher fees for products and services. Information providers must find ways to establish alliances and communication networks with each other in order to help defray expenses in processing and maintaining databases. Cooperative agreements supporting multi-discipline, multi-lingual thesauri have already been accomplished. But much more effort is needed, especially in the international arena.

**G. Estimated Initial Cost And Benefits**

| | |
|---|---|
| **Number of new entries** | **6,000** |
| **Number of new cross-references** | **15,000** |
| **Rate per new entry ($ 4.75)** | **$99,750** |
| **Rate per new page...(30 entries @$142.50)** | |
| **Terms for automated conversion** | **22,000** |
| **Editing time per new term..... (3.6%)** | **$ 3,591** |
| **Identifying and marking-up text(1.5%)** | **$ 1,496** |
| **Inputting entries (3.0%)** | **$ 2,992** |
| **Administrative time (5.0%)** | **$ 4,988** |
| **TOTAL** | **$ 112,817** |

**G.1 Cost Benefits and Improvements**

The categorization system should be designed to satisfy the needs of different categories of users like facilitating the transfer of research results from the scientist to the

engineer, especially on intricate and interdisciplinary problems. The cost effectiveness ratio for introducing new categorization schemes and improving upon existing ones needs to be determined in terms of the services rendered. Different schemes may also be evaluated in terms of system cost for an equivalent amount in quantity and quality of information transfer.

The improved SCG must satisfy other user requirements. One requirement of an improved SCG is that it will have the potential to increase accessibility by reducing the time required to obtain needed information. Another requirement, based on the proceeding one, is that each improvement also has the potential to increase the productivity of DTIC users.

## G.2 User Perception of Value

DTIC, as a user oriented organization, is especially concerned about what the user perceive as value. The perceived value approach, useful to DTIC Marketing personnel, was based on subjective evaluation performed by users of the DROLS information system or service. The underlying premise is that users can recognize the benefits they gain from a system and are capable of transforming these into ranking scales and/or monetary terms.

One feasible and practical value approach is to seek what perception DTIC users have concerning the changes that have taken place with the SCG in affecting the way they work and whether these changes have been beneficial or detrimental. Coupled with this user perception should be the perception of DTIC management and other stakeholders concerning what effect these changes have on their efforts. When the focus of their evaluations move from the level of technical performance to organizational impact, the importance of these perceptions and judgments increase. DTIC already has experienced significant changes because of implementing EDMS. Changes made in the SCG will affect the users, DTIC employees and management.

Another approach is to determine customer satisfaction based on retention and loyalty. DTIC, over the last 10 years, has experienced an approximate 50% reduction in DROLS sites and usage. No one, at this time, can precisely say why this is occurring, but this decline needs to be fully investigated and counter-acted upon. Information access and availability is most certainly a factor. The values delivered to our customers should be measured against customer-delivered value from other information providers. From whom are these former customers now receiving their information? From our own surveys, it appears that our customers, beside wanting more accessible information, also want DTIC's help in pulling together information from a variety of sources, including the Internet, and putting it in a usable format. Reversing these customer losses and/or the lack of database usage needs to receive top management's undivided attention. Extensive corrective action, along with ample

resources, needs to be invested into a viable formula for improving retention and loyalty of DTIC customers.

## H. Data Support, Information Access and Communications

### H.1 SCG Should Support Intermingled Research Data

The indexing, cataloging, processing, and storage systems for scientific and technical literature may be significantly different from that of other literature such as Law or the Arts. But the intermingling of research data from the scientific and technical disciplines on one hand with the social, arts, and humanities of the other is occurring more extensively and rapidly today. This is revealed in significant increases in administrative and management reporting of the last decade. Over 50,000 documents have been identified and entered the DTIC databases since 1980 with issues concerning sexual harassment, age discrimination, flexible workplaces, employment of handicapped individuals, etc., as well as regulations and findings that support enforcement and management changes. Many of these documents are being meticulously examined by DoD agencies and their contractors. This trend is not reflected in the present SCG but suggestions have been made elsewhere toward implementing needed changes. This trend will continue well into the next millennium when the flow of this type of information will quadruple.

### H.2 SCG Compatibility with National and International Standards

DTIC Categorization and Indexing schemes should be compatible with national and international procedures and standards. The SCG defines the subject areas for which DTIC and other Federal Agencies may accept responsibility for ensuring effective transfer and dissemination of national and international information. SCG will facilitate the acquisition and handling of documentation involved with translation of foreign documents, copyrights and patents generated from foreign defense and non-defense related technologies, as well as the information transfer of foreign non-print products.

### H.3 Information Access and Communications

Information Access and communications, as an integral part of the overall DTIC information management program, is the main objective for indexing, processing, and retrieving DoD information. It involves not only quantifiable numbers but also a measure of the unquantifiable results as portrayed through corporate philosophy, intuition, instinct and corporate culture. Much of the unquantifiable is based upon an individual's or an organization's personal knowledge base conceived by customers as a portion of DTIC's value delivery system.

Quantifiable measurements could include an increase in the customer base, an increase in document flow, and a decrease in the time required to produce and distribute the products.

Customer loyalty through retention levels is also a quantifiable measurement. These measurements could also indicate the degree of satisfaction by our users, contributors and employees.

## I. SCG Strengths Weakness Opportunities & Threats Matrix (SWOT) Analysis: A Strategy-Formulation Process

### I.1 Strategy Formulations

The following analytical tools are presented more as a means to facilitate, rather than diminish communication. Without objective information and analysis, personal biases, politics, emotions, personalities, and halo error(tendency to put too much weight on a single factor) may play a dominant role in the strategy-formulation process. DTIC must develop and execute good strategies to grow and prosper.

The strategic-formulation process requires good intuitive judgment in order to be successful. The SWOT Matrix helps managers develop four types of strategies where DTIC can be fitted: SO Strategies, WO strategies, ST Strategies, and WT Strategies. The reference point is the entire DTIC effort associated with the information movement, management, control, and accessibility influenced by the SCG.

### I.2 SWOT MATRIX

| | Strengths—S | Weaknesses--W |
|---|---|---|
| Always Leave Blank | List Strengths | List Weaknesses |
| Opportunities | SO Strategies | WO Strategies |
| List Opportunities | Use Strengths to take advantage of opportunities | Overcome Weaknesses by taking advantage of opportunities |
| Threats-T | ST Strategies | WT Strategies |
| List Threats | Use Strengths to avoid threats | Minimize Weaknesses and Avoid Threats |

### I.3 Strategy Formulation and Participation

In the following strategy formulation for DTIC all the feasible alternatives that could benefit are not considered because there could be an infinite number of ways to implement those actions. The strategies presented here are only a start. This beginning provides the best opportunity for concerned

managers and employees to gain an understanding of the objectives and participate in the strategy analysis and choice activities. Alternative strategies proposed by the participants should be considered and discussed at a series of meetings established for this purpose. Once the proposed strategies are identified and understood, the strategies should be ranked in order of attractiveness by participants.

Order of Attractiveness:

1= Should not be implemented
2= Should possibly be implemented
3= Should probably be implemented
4= Should definitely be implemented

**I.4 Developing Strategies**

Developing strategies that use strengths to capitalize on opportunities can be considered an offense, while strategies designed to improve upon weaknesses by avoiding threats can be termed defensive. DTIC has some external opportunities and threats and internal strengths and weaknesses that can be aligned to formulate feasible alternative strategies. The Matrix is helpful in making strategic decisions about the alternatives available to the revision and enhancement of the SCG.

Other than ranking strategies to achieve a prioritized list there is an analytical technique that evaluates alternative strategies objectively. The Quantitative Strategic Planning Matrix(QSPM) is based on the External Factor Evaluations Matrix and the Internal Factors Evaluations Matrix. These key external and internal factors are Critical Success Factors and are assigned weights identical to those in the Matrix. Then numerical values that indicate the relative attractiveness to a given set of alternatives are determined. Any factor that affect the choice of the strategies being made are compared relative to the key factor.

The range of attractiveness scores:
1= Not Attractive
2= Somewhat Attractive
3= Reasonably Attractive
4= Highly Attractive

**I.4.1 Strengths:**

1. DTIC is DoD's Primary Document Distribution Center,
2. Onboard Staff Are Highly Trained Professionals,
3. DTIC Thesaurus is Widely Utilized by DTIC, DoD, Contractors, and Other Professional Staffs,
4. SCG is Utilized as an Effective Document Classification/Vocabulary Control Mechanism for A DTIC collection of over 2,000 K Documents,
5. SCG Promotes Information Movement and Management,
6. SCG Fields and Groups Permits Document Management and Selective Dissemination,
7. Maintains On-site STI Policy Office Responsibilities,

8. Affixes Value Added Services through the Indexing Process,
9. And Provides a High Capacity Computerized Information and Reproduction Facility.

**I.4.2 Weaknesses:**

1. Term Anachronism:
   SCG Revisions Are More Than 10 Years Old
   Resistance to Needed Changes in Terminology Exist, and
   Several Fields Need Restructuring for proper input,
2. Too Stringent Vocabulary Control Mechanisms Are In Place,
3. Categorization Scheme Lacks Hierarchical Structure,
4. Automated Online User Access Terminology is Lacking,
5. Sub-language and Domain Specific Terms are Lacking,
6. Indexers and Users Don't Speak Same Language
   Because of Indexer's State-of-the-Arts Learning Curve,
7. MAI Needs Enhancements:
   To update Recognition Dictionary
   To Provide Better Phrase Selection Routines
   To Reduce Generic Term Selections
   To Remove Erroneous Terms and Variants, and
8. Proactive Collecting Initiatives are Lacking causing DTIC not to Timely Acquire Needed Documents.

**I.4.3 Opportunities:**

1. Establish Leadership in Thesaurus Development:
   Provide Automated Links to Other Agency Thesauri,
2. Establish Hierarchical Categorization Scheme and
   Include Reference and Usage Terms in DRIT,
3. Expand User Base by Obtaining High Interest Documents,
4. Use Fields/Groups for High Level Primary Information Dissemination,
5. Establish A Proactive Document Acquisition Policy,
6. Establish Acquisition Database within Collection,
7. Enhance SCG Fields and Groups Definitions and Terms,
8. Establish 'Metarules" constraints as Scope Notes,
9. Customized Covers and Title Pages of Documents and include organizational Information,
10. Establish Audit Trails into MIS Databases(DD 350, WUIS, and IR&D) to Enforce Compliance, and
11. Expand DTIC's Mission into Acquisition Activities.

**I.4.4 Threats**

1. Failure to Collect Important and Needed Documents,
2. Lack of Communicating Tools are Causing Users to Go Elsewhere for Needed Information,
3. More Agencies are Placing Their Reports Up On WWW,
4. Decrease in New Limited Information Document Input,
5. Decrease in New Total Document Input,
6. DTIC is Receiving Less Than 33% of Appropriate New Documents, and
7. Agency's Functions May Be Privatized.

**I.4.5 SO Strategies**

1. Establish Workgroups and Provide Leadership in Thesaurus Development,
2. Enhance and promote Information Movement and Transfer Methods by Reviewing, Revising and Changing Outdated Regulations,
3. Promote and Improve Primary Document Distribution to OSD Components,
4. Convene scheduled DTIC Users Meetings to Discuss SCG and Thesaurus Development,
5. Provide a Centralize Document Validation System for Control of Limited and Classified Distributions,
6. Provide Term Definitions and Scope Notes for Online Users,
7. Establish an Online Network to Other Agency's Thesauri,
8. Seek and Acquire High Interest Documents,
9. Assign Roving Information Specialist duties of Contacting HQ Monitoring Agencies for Document submissions, and
10. Setup Online Hierarchical SCG Categorization Scheme.

**I.4.6 WO Strategies**

1. Schedule Regular Review Periods for SCG and Thesaurus Maintenance,
2. Expand Thesaurus Terminology with Sub-languages,
3. Provide More Scope Notes and Use References Online,
4. Provide F/G Controlled MAI Selections,
5. Ensure Popular Terminology is an early Part of Retrieval Vocabulary,
6. Establish an Integrated Document Exchange and Distribution Network for DoD Agencies, and
7. Establish Lines of Communication with Research Laboratories and Headquarters Agencies for Audit Purposes.

**I.4.7 ST Strategies**

1. Expand Program to Highlight Reports Along With the Corporate Sources Information on Internet and WWW,
2. Limit Number of Archival Documents per Cycle,
3. Provide Online Mechanism to Easier Accessibility,
4. Establish Proactive Collecting as DoD Policy,
5. Increase Document Flow Through Foreign Exchanges,
6. Increase Employee Relationship Marketing Training,
7. Increase Electronic Document Processing, and
8. Use DTIC Distribution Network for Primary Document Distribution.

**I.4.8 WT Strategies**

1. MAI Archival Document without Post Review,
2. Establish GUI to Internet and WWW to Promote Easier User Accessibility,
3. Require Professional Staff to Become and Remain Aware of State-of-the-Art Research,
4. Increase Collection of Popular Fields Documents, and
5. Emphasize Cost Advantage to Agencies in Reproducing Their Primary Distributed Documents.

## Conclusions

Having ready access to DTIC information on the location and acquisition of technical documents is one of the primary concerns of users. DTIC has a responsibility to make this task as economically and painlessly as possible. The subject grouping of documents in a manner readily understood by the user community contributes to the efficiency of the total information network. The ultimate goal is increased productivity of DoD organizations and their contractors. The difficulties associated with this task increases when variations in technical languages becomes barriers to communication rather than linguistic support. Common, easily recognizable categories, i.e., Electronics should not be set-up as unrecognizable Electrotechnology and similarly, small stagnant fields should not occupy prominent positions in the SCG scheme.

Within a decade, enormous changes in technological innovations can take place that could make communicating difficult if these changes in language and terminology are not incorporated as retrieval mechanisms. DTIC seems to be oblivious to the enormous changes that are presently taking place within the DoD Acquisition Process as is evident by the lack of indexing terminology enabling document retrieval for the Acquisition workforce.

Users need not be concerned with controlled vocabularies and should be provided with an online user's access thesaurus or knowledge-based interface to provide easy access into the Inverted Files with commonality to all three databases. Customers have a way of placing a monetary value on the time and effort spent in acquiring useful information. They have a tendency to abandon unproductive retrieval systems regardless of cost.

The research supports continuation of the existing subject categorization scheme with continuous improvements rather than any radical departure. The present scheme, if revised and more fully automated can accommodate future DoD information needs well into the next millennium.

DTIC also has a responsibility to educate its customers about the internal information system operations. DTIC needs to establish a systematic program to provide users with indexing, retrieval, and subject categorization training that cannot be obtained anywhere else. This training should be pursuant to low cost Web-based technologies that use online distributed learning processes.

DTIC should change the scope of the indexed material by including the table of contents in the indexing process. This will establish clearer lines of communication into the document "Aboutness." This

change could be an inexpensive enhancement to delivered customer value.

The thesaurus terminology needs to reflect the present day environment of ongoing research and lexical constructions should be performed automatically. Other thesauri should be incorporated into the recognition dictionary. By contrast, term anachronism, more pronounced in the WUIS and IR&D databases, needs to be removed or compensated by seeking, accepting and adopting continuous changes to terminology within the categorization scheme. Changing the categorization scheme, revising or increasing the fields and groups, adding sub-language terms, and accepting selective keywords all tend to increase accessibility to the document collection and promote better communications between users and the system. The search fields and retrieval mechanisms for all three databases should be the same. The present categorization scheme should be continued with more frequent maintenance and review. Today, Internet GUIs, Web Browsers and other user friendly innovations are expected to be present as information access tools for the unsophisticated searcher and DTIC cannot afford to provide less.

## RECOMMENDATIONS

**DTIC should proceed with the following recommendations in an incremental fashion. Through a series of steps or phases where each recommendation is tested and evaluated before preceding with any further action or commitment.**

**1.** Initiate daily online vocabulary development and establish continuous maintenance of the recognition dictionary online by incorporating the additional terms suggested through the new field and group categorization structure.

**2.** Review the 1,000 plus thesaurus terms that were acquired during the course of this research and add the most appropriate ones to the revised fields.

**3.** Provide easy online access to DTIC SCG with navigational features, i.e., hot buttons, cut and paste, and a variety of display modes, including split screens and highlighting.

4. Report all progress regarding the number of new and added terms to the thesaurus during management reviews. Incorporate new terms into the vocabulary as soon as they are needed for retrieval. Maintain the thesaurus in an electronic online environment accessible in read only mode to anyone having a need to use it.

5. Consider eliminating the Lexical Dictionary altogether or provide database commonality with the DTIC thesaurus for maintenance purposes so that effort to maintain it is not duplicative.

6. Establish online access to other organization's technical database thesauri that permits import connections through Internet features.

7. Establish guidelines for including technical definitions in the scope notes of the SCG fields and groups. They should show meaning and usage as well as hierarchical structuring. Such features should be integrated into the thesaurus and EDMS. The thesaurus should not only provide a full range of terms to cover all the types of material entering the database, but also provide:

a) Scope notes to show term meaning and usage
b) Dates or periods of term anachronism, introduction and cessation
c) Use, related, and associated references
d) Sub-language terms suitable for indexing table of contents or chapter-level content.

8. Use the 1975 DRIT as a baseline to establish the enhancements described in Item 7, and to ensure that the effort is extended well beyond what was anticipated during that time frame. One extension could include domain centered or sub-language terms.

9. Establish other uses of the SCG, i.e., in the management and control loop. Some recent uses that were considered show the SCG F&G can provide:

a) Database Statistics on Document Orders
b) Periods of Research Activity Growth or Decline
c) Popularity of Subject Areas
d) Support for Document Acquisition
e) Supplemented and Restricted term selections
f) Automated Primary Document Dissemination
g) Areas and Extent of Classified Documents

10. Establish a policy or directive that Information Access and Availability is a major issue in DTIC customer satisfaction/ dissatisfaction matrix and that all DTIC employees should work to promote better quality access service. Employees should look for means and reasons to provide service rather than hinder or block requests for information.

11. Require EDMS/MAI interface changes to permit the "Table of Contents" to be indexed along with the titles and abstracts to better portray document "aboutness."

12. Establish a Web-based distributed learning center and provide systematic training in information services. Develop specialized in-depth courses to address specific problem areas like indexing, thesaurus development, subject categorization, and database development tools.

13. Encourage Work Group participation in areas of document coding and index enhancement techniques where all parties are beneficiaries. Become the facilitator for better information service connections by targeting conference proceedings and journal articles to disseminate among DTIC user organizations.

14. Identify with efforts to focus on obtaining a useful, valued Subject Categorization Guide as well as a viable active thesaurus for indexing purposes. DTIC needs to change its focus from how much does it cost to what's the best way to obtain improvements and returns on investment. Contracting out this efforts is a more costly option that is not recommended.

15. Provide the software mechanism to effect commonality of data access and data entry for the retrieval(search) fields for all DTIC databases.

# APPENDIX 1

## Subject Categories Field Ratios
## for Years 1960-1997
## Document Summaries by Fields & Groups
## for years 1960-1997

## Subject Categories Field Ratios

| Fld | Name | Rnk | 1960-1970 | Ratio | Rnk | 1970-1980 | Ratio | Rnk | 1980-1990 | Ratio | Rnk | 1990-1997 | Ratio | Rnk | DB Totals | DB Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Aviation Technology | 10 | 26,152 | 4.59% | 11 | 32,210 | 5.21% | 12 | 25,282 | 4.02% | 9 | 27,044 | 4.96% | 11 | **110,688** | 4.93% |
| 2 | Agriculture | 24 | 2,764 | 0.51% | 25 | 1,884 | 0.30% | 21 | 4,088 | 0.65% | 25 | 582 | 0.12% | 25 | **9,318** | 0.41% |
| 3 | Astronomy & Astrophysics | 23 | 3,109 | 0.58% | 24 | 3,021 | 0.48% | 23 | 3,738 | 0.59% | 24 | 1,385 | 0.30% | 24 | **11,253** | 0.50% |
| 4 | Atmospheric Sciences | 19 | 7,629 | 1.42% | 18 | 11,533 | 1.86% | 16 | 10,475 | 1.66% | 19 | 6,338 | 1.40% | 18 | **35,975** | 1.60% |
| 5 | Behavior & Social Sciences | 13 | 20,455 | 3.82% | 10 | 35,629 | 5.77% | 3 | 51,006 | 8.11% | 3 | 42,894 | 9.48% | 6 | **149,989** | 6.68% |
| 6 | Biological & Medical Sciences | 9 | 24,738 | 4.62% | 9 | 35,943 | 5.82% | 6 | 43,836 | 6.97% | 6 | 28,986 | 6.40% | 8 | **133,503** | 5.94% |
| 7 | Chemistry | 14 | 20,O71 | 3.75% | 13 | 25,950 | 0.42% | 5 | 46,364 | 7.38% | 5 | 31,909 | 7.07% | 9 | **124,294** | 5.53% |
| 8 | Earth Sciences & Oceanograph | 8 | 24,813 | 4.64% | 3 | 46,773 | 7.57% | 1 | 79,769 | 12.7% | 13 | 13,596 | 3.00% | 2 | **164,951** | 7.34% |
| 9 | Electrotechnology & Fluidics | 7 | 28,024 | 5.24% | 7 | 37,259 | 6.03% | 13 | 22,550 | 3.58% | 12 | 19,478 | 4.30% | 12 | **107,311** | 4.78% |
| 10 | Power Production & Energy Co | 20 | 6,160 | 1.15% | 22 | 4,737 | 0.76% | 22 | 3,983 | 0.63% | 23 | 2,123 | 0.46% | 21 | **17,003** | 0.76% |
| 11 | Materials | 15 | 20,016 | 3.74% | 12 | 27,784 | 4.50% | 11 | 26,415 | 4.20% | 10 | 21,976 | 4.85% | 13 | **96,191** | 4.28% |
| 12 | Mathematical & Computer Scie | 12 | 20,558 | 3.84% | 6 | 48,656 | 7.76% | 4 | 47,584 | 7.57% | 4 | 36,682 | 8.11% | 5 | **153,480** | 6.83% |
| 13 | Mechanical, In Civil Engineerin | 11 | 22,998 | 4.30% | 8 | 36,821 | 5.96% | 8 | 34,441 | 5.48% | 8 | 24,719 | 5.46% | 10 | **118,979** | 5.30% |
| 14 | Test Equipment, Research Facil | 18 | 10,142 | 1.89% | 16 | 14,406 | 2.33% | 16 | 13,604 | 2.16% | 17 | 7,589 | 1.67% | 17 | **45,741** | 2.04% |
| 15 | Military Sciences | 5 | 34,714 | 6.49% | 4 | 42,337 | 6.73% | 7 | 37,841 | 6.02% | 2 | 43,036 | 9.51% | 3 | **157,928** | 7.03% |
| 16 | Guided Missile Technology | 3 | 47,030 | 8.80% | 14 | 18,926 | 3.06% | 18 | 12,793 | 2.03% | 18 | 6,660 | 1.47% | 14 | **85,409** | 3.80% |
| 17 | Navigation, Detection & Counte | 1 | 51,586 | 9.65% | 2 | 46,430 | 7.52% | 10 | 30,210 | 4.80% | 7 | 26,426 | 5.84% | 4 | **154,652** | 6.88% |
| 18 | Nuclear Science & Technology | 21 | 4,273 | 0.79% | 21 | 5,617 | 0.90% | 25 | 3,010 | 0.47% | 22 | 2,932 | 0.64% | 22 | **15,832** | 0.70% |
| 19 | Ordnance | 4 | 46,645 | 8.72% | 5 | 39,037 | 6.32% | 9 | 30,958 | 4.92% | 11 | 21,237 | 4.69% | 7 | **137,877** | 6.14% |
| 20 | Physics | 2 | 51,062 | 9.55% | 1 | 65,970 | 10.7% | 2 | 55,937 | 8.90% | 1 | 53,381 | 11.8% | 1 | **226,350** | 10.07% |
| 21 | Propulsion, Engines, & Fuels | 6 | 32,014 | 5.99% | 15 | 16,579 | 2.68% | 14 | 14,975 | 2.38% | 14 | 10,019 | 2.21% | 15 | **73,587** | 3.28% |
| 22 | Space Technology | 16 | 15,687 | 2.93% | 20 | 5,785 | 0.93% | 20 | 5,352 | 0.85% | 20 | 4,718 | 1.04% | 19 | **31,542** | 1.40% |
| 23 | Biotechnology | 22 | 3,707 | 0.69% | 19 | 5,787 | 0.93% | 19 | 6,059 | 0.96% | 21 | 4,421 | 0.97% | 20 | **19,974** | 0.89% |
| 24 | Environmental Pollution & Contr | 25 | 312 | 0.05% | 23 | 3,578 | 0.57% | 24 | 3,203 | 0.50% | 16 | 8,267 | 0.68% | 23 | **15,360** | 0.68% |
| 25 | Communications | 17 | 11,325 | 2.11% | 17 | 14,094 | 2.28% | 15 | 14,718 | 2.34% | 15 | 9,363 | 2.07% | 16 | **49,500** | 2.20% |
| **Totals** | | | **515,913** | | | **626,746** | | | **628,191** | | | **455,761** | | | **2,246,687** | |

# DOCUMENT SUMMARY BY FIELDS AND GROUPS FOR YEARS 1960-1997

| FLD | Name | CLASS PER FLD | % CLASS PER FLD | FLD TOTAL ALL GRPS | DB % TOTAL | Rank DB | DOCUMENT ORDERS | TIMES DOCS ORDERED | ORDER RANK |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Aviation Technology | 18,290 | 18% | 110,688 | 4.8% | 11 | 2,892,392 | 26.13 | 8 |
| 2 | Agriculture | 420 | 4.5% | 9,318 | 0.4% | 25 | 125,138 | 13.43 | 23 |
| 3 | Astronomy and Astrophysics | 309 | 3% | 11,253 | 0.5% | 24 | 151,054 | 13.42 | 24 |
| 4 | Atmospheric Sciences | 1,483 | 4% | 35,975 | 2% | 18 | 848,643 | 23.59 | 12 |
| 5 | Behavior & Social Sciences | 8,717 | 6% | 149,984 | 7% | 5 | 5,346,995 | 35.65 | 2 |
| 6 | Biological & Medical Sciences | 3,284 | 2% | 133,503 | 6% | 8 | 1,944,484 | 14.57 | 21 |
| 7 | Chemistry | 3,213 | 4% | 124,320 | 6% | 9 | 1,697,423 | 13.65 | 22 |
| 8 | Earth Sciences & Oceanography | 6,884 | 4% | 164,951 | 7% | 2 | 1,721,669 | 10.44 | 25 |
| 9 | Electrotechnology & Fluidics | 10,629 | 10% | 107,311 | 5% | 12 | 2,787,703 | 25.98 | 9 |
| 10 | Power Production & Energy Conversion (Nonpropulsive) | 2,099 | 12% | 17,003 | 1% | 21 | 324,930 | 19.11 | 18 |
| 11 | Materials | 4,348 | 5% | 96,191 | 4% | 13 | 2,568,587 | 26.70 | 7 |
| 12 | Mathematical & Computer Sciences | 6,943 | 5% | 143,098 | 6% | 6 | 5,719,091 | 39.97 | 1 |
| 13 | Mechanical,Industrial, Civil & Marine Engineering | 12,208 | 10% | 118,979 | 5% | 10 | 2,646,144 | 22.24 | 15 |
| 14 | Test Equipment, Research Facilities & Reprography | 3,323 | 7% | 45,741 | 2% | 17 | 1,124,533 | 24.58 | 11 |
| 15 | Military Sciences | 56,742 | 36% | 158,929 | 7% | 3 | 5,198,985 | 32.71 | 4 |
| 16 | Guided Missile Technology | 36,190 | 42% | 85,409 | 4% | 14 | 1,500,151 | 17.56 | 20 |
| 17 | Navigation, Detection & Countermeasures | 74,940 | 48% | 154,652 | 7% | 4 | 4,529,428 | 29.29 | 5 |
| 18 | Nuclear Science & Technology | 4,807 | 30% | 15,832 | 1% | 23 | 344,421 | 21.75 | 16 |
| 19 | Ordnance | 40,279 | 29% | 137,877 | 6% | 7 | 3,080,396 | 22.34 | 14 |
| 20 | Physics | 15,605 | 7% | 226,350 | 10% | 1 | 5,638,982 | 24.91 | 10 |
| 21 | Propulsion, Engines, & Fuels | 10,773 | 15% | 73,587 | 3% | 15 | 1,293,720 | 17.58 | 19 |
| 22 | Space Technology | 7,412 | 23% | 31,542 | 1% | 19 | 660,236 | 20.93 | 17 |
| 23 | Biotechnology | 1,293 | 6% | 19,974 | 1% | 20 | 688,923 | 34.49 | 3 |
| 24 | Environmental Pollution & Control | 86 | 1% | 15,360 | 1% | 22 | 358,209 | 23.32 | 13 |
| 25 | Communications | 11,189 | 23% | 49,500 | 2% | 16 | 1,432,543 | 28.94 | 6 |
| | **DATABASE TOTALS** | **341,466** | **15.29%** | **2,237,327** | **100.0%** | | **54,624,780** | **24.42** | |

# APPENDIX 2

# PROPOSED SUBJECT FIELD CHANGES

# PROPOSE DTIC SUBJECT FIELDS AND GROUPS CHANGES

| FLD | Present Name | New or Existing Field Name | Proposed Action Or Change |
|---|---|---|---|
| 1 | Aviation Technology | AVIATION TECHNOLOGY | Aviation Technology (No Action) |
| 2 | Agriculture | EARTH SCIENCES | Merge with New Field 8 Earth Sciences AND Biological Sciences |
| 3 | Astronomy and Astrophysics | PHYSICS | Combine Astrophysics with Field 20 Physics |
| | | ASTRONOMY AND SPACE TECHNOLOGY | Combine Astronomy with Field 22 Space Technology |
| 4 | Atmospheric Sciences | ATMOSPHERIC AND OCEAN SCIENCES | Combine with Oceanography with Name Chg to Ocean Sciences |
| 5 | Behavior & Social Sciences | MANAGEMENT SCIENCES AND TECHNOLOGY | Split from Administrative and Management Data (NEW) |
| | | SOCIAL SCIENCES AND PSYCHOLOGY | Expand Social Sciences and add psychology |
| 6 | Biological & Medical Sciences | LIFE SCIENCES | Merge Biological Sciences, Add Health Sciences, Food & Ecology |
| | | MEDICAL AND PHARMACEUTICAL SCIENCES | Combine Medical with Pharmaceutical Sciences (NEW) |
| 7 | Chemistry | CHEMISTRY | Chemistry (No Action) |
| 8 | Earth Sciences and Oceanography | ATMOSPHERIC AND OCEAN SCIENCES | Split Oceanography from Earth Sciences /Allied with Atmospheric Sciences |
| | | EARTH SCIENCES | Merge Agriculture with Earth Sciences |
| 9 | Electrotechnology & Fluidics | ELECTRONICS AND FLUIDICS TECHNOLOGY | Split Electronic Technology From Fluidics and Combine Fluidics with Physi |
| 10 | Power Production and Energy Conversion | POWER PRODUCTION AND ENERGY CONVERSION | Power Production and Energy Conversion(No Action) |
| 11 | Materials | MATERIAL SCIENCES | Material Sciences (Expanded No Action) |
| 12 | Mathematical & Computer Sciences | COMPUTER AND INFORMATION SCIENCES | Split Computers from Mathematics (New Allied Field-Information Sc |
| | | MATHEMATICAL SCIENCES AND MODELING TECHNOLOGY | Mathematical Sciences and Modeling New Field(Expansion) |
| 13 | Mechanical, Indus Civil Engineering | MACHINERY, TOOLING AND PACKAGING TECHNOLOGY | Split Nuts, Bolts, Fastners, Packaging,Equipment, etc from Engineering(NE |
| | | MECHANICAL, INDUSTRIAL, CIVIL, MARINE ENGINEERING | Mechanical, Industrial, Civil and Marine Engineering (SPLIT) |
| 14 | Test Equipment, Research Facilities | TEST EQUIPMENT AND RESEARCH FACILITIES | Test Equipment and Research Facilities (No Action) |
| 15 | Military Sciences | MILITARY SCIENCES AND TECHNOLOGY | Breakout -Defense Systems,Military Forces,Operations, Strategy and Tacti |
| 16 | Guided Missile Technology | GUIDED MISSILE TECHNOLOGY | Guided Missile Technology (No Action) |
| 17 | Navigation, Detection, and Countermeasures | DETECTION, AND COUNTERMEASURES | BREAKOUT Navigation,Split Electronics AND Electronic Equipment |
| 18 | Nuclear Science & Technology | NUCLEAR SCIENCE AND TECHNOLOGY | Nuclear Science and Technology (No Action) |
| 19 | Ordnance | ORDNANCE | Ordnance (No Action) |
| 20 | Physics | PHYSICS | Merge Astrophysics with Physics |
| 21 | Propulsion, Engines, & Fuels | PROPULSION, ENGINES,AND FUELS | Propulsion, Engines, and Fuels (No Action) |
| 22 | Space Technology | ASTRONOMY AND SPACE TECHNOLOGY | Allied with Astronomy |
| 23 | Biotechnology | BIOLOGICAL SCIENCES | Merge with Life Sciences |
| 23 | Environmental Pollution & Control | ENVIRONMENTAL POLLUTION AND CONTROL | Environmental Pollution and Control (Expansion Action) |
| 24 | Communications | COMMUNICATIONS | Communications Technology (Expansion Action) |
| | | ELECTRONICS (TECHNOLOGY) | Re-established Field for Solid State, Optical, (NEW) |
| | | | Electronic Component Technology and Equipment |
| | | NAVIGATION , GUIDANCE AND VEHICLE CONTROL | Breakout from Detection & Countermeasures |

# APPENDIX 3

# TECHNICAL REPORT FIELD DATA

**Technical Reports Subject Fields & Groups for 1960-1997**

**Technical Reports Classified Fields & Groups for 1960-1997**

**Technical Report Document Orders By Field & Group 1960-1997**

# Technical Report Subject Fields & Groups
# 19960-1997

# TECHNICAL REPORT SUBJECT FIELDS & GROUPS

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 1 | | AVIATION TECHNOLOGY | | | | | |
| | 10100 | AERODYNAMICS | 2,496 | 2,430 | 1,538 | 3,374 | **9,838** |
| | 10200 | MILITARY AIRCRAFT OPERATIONS | 858 | 502 | 1,037 | 2,664 | **5,061** |
| | 10300 | AIRCRAFT | 3,290 | 5,324 | 5,772 | 5,082 | **19,468** |
| | 10301 | HELICOPTERS | 1,855 | 3,955 | 2,757 | 2,259 | **10,826** |
| | 10302 | BOMBERS | 2,868 | 2,373 | 1,253 | 1,178 | **7,672** |
| | 10303 | ATTACK & FIGHTER AIRCRAFT | 3,723 | 5,310 | 3,555 | 3,845 | **16,433** |
| | 10304 | PATRO & RECONNAISSANCE AIRCRAFT | 1,393 | 1,768 | 921 | 531 | **4,613** |
| | 10305 | TRANSPORT AIRCRAFT | 1,775 | 1,872 | 1,052 | 1,365 | **6,064** |
| | 10306 | TRAINING AIRCRAFT | 328 | 365 | 272 | 301 | **1,266** |
| | 10307 | V/STOL | 1,280 | 1,510 | 922 | 242 | **3,954** |
| | 10308 | GLIDERS & PARACHUTES | 571 | 630 | 378 | 318 | **1,897** |
| | 10309 | CIVILIAN AIRCRAFT | 794 | 301 | 204 | 147 | **1,446** |
| | 10310 | PILOTLESS AIRCRAFT | 477 | 1,047 | 744 | 356 | **2,624** |
| | 10311 | LIGHTER-THAN-AIR AIRCRAFT | 271 | 285 | 317 | 84 | **957** |
| | 10312 | RESEARCH & EXPERIMENTAL AIRCRAFT | 670 | 312 | 582 | 2,124 | **3,688** |
| | 10400 | FLIGHT CONTROL & INSTRUMENTATION | 1,864 | 1,102 | 1,186 | 1,185 | **5,337** |
| | 10500 | TERMINAL FLIGHT FACILITIES | 1,263 | 2,655 | 2,029 | 1,529 | **7,476** |
| | 10600 | COMMERCIAL & GENERAL AVIATION | 376 | 469 | 763 | 460 | **2,068** |
| | | **TOTALS** | **26,152** | **32,210** | **25,282** | **27,044** | **110,688** |

# TECHNICAL REPORTS SUBJECT FIELD & GROUPS

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 2 | | **AGRICULTURE** | | | | | |
| | 20100 | AGRICULTURAL CHEMISTRY | 371.00 | 185.00 | 556.00 | 169.00 | **1,281.00** |
| | 20200 | AGRICULTURAL ECONOMICS | 403.00 | 191.00 | 580.00 | 56.00 | **1,230.00** |
| | 20300 | AGRICULTURAL ENGINEERING | 375.00 | 237.00 | 565.00 | 43.00 | **67.00** |
| | 20400 | AGRONOMY,HORTICULTURE,AQUICULTURE | 497.00 | 299.00 | 686.00 | 133.00 | **1,615.00** |
| | 20500 | ANIMAL HUSBANDRY AND VETERINARY MEDICINE | 674.00 | 662.00 | 993.00 | 96.00 | **2,425.00** |
| | 20600 | FORESTRY | 444.00 | 310.00 | 708.00 | 85.00 | **70.00** |
| | | **TOTALS** | **2,764.00** | **1,884.00** | **4,088.00** | **582.00** | **9,318.00** |
| 3 | | **ASTRONOMY & ASTROPHYSICS** | | | | | |
| | 30100 | ASTRONOMY | 860 | 482 | 1,167 | 399 | **2,908** |
| | 30200 | ASTROPHYSICS | 2,162 | 2,204 | 1,789 | 875 | **7,030** |
| | 30300 | CELESTIAL MECHANICS | 587 | 335 | 782 | 111 | **1,815** |
| | | **TOTALS** | **3,609** | **3,021** | **3,738** | **1,385** | **11,753** |
| 4 | | **ATMOSPHERIC SCIENCES** | | | | | |
| | 40100 | ATMOSPHERIC PHYSICS | 3,356 | 5,788 | 4,271 | 2,064 | **15,479** |
| | 40200 | METEOROLOGY | 4,273 | 5,745 | 6,204 | 4,274 | **20,496** |
| | | **TOTALS** | **7,629** | **11,533** | **10,475** | **6,338** | **35,975** |

# TECHNICAL RERPORT SUBJECT FIELDS & GROUPS

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 5 | | **BEHAVIOR & SOCIAL SCIENCE** | | | | | |
| | 50100 | ADMINISTRATION & MANAGEMENT | 3,443 | 5,853 | 12,262 | 10,511 | **32,069** |
| | 50200 | INFORMATION SCIENCE | 3,198 | 4,985 | 7,020 | 6,175 | **21,378** |
| | 50300 | ECONOMICS AND COST ANALYSIS | 2,006 | 3,867 | 4,618 | 5,382 | **15,873** |
| | 50400 | GOVERNMENT & POLITICAL SCIENCE | 1,291 | 2,481 | 3,798 | 5,387 | **12,957** |
| | 50500 | SOCIOLOGY & LAW | 1,116 | 1,652 | 2,635 | 1,924 | **7,327** |
| | 50600 | HUMANITIES AND HISTORY | 3,393 | 6,616 | 8,656 | 3,042 | **21,707** |
| | 50700 | LINGUISTICS | 530 | 591 | 724 | 446 | **2,291** |
| | 50800 | PSYCHOLOGY | 4,025 | 6,101 | 5,236 | 3,578 | **18,940** |
| | 50900 | PERSONNEL MANAGEMENT & LABOR RELATIONS | 1,453 | 3,483 | 6,057 | 6,449 | **17,442** |
| | | **TOTALS** | **20,455** | **35,629** | **51,006** | **42,894** | **149,984** |
| 6 | | **BIOLOGICAL & MEDICAL SCIENCES** | | | | | |
| | 60100 | BIOCHEMISTRY | 2,348 | 2,720 | 3,045 | 2,448 | **10,561** |
| | 60200 | GENETIC ENGINEERING & MOLECULAR BIOLOGY | 1 | 1 | 500 | 492 | **994** |
| | 60300 | BIOLOGY | 1,252 | 1,244 | 1,494 | 2,011 | **6,001** |
| | 60400 | ANATOMY & PHYSIOLOGY | 4,927 | 5,477 | 3,744 | 3,932 | **18,080** |
| | 60500 | MEDICINE & MEDICAL RESEARCH | 4,611 | 7,199 | 8,645 | 10,137 | **30,592** |
| | 60600 | ECOLOGY | 47 | 115 | 149 | 723 | **1,034** |
| | 60700 | RADIOBIOLOGY | 1,095 | 1,642 | 1,691 | 925 | **5,353** |
| | 60800 | FOOD, FOOD SERVICE & NUTRITION | 477 | 956 | 644 | 486 | **2,563** |
| | 60900 | HYGGIENE & SANITATION | 130 | 145 | 191 | 84 | **550** |
| | 61000 | STRESS PHYSIOLOGY | 1,149 | 4,074 | 3,152 | 1,222 | **9,597** |
| | 61100 | TOXICOLOGY | 695 | 2,584 | 6,897 | 1,696 | **11,872** |
| | 61200 | MEDICAL FACILITIES, EQUIPMENT & SUPPLIES | 635 | 2,518 | 4,608 | 1,050 | **8,811** |
| | 61300 | MICROBIOLOGY | 3,521 | 3,466 | 2,498 | 1,963 | **11,448** |
| | 61400 | WEAPONS EFFECT(BIOLOGICAL) | 1,027 | 769 | 1,124 | 197 | **3,117** |
| | 61500 | PHARMACOLOGY | 2,823 | 3,033 | 5,454 | 1,620 | **12,930** |
| | | **TOTALS** | **24,738** | **35,943** | **43,836** | **28,986** | **133,503** |

# TECHNICAL REPORT SUBJECT FIELDS & GROUPS

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 7 | | CHEMISTRY | | | | | |
| | 70100 | INDUSTRIAL CHEMISTRY & CHEMICAL PROCESSING | 1,589 | 1,288 | 4,213 | 655 | **7,745** |
| | 70200 | INORGANIC CHEMISTRY | 3,426 | 3,949 | 7,254 | 9,606 | **24,235** |
| | 70300 | ORGANIC CHEMISTRY | 5,106 | 5,236 | 9,140 | 6,073 | **25,555** |
| | 70400 | PHYSICAL CHEMISTRY | 5,649 | 8,237 | 11,250 | 10,674 | **35,810** |
| | 70500 | RADIATION & NUCLEAR CHEMISTRY | 1,903 | 3,417 | 6,319 | 1,222 | **12,861** |
| | 70600 | POLYMER CHEMISTRY | 2,398 | 3,823 | 8,188 | 3,760 | **18,169** |
| | | **TOTALS** | **20,071** | **25,950** | **46,364** | **31,990** | **124,375** |

| FIELD | GROUP | | | | | | |
|---|---|---|---|---|---|---|---|
| 8 | | EARTH SCIENCES & OCEANOGRAPHY | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
| | 80100 | BIOLOGICAL OCEANOGRAPHY | 1,854 | 3,220 | 6,418 | 394 | **11,886** |
| | 80200 | CARTOGRAPHY &AERIAL PHOTOGRAPHY | 2,976 | 4,412 | 7,114 | 1,133 | **15,635** |
| | 80300 | PHYSICAL & DYNAMIC OCEANOGRAPHY | 3,833 | 8,413 | 10,151 | 3,819 | **26,216** |
| | 80400 | GEOMAGNETISM | 1,913 | 2,951 | 6,105 | 209 | **11,178** |
| | 80500 | GEODESY | 1,991 | 3,965 | 7,461 | 700 | **14,117** |
| | 80600 | GEOGRAPHY | 1,357 | 2,718 | 5,871 | 1,572 | **11,518** |
| | 80700 | GEOLOGY,GEOCHEMISTRY & MINERALOGY | 2,662 | 5,017 | 7,179 | 1,280 | **16,138** |
| | 80800 | HYDROLOGY,LIMNOLOGY & POTAMOLOGY | 1,639 | 3,684 | 9,013 | 1,729 | **16,065** |
| | 80900 | MINING ENGINEERING | 1,314 | 2,873 | 5,924 | 144 | **10,255** |
| | 81000 | SOIL MECHANICS | 1,908 | 3,895 | 6,572 | 966 | **13,341** |
| | 81100 | SEISMOLOGY | 2,859 | 4,314 | 6,975 | 846 | **14,994** |
| | 81200 | SNOW, ICE & PERMAFROST | 507 | 1,311 | 986 | 804 | **3,608** |
| | | **TOTALS** | **24,813** | **46,773** | **79,769** | **13,596** | **164,951** |

# TECHNICAL REPORT SUBJECT FIELDS & GROUPS

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 9 | | **ELECTROTECHNOLOGY & FLUIDICS** | | | | | |
| | 90100 | ELECTRICAL & ELECTRONIC EQUIPMENT | 23,259 | 25,268 | 13,597 | 11,408 | **73,532** |
| | 90200 | FLUIDICS & FLUERICS | 272 | 542 | 178 | 68 | **1,060** |
| | 90300 | LASERS & MASERS | 2,925 | 9,080 | 7,150 | 4,407 | **23,562** |
| | 90400 | LINE, SURFACE & BULK ACOUSTIC WAVE DEVICES | 10 | 564 | 327 | 115 | **1,006** |
| | 90500 | ELECTROOPTICAL & OPTOELECTRONIC DEVICES | 1,529 | 1,673 | 965 | 2,558 | **6,725** |
| | 90600 | ACOUSTOOPTIC & OPTOACOUSTIC DEVICES | 1 | 57 | 142 | 330 | **530** |
| | 90700 | ELECTROMAGNETIC SHIELDING | 28 | 75 | 191 | 592 | **886** |
| | | **TOTALS** | **28,024** | **37,259** | **22,550** | **19,478** | **107,311** |

| FIELD | GROUP | POWER PRODUCTION & ENERGY CONVERSION | | | | | |
|---|---|---|---|---|---|---|---|
| 10 | 100100 | NON-ELECTRIC ENERGY CONVERSION | 1,009 | 380 | 330 | 190 | **1,909** |
| | 100200 | ELECTRIC POWER PRODUCTION & DISTRIBUTION | 3,911 | 2,833 | 2,547 | 1,255 | **10,546** |
| | 100300 | ELECTROCHEMICAL ENERGY STORAGE | 1,098 | 1,399 | 956 | 592 | **4,045** |
| | 100400 | ENERGY STORAGE | 142 | 125 | 150 | 86 | **503** |
| | | **TOTALS** | **6,160** | **4,737** | **3,983** | **2,123** | **17,003** |

# TECHNICAL REPORTS SUBJECT FIELDS & GROUPS

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 11 | | **MATERIALS** | | | | | |
| | 110100 | ADHESIVES, SEALS & BINDERS | 566 | 899 | 677 | 729 | **2,871** |
| | 110200 | CERAMICS,REFRACTORIES & GLASS | 1,893 | 2,661 | 2,028 | 2,048 | **8,630** |
| | 110201 | REFRACTORY FIBERS | 213 | 295 | 213 | 286 | **1,007** |
| | 110300 | COATINGS, COLORANTS & FINISHES | 1,283 | 1,966 | 1,772 | 1,881 | **6,902** |
| | 110400 | LAMINATES & COMPOSITE MATERIALS | 1,733 | 3,987 | 4,589 | 6,187 | **16,496** |
| | 110500 | TEXTILES | 620 | 950 | 666 | 470 | **2,706** |
| | 110600 | METALLURGY & METALLOGRAPHY | 3,499 | 4,804 | 4,874 | 2,297 | **15,474** |
| | 110601 | PROPERTIES OF METALS & ALLOYS | 2,256 | 3,189 | 3,199 | 2,818 | **11,462** |
| | 110602 | FABRICATION METALLURGY | 2,689 | 3,224 | 2,890 | 1,022 | **9,825** |
| | 110700 | MISCELLANEOUS MATERIALS | 1,149 | 781 | 415 | 718 | **3,063** |
| | 110800 | LUBRICANTS & HYDRAULIC FLUIDS | 877 | 1,345 | 740 | 547 | **3,509** |
| | 110900 | PLASTICS | 2,212 | 2,594 | 3,277 | 2,083 | **10,166** |
| | 111000 | ELASTOMERS | 663 | 575 | 767 | 537 | **2,542** |
| | 111100 | SOLVENTS, CLEANERS & ABRASIVES | 116 | 129 | 91 | 204 | **540** |
| | 111200 | WOOD, PAPER & RELATED FORESTRY PRODUCTS | 247 | 385 | 217 | 149 | **998** |
| | | **TOTALS** | **20,016** | **27,784** | **26,415** | **21,976** | **96,191** |

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 12 | | **MATHEMATICAL & COMPUTER SCIENCES** | | | | | |
| | 120100 | NUMERICAL MATHEMATICS | 1,651 | 3,855 | 6,504 | 3,140 | **15,150** |
| | 120200 | THEORETICAL MATHEMATICS | 2,623 | 4,997 | 4,073 | 1,063 | **12,756** |
| | 120300 | STATISTICS & PROBABILITY | 2,376 | 6,221 | 7,304 | 2,738 | **18,639** |
| | 120400 | OPERATIONS RESEARCH | 3,170 | 3,580 | 1,650 | 2,156 | **10,556** |
| | 120500 | COMPUTER PROGRAMMING & SOFTWARE | 4,562 | 14,807 | 15,121 | 15,901 | **50,391** |
| | 120600 | COMPUTER HARDWARE | 4,285 | 10,382 | 7,925 | 2,786 | **25,378** |
| | 120700 | COMPUTER SYSTEMS | 547 | 1,543 | 2,277 | 4,426 | **8,793** |
| | 120800 | COMPUTER SYSTEMS MANAGEMENT & STANDARDS | 5 | 276 | 156 | 604 | **1,041** |
| | 120900 | CYBERNETICS | 1,339 | 2,995 | 2,574 | 3,868 | **10,776** |
| | | **TOTALS** | **20,558** | **48,656** | **47,584** | **36,682** | **153,480** |



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# TECHNICAL REPORT SUBJECT FIELDS & GROUPS

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTAL |
|---|---|---|---|---|---|---|---|
| 13 | | MECHANICAL, INDUSTRIAL, CIVIL & MAR E ENGINEERING | | | | | |
| | 130100 | AIR CONDITIONING, HEATING, LIGHTING & VENTILATING | 1,293 | 1,908 | 1,698 | 1,454 | **6,353** |
| | 130200 | CIVIL ENGINEERING | 719 | 4,534 | 8,285 | 2,684 | **16,222** |
| | 130300 | CONSTRUCTION EQUIPMENT, MATERIALS & SUPPLIES | 341 | 1,255 | 1,122 | 640 | **3,358** |
| | 130400 | CONTAINERS AND PACKAGING | 829 | 1,368 | 635 | 1,597 | **4,429** |
| | 130500 | COUPLERS, FASTNERS & JOINTS | 870 | 1,239 | 928 | 731 | **3,768** |
| | 130600 | SURFACE TRANSPORTATION & EQUIPMENT | 1,857 | 2,820 | 2,855 | 1,857 | **9,389** |
| | 130601 | SURFACE EFFECT VEHICLES & AMPHIBIOUS VEHICLES | 411 | 818 | 312 | 82 | **1,623** |
| | 130700 | HYDRAULIC & PNEUMATIC EQUIPMENT | 880 | 989 | 754 | 719 | **3,342** |
| | 130800 | MANUFACTURING & INDUSTRIAL ENGINEERING & CONTROL | 3,069 | 4,255 | 4,216 | 3,273 | **14,813** |
| | 130900 | MACHINERY & TOOLS | 1,348 | 2,490 | 1,786 | 1,502 | **7,126** |
| | 131000 | MARINE ENGINEERING | 4,099 | 7,204 | 5,294 | 4,805 | **21,402** |
| | 131001 | SUBMARINE ENGINEERING | 1,828 | 1,857 | 1,803 | 1,883 | **7,371** |
| | 131100 | PUMPS, FILTERS,PIPES,TUBING,FITTINGS,& VALVES | 2,028 | 1,403 | 864 | 670 | **4,965** |
| | 131200 | SAFETY ENGINEERING | 805 | 1,760 | 1,597 | 1,460 | **5,622** |
| | 131300 | STRUCTURAL ENGINEERING & BUILDING TECHNOLOGY | 2,621 | 2,921 | 2,292 | 1,362 | **9,196** |
| | | | **22,998** | **36,821** | **34,441** | **24,719** | **118,979** |

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTAL |
|---|---|---|---|---|---|---|---|
| 14 | | TEST EQUIPMENT, RESEARCH FACILITIES & REPROGRAPHY | | | | | |
| | 140100 | HOLOGRAPHY | 109 | 314 | 318 | 315 | **1,056** |
| | 140200 | TEST FACILITIES,EQUIPMENT & METHODS | 8,112 | 11,892 | 11,780 | 4,942 | **36,726** |
| | 140300 | RECORDING & PLAYBACK DEVICES | 451 | 575 | 416 | 1,222 | **2,664** |
| | 140400 | PHOTOGRAPHY | 1,150 | 1,270 | 649 | 822 | **3,891** |
| | 140500 | PRINTING & GRAPHIC ARTS | 320 | 355 | 441 | 288 | **1,404** |
| | | **TOTAL** | **10,142** | **14,406** | **13,604** | **7,589** | **45,741** |

# TECHNICAL REPORTS SUBJECT FIELDS & GROUPS

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 15 | | MILITARY SCIENCES | | | | | |
| | 150100 | MILITARY FORCES & ORGANIZATIONS | 35 | 181 | 915 | 6,277 | **7,408** |
| | 150200 | CIVIL DEFENSE | 521 | 577 | 236 | 139 | **1,473** |
| | 150300 | DEFENSE SYSTEMS | 1,302 | 1,869 | 1,762 | 2,553 | **7,486** |
| | 150301 | ANTIMISSILE DEFENSE SYSTEMS | 2,733 | 5,105 | 3,033 | 2,081 | **12,952** |
| | 150302 | ANTIAIRCRAFT DEFENSE SYSTEMS | 2,340 | 1,968 | 797 | 463 | **5,568** |
| | 150303 | ANTISATELLITE DEFENSE SYSTEMS | 160 | 223 | 209 | 101 | **693** |
| | 150400 | MILITARY INTELLIGENCE | 3,844 | 3,262 | 1,857 | 2,072 | **11,035** |
| | 150500 | LOGISTICS,MILITARY FACILITIES & SUPPLIES | 2,592 | 5,264 | 7,568 | 9,882 | **25,306** |
| | 150600 | MILITARY OPERATIONS, STRATEGY & TACTICS | 8,174 | 9,002 | 10,124 | 10,149 | **37,449** |
| | 150601 | NAVAL SURFACE WARFARE | 633 | 1,237 | 1,378 | 1,144 | **4,392** |
| | 150602 | UNDERSEA & ANTISUBMARINE WARFARE | 1,875 | 3,514 | 1,702 | 1,566 | **8,657** |
| | 150603 | CHEMICAL, BIOLOGICAL & RADIOLOGICAL WARF | 6,687 | 7,156 | 5,908 | 4,227 | **23,978** |
| | 150604 | NUCLEAR WARFARE | 1,809 | 1,579 | 1,416 | 886 | **5,690** |
| | 150605 | SPACE WARFARE | 104 | 72 | 128 | 165 | **469** |
| | 150606 | LAND MINE WARFARE | 50 | 88 | 283 | 657 | **1,078** |
| | 150607 | UNCONVENTIONAL WARFARE | 1,855 | 1,240 | 525 | 674 | **4,294** |
| | | **TOTALS** | **34,714** | **42,337** | **37,841** | **43,036** | **157,928** |

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 16 | | GUIDED MISSILE TECHNOLOGY | | | | | |
| | 160100 | GUIDED MISSILE LAUNCHING & BASING SUPPOR | 7,207 | 1,281 | 1,597 | 705 | **10,790** |
| | 160200 | GUIDED MISSILE TRAJECTORIES,ACCURACY & B | 2,892 | 837 | 574 | 524 | **4,827** |
| | 160201 | GUIDED MISSILE DYNAMICS, CONFIGURATIONS | 1,223 | 719 | 440 | 308 | **2,690** |
| | 160300 | GUIDED MISSILE WARHEADS AND FUZES | 4,205 | 1,227 | 724 | 349 | **6,505** |
| | 160400 | GUIDED MISSILES | 15,422 | 2,167 | 2,120 | 1,517 | **21,226** |
| | 160401 | AIR & SPACE-LAUNCHED GUIDED MISSILES | 2,511 | 3,160 | 3,067 | 1,329 | **10,067** |
| | 160402 | SURFACE-LAUNCHED GUIDED MISSILES | 10,248 | 5,541 | 2,922 | 1,414 | **20,125** |
| | 160403 | UNDERWATER-LAUNCHED GUIDED MISSILES | 544 | 693 | 190 | 114 | **1,541** |
| | 160500 | GUIDED MISSILE REENTRY VEHICLES | 2,778 | 3,301 | 1,159 | 400 | **7,638** |
| | | **TOTAL** | **47,030** | **18,926** | **12,793** | **6,660** | **85,409** |

# TECHNICAL REPORT SUBJECT FIELDS & GROUPS

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 17 | | **NAVIGATION, DETECTION & COUNTERMEASURES** | | | | | |
| | 170100 | ACOUSTIC DETECTION &DETECTORS | 5,035 | 7,336 | 3,806 | 3,842 | **20,019** |
| | 170200 | NON-ACOUSTIC & NON-MAGNETIC SUBMARINE D | 1 | 7 | 43 | 47 | **98** |
| | 170300 | DIRECTION FINDING | 915 | 879 | 527 | 164 | **2,485** |
| | 170400 | COUNTERMEASURES | 3,078 | 2,619 | 3,382 | 1,983 | **11,062** |
| | 170401 | RADIO COUNTERMEASURES | 795 | 728 | 423 | 368 | **2,314** |
| | 170402 | ACOUSTIC COUNTERMEASURES | 46 | 209 | 83 | 156 | **494** |
| | 170403 | RADAR COUNTERMEASURES | 4,849 | 2,581 | 1,024 | 992 | **9,446** |
| | 170404 | OPTICAL COUNTERMEASURES | 232 | 1,053 | 919 | 975 | **3,179** |
| | 170500 | OPTICAL DETECTION & DETECTORS | 3,168 | 4,475 | 2,442 | 2,425 | **12,510** |
| | 170501 | INFRARED DETECTION & DETECTORS | 4,617 | 6,249 | 4,215 | 2,867 | **17,948** |
| | 170502 | ULTRAVIOLET DETECTION & DETECTORS | 427 | 288 | 164 | 132 | **1,011** |
| | 170600 | MAGNETIC & ELECTRIC FIELD DETECTION & DETE | 464 | 537 | 447 | 358 | **1,806** |
| | 170700 | NAVIGATION & GUIDANCE | 647 | 834 | 770 | 1,465 | **3,716** |
| | 170701 | LAND & RIVERINE NAVIGATION & GUIDANCE | 154 | 118 | 87 | 170 | **529** |
| | 170702 | UNDERWATER & MARINE NAVIGATION & GUIDAN | 193 | 244 | 180 | 717 | **1,334** |
| | 170703 | AIR NAVIGATION & GUIDANCE | 5,134 | 3,211 | 2,105 | 1,447 | **11,897** |
| | 170704 | SPACE NAVIGATION & GUIDANCE | 930 | 241 | 145 | 158 | **1,474** |
| | 170800 | MISCELLANEOUS DETECTION & DETECTORS | 8 | 15 | 181 | 593 | **797** |
| | 170900 | ACTIVE & PASSIVE RADAR DETECTION & EQUIPM | 20,231 | 13,458 | 8,282 | 5,791 | **47,762** |
| | 171000 | SEISMIC DETECTION &DETECTORS | 537 | 1,204 | 380 | 432 | **2,553** |
| | 171100 | TARGET DIRECTION,RANGE & POSITION FINDING | 125 | 144 | 605 | 1,344 | **2,218** |
| | | **TOTAL** | **51,586** | **46,430** | **30,210** | **26,426** | **154,652** |

# TECHNICAL REPORTS SUBJECT FIELDS & GROUPS

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 18 | | NUCLEAR SCIENCE AND TECHNOLOGY | | | | | |
| | 180100 | FUSION DEVICES (THERMONUCLEAR) | 60 | 245 | 297 | 272 | **874** |
| | 180200 | ISOTOPES | 34 | 35 | 28 | 398 | **495** |
| | 180300 | NUCLEAR EXPLOSI N & DEVICES(NONMILITARY) | 229 | 397 | 144 | 114 | **884** |
| | 180400 | NUCLEAR INSTRUMENTATION | 815 | 659 | 393 | 701 | **2,568** |
| | 180500 | NUCLEAR POWER PLANTS & FUSION REACTOR EN | 382 | 215 | 289 | 219 | **1,105** |
| | 180501 | NUCLEAR FISSION REACTORS(POWER) | 53 | 52 | 107 | 98 | **310** |
| | 180502 | NUCLEAR FISSION REACTOR(NON-POWER) | 82 | 83 | 55 | 17 | **237** |
| | 180600 | NUCLEAR RADIATION SHIELDING,PROTECTION & S | 520 | 1,503 | 858 | 377 | **3,258** |
| | 180700 | RADIOACTIVITY, RADIOACTIVE WASTES & FISSION | 1,717 | 2,088 | 680 | 507 | **4,992** |
| | 180800 | SNAP(SYSTEMS FOR NUCLEAR AUXILIARY POWER) | 75 | 53 | 17 | 36 | **181** |
| | 180900 | FISSION REACTOR PHYSICS | 94 | 107 | 60 | 96 | **357** |
| | 181000 | FISSION REACTOR MATERIALS | 212 | 180 | 82 | 97 | **571** |
| | | **TOTALS** | **4,273** | **5,617** | **3,010** | **2,932** | **15,832** |

# TECHNICAL REPORTS SUBJECT FIELDS & GROUPS

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 19 | | ORDNANCE | | | | | |
| | 190100 | AMMUNITION & EXPLOSIVES | 15,656 | 11,678 | 9,442 | 5,966 | **42,742** |
| | 190101 | PYROTECHNICS | 1,197 | 1,417 | 1,168 | 975 | **4,757** |
| | 190200 | AERIAL BOMBS | 953 | 2,143 | 957 | 890 | **4,943** |
| | 190300 | COMBAT VEHICLES | 1,813 | 2,365 | 3,818 | 1,729 | **9,725** |
| | 190400 | ARMOR | 2,507 | 1,419 | 1,579 | 607 | **6,112** |
| | 190500 | FIRE CONTROL & BOMBING SYSTEMS | 6,075 | 4,459 | 2,391 | 2,048 | **14,973** |
| | 190600 | GUNS | 3,753 | 3,197 | 3,538 | 2,533 | **13,021** |
| | 190700 | ROCKETS | 3,773 | 1,774 | 740 | 635 | **6,922** |
| | 190800 | UNDERWATER ORDNANCE | 1,404 | 622 | 447 | 277 | **2,750** |
| | 190801 | TORPEDOES | 1,288 | 1,312 | 1,013 | 536 | **4,149** |
| | 190900 | EXPLOSIONS | 2,303 | 2,283 | 1,613 | 1,127 | **7,326** |
| | 191000 | BALLISTICS | 2,384 | 3,227 | 1,535 | 1,142 | **8,288** |
| | 191100 | NUCLEAR WEAPONS | 3,498 | 2,851 | 2,113 | 1,896 | **10,358** |
| | 191200 | DIRECTED ENERGY WEAPONS | 21 | 233 | 452 | 516 | **1,222** |
| | 191300 | GUIDED MUNITIONS | 20 | 57 | 152 | 360 | **589** |
| | | **TOTAL** | **46,645** | **39,037** | **30,958** | **21,237** | **137,877** |

# TECHNICAL REPORTS SUBJECT FIELDS & GROUPS

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 20 | | PHYSICS | | | | | |
| | 200100 | ACOUSTICS | 3,132 | 5,951 | 4,081 | 3,622 | **16,786** |
| | 200200 | CRYSTALLOGRAPHY | 2,158 | 2,453 | 2,194 | 2,905 | **9,710** |
| | 200300 | ELECTRICITY & MAGNETISM | 3,145 | 3,545 | 4,534 | 6,214 | **17,438** |
| | 200400 | FLUID MECHANICS | 10,233 | 10,702 | 8,339 | 6,619 | **35,893** |
| | 200500 | ATOMIC & MOLECULAR PHYSICS & SPECTROSCOPY | 4,240 | 6,144 | 4,778 | 5,324 | **20,486** |
| | 200600 | OPTICS | 3,559 | 5,655 | 5,975 | 6,770 | **21,959** |
| | 200601 | FIBER OPTICS & INTEGRATED OPTICS | 142 | 552 | 939 | 1,276 | **2,909** |
| | 200700 | PARTICLE ACCELERATORS | 352 | 577 | 1,346 | 879 | **3,154** |
| | 200800 | NUCLEAR PHYSICS & ELEMENTARY PARTICLE PHYS | 4,378 | 3,258 | 1,872 | 2,054 | **11,562** |
| | 200900 | PLASMA PHYSICS & MAGNETOHYDRODYNAMICS | 2,722 | 3,814 | 2,339 | 1,752 | **10,627** |
| | 201000 | QUANTUM THEORY & RELATIVITY | 1,550 | 1,187 | 882 | 1,033 | **4,652** |
| | 201100 | MECHANICS | 4,780 | 6,616 | 6,860 | 5,070 | **23,326** |
| | 201200 | SOLID STATE PHYSICS | 4,275 | 8,568 | 4,756 | 2,437 | **20,036** |
| | 201300 | THERMODYNAMICS | 2,588 | 2,155 | 1,961 | 3,964 | **10,668** |
| | 201400 | RADIOFREQUENCY WAVE PROPAGATION | 3,616 | 4,149 | 4,149 | 3,048 | **14,962** |
| | 201500 | ELECTROMAGNETIC PULSES | 192 | 644 | 932 | 414 | **2,182** |
| | | **TOTALS** | **51,062** | **65,970** | **55,937** | **53,381** | **226,350** |

# TECHNICAL REPORTS SUBJECT FIELDS & GROUPS

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 21 | | **PROPULSION,ENGINES & FUELS** | | | | | |
| | 210100 | AIR BREATHING ENGINES(UN ONVENTI NAL) | 265 | 97 | 229 | 151 | **742** |
| | 210200 | COMBUSTION & IGNITION | 2,072 | 2,382 | 2,679 | 1,957 | **9,090** |
| | 210300 | ELECTRIC & ION PROPULSION | 285 | 262 | 197 | 229 | **973** |
| | 210400 | FUELS | 1,529 | 1,368 | 1,744 | 1,475 | **6,116** |
| | 210500 | JET & GAS TURBINE ENGINES | 4,717 | 4,981 | 4,155 | 2,830 | **16,683** |
| | 210600 | NUCLEAR PROPULSION | 714 | 101 | 55 | 85 | **955** |
| | 210700 | RECIPROCATING &ROTATING ENGINES | 517 | 599 | 691 | 562 | **2,369** |
| | 210800 | ROCKET ENGINES | 5,500 | 1,056 | 1,174 | 729 | **8,459** |
| | 210801 | LIQUID PROPELLANT ROCKET ENGINES | 2,415 | 683 | 381 | 241 | **3,720** |
| | 210802 | SOLID PROPELLANT ROCKET ENGINES | 3,707 | 2,175 | 1,547 | 547 | **7,976** |
| | 210900 | ROCKET PROPELLANTS | 728 | 288 | 338 | 407 | **1,761** |
| | 210901 | LIQUID ROCKET PROPELLANTS | 3,349 | 611 | 392 | 283 | **4,635** |
| | 210902 | SOLID ROCKET PROPELLANTS | 6,216 | 1,976 | 1,393 | 523 | **10,108** |
| | | **TOTAL** | **32,014** | **16,579** | **14,975** | **10,019** | **73,587** |

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 22 | | **SPACE TECHNOLOGY** | | | | | |
| | 220100 | ASTRONAUTICS | 1,052 | 485 | 961 | 1,189 | **3,687** |
| | 220200 | UNMANNED SPACECRAFT | 7,200 | 3,597 | 3,361 | 2,101 | **16,259** |
| | 220300 | SPACECRAFT TRAJECTORIES & REENTRY | 2,153 | 867 | 542 | 414 | **3,976** |
| | 220400 | GROUND SUPPORT SYSTEMS & FACILITIES F | 3,678 | 349 | 155 | 211 | **4,393** |
| | 220500 | MANNED SPACECRAFT | 1,604 | 487 | 333 | 803 | **3,227** |
| | | **TOTAL** | **15,687** | **5,785** | **5,352** | **4,718** | **31,542** |

# TECHNICAL REPORTS SUBJECT FIELDS & GROUPS

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 23 | | **BIOTECHNOLOGY** | | | | | |
| | 230100 | BIOMEDICAL INSTRUMENTATION & BIOENGINEERIN | 147 | 368 | 164 | 134 | **813** |
| | 230200 | HUMAN FACTORS ENGINEERING & MAN MACHINE S | 1,209 | 2,077 | 2,873 | 1,633 | **7,792** |
| | 230300 | BIONICS | 650 | 762 | 633 | 250 | **2,295** |
| | 230400 | PROTECTIVE EQUIPMENT | 840 | 1,171 | 1,329 | 1,418 | **4,758** |
| | 230500 | LIFE SUPPORT SYSTEMS | 601 | 711 | 519 | 448 | **2,279** |
| | 230600 | ESCAPE, RESCUE & SURVIVAL | 260 | 698 | 541 | 538 | **2,037** |
| | | **TOTALS** | **3,707** | **5,787** | **6,059** | **4,421** | **19,974** |

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 24 | | **ENVIRONMENTAL POLLUTION & CONTROL** | | | | | |
| | 240100 | AIR POLLUTION & CONTROL | 112 | 971 | 548 | 782 | **2,413** |
| | 240200 | NOISE POLLUTION & CONTROL | - | 22 | 55 | 321 | **398** |
| | 240300 | SOLID WASTES POLLUTION & CONTROL | - | 1 | 342 | 2,125 | **2,468** |
| | 240400 | WATER POLLUTION & CONTROL | 115 | 2,005 | 1,529 | 2,727 | **6,376** |
| | 240500 | PESTICIDES POLLUTION & CONTROL | 4 | 85 | 58 | 195 | **342** |
| | 240600 | RADIATION POLLUTION & CONTROL | 17 | 19 | 129 | 321 | **486** |
| | 240700 | ENVIRONMENTAL HEALTH & SAFETY | 64 | 475 | 542 | 1,796 | **2,877** |
| | | **TOTALS** | **312** | **3,578** | **3,203** | **8,267** | **15,360** |

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 25 | | **COMMUNICATIONS** | | | | | |
| | 250100 | TELEMETRY | 1,013 | 547 | 403 | 480 | **2,443** |
| | 250200 | RADIO COMMUNICATIONS | 6,377 | 4,818 | 4,113 | 3,878 | **19,186** |
| | 250300 | NON-RADIO COMMUNICATIONS | 2,605 | 5,558 | 5,267 | 754 | **14,184** |
| | 250400 | VOICE COMMUNICATIONS | 570 | 1,227 | 950 | 548 | **3,295** |
| | 250500 | COMMAND, CONTROL & COMMUNICATIONS SYSTEM | 760 | 1,944 | 3,985 | 3,703 | **10,392** |
| | | **TOTALS** | **11,325** | **14,094** | **14,718** | **9,363** | **49,500** |

# Technical Reports Classified Fields & Groups
# 1960-1997

# TECHNICAL REPORTS CLASSIFIED FIELDS & GROUPS

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 1 | | **AVIATION TECHNOLOGY** | | | | | |
| | 10100 | AERODYNAMICS | 191 | 42 | 79 | 267 | **579** |
| | 10200 | MILITARY AIRCRAFT OPERATIONS | 656 | 105 | 215 | 162 | **1,138** |
| | 10300 | AIRCRAFT | 945 | 248 | 646 | 208 | **1,717** |
| | 10301 | HELICOPTERS | 437 | 520 | 514 | 191 | **1,662** |
| | 10302 | BOMBERS | 1,270 | 707 | 390 | 129 | **2,496** |
| | 10303 | ATTACK & FIGHTER AIRCRAFT | 1,476 | 1,302 | 950 | 425 | **4,158** |
| | 10304 | PATROL & R & RECONNAISSANCE AIRCRAFT | 603 | 477 | 396 | 105 | **1,581** |
| | 10305 | TRANSPORT AIRCRAFT | 290 | 198 | 125 | 57 | **670** |
| | 10306 | TRAINING AIRCRAFT | 100 | 37 | 18 | - | **2,251** |
| | 10307 | V/STOL | 304 | 214 | 118 | 17 | **653** |
| | 10308 | GLIDERS & PARACHUTES | 53 | 35 | 16 | 15 | **119** |
| | 10309 | CIVILIAN AIRCRAFT | 16 | 6 | 8 | 3 | **772** |
| | 10310 | PILOTLESS AIRCRAFT | 107 | 253 | 134 | 41 | **535** |
| | 10311 | LIGHTER-THAN-AIR AIRCRAFT | 36 | 23 | 30 | 8 | **97** |
| | 10312 | RESEARCH & EXPERIMENTAL AIRCRAFT105 | 105 | 22 | 24 | 745 | **632** |
| | 10400 | FLIGHT CONTROL & INSTRUMENTATION | 665 | 63 | 69 | 39 | **836** |
| | 10500 | TERMINAL FLIGHT FACILITIES | 254 | 157 | 127 | 20 | **558** |
| | 10600 | COMMERCIAL & GENERAL AVIATION | 45 | 17 | 16 | 4 | **1,394** |
| | | TOTALS | **7,553** | **4,426** | **3,875** | **2,436** | **18,290** |

# TECHNICAL REPORTS CLASSIFIED FIELDS & GROUPS

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 2 | | AGRICULTURE | | | | | |
| | 20100 | AGRICULTURAL CHEMISTRY | 36 | 13 | 4 | 2 | 55 |
| | 20200 | AGRICULTURAL ECONOMICS | 48 | 16 | 7 | 0 | 71 |
| | 20300 | AGRICULTURAL ENGINEERING | 41 | 17 | 9 | 0 | 67 |
| | 20400 | AGRONOMY,HORTICULTURE,AQUICULTURE | 37 | 17 | 5 | 2 | 61 |
| | 20500 | ANIMAL HUSBANDRY,& VETERINARY MED | 59 | 26 | 11 | 0 | 96 |
| | 20600 | FORESTRY | 43 | 19 | 8 | 0 | 70 |
| | | TOTALS | 264 | 108 | 44 | 4 | 420 |
| 3 | | ASTRONOMY & ASTROPHYSICS | | | | | |
| | 30100 | ASTRONOMY | 64 | 26 | 7 | 3 | 100 |
| | 30200 | ASTROPHYSICS | 79 | 43 | 8 | 5 | 135 |
| | 30300 | CELESTIAL MECHANICS | 49 | 17 | 7 | 1 | 74 |
| | | TOTALS | 192 | 86 | 22 | 9 | 309 |
| 4 | | ATMOSPHERIC SCIENCES | | | | | |
| | 40100 | ATMOSPHERIC PHYSICS | 248 | 408 | 172 | 39 | 867 |
| | 40200 | METEOROLOGY | 358 | 114 | 95 | 49 | 616 |
| | | TOTALS | 606 | 522 | 267 | 88 | 1,483 |

# TECHNICAL REPORT CLASSIFIED FIELDS AND GROUPS

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 5 | | **BEHAVIOR & SOCIAL SCIENCE** | | | | | |
| | 50100 | ADMINISTRATION & MANAGEMENT | 998 | 274 | 599 | 192 | **2,063** |
| | 50200 | INFORMATION SCIENCE | 562 | 1,054 | 709 | 153 | **2,478** |
| | 50300 | ECONOMICS AND COST ANALYSIS | 352 | 402 | 232 | 100 | **1,086** |
| | 50400 | GOVERNMENT & POLITICAL SCIENCE | 347 | 209 | 185 | 216 | **957** |
| | 50500 | SOCIOLOGY & LAW | 167 | 50 | 33 | 11 | **261** |
| | 50600 | HUMANITIES AND HISTORY | 419 | 351 | 167 | 7 | **944** |
| | 50700 | LINGUISTICS | 5 | 4 | 5 | 1 | **15** |
| | 50800 | PSYCHOLOGY | 260 | 63 | 38 | 4 | **365** |
| | 50900 | PERSONNEL MANAGEMENT & LABOR RELATIONS | 281 | 126 | 99 | 42 | **548** |
| | | **TOTALS** | **3,391** | **2,533** | **2,067** | **726** | **8,717** |
| 6 | | **BIOLOGICAL & MEDICAL SCIENCES** | | | | | |
| | 60100 | BIOCHEMISTRY | 96 | 17 | 10 | 9 | **132** |
| | 60200 | GENETIC ENGINEERING & MOLECULAR BIOLOGY | 1 | - | 4 | 2 | **7** |
| | 60300 | BIOLOGY | 53 | 10 | 6 | 3 | **72** |
| | 60400 | ANATOMY & PHYSIOLOGY | 294 | 139 | 31 | 4 | **468** |
| | 60500 | MEDICINE & MEDICAL RESEARCH | 88 | 74 | 63 | 63 | **288** |
| | 60600 | ECOLOGY | 7 | 6 | 1 | - | **14** |
| | 60700 | RADIOBIOLOGY | 96 | 92 | 75 | 18 | **281** |
| | 60800 | FOOD, FOOD SERVICE & NUTRITION | 37 | 3 | 3 | 1 | **44** |
| | 60900 | HYGGIENE & SANITATION | 34 | 1 | 3 | - | **38** |
| | 61000 | STRESS PHYSIOLOGY | 41 | 40 | 36 | 8 | **125** |
| | 61100 | TOXICOLOGY | 98 | 86 | 130 | 42 | **356** |
| | 61200 | MEDICAL FACILITIES, EQUIPMENT & SUPPLIES | 27 | 110 | 55 | 22 | **214** |
| | 61300 | MICROBIOLOGY | 187 | 81 | 52 | 11 | **331** |
| | 61400 | WEAPONS EFFECT(BIOLOGICAL) | 186 | 103 | 77 | 15 | **381** |
| | 61500 | PHARMACOLOGY | 287 | 110 | 111 | 25 | **533** |
| | | **TOTALS** | **1,532** | **872** | **657** | **223** | **3,284** |

# TECHNICAL REPORTS CLASSIFIED FIELDS & GROUPS

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 7 | | CHEMISTRY | | | | | |
| | 70100 | INDUSTRIAL CHEMISTRY & CHEMICAL PROCESSING | 303 | 29 | 17 | 12 | **361** |
| | 70200 | INORGANIC CHEMISTRY | 265 | 133 | 114 | 26 | **538** |
| | 70300 | ORGANIC CHEMISTRY | 558 | 113 | 68 | 30 | **769** |
| | 70400 | PHYSICAL CHEMISTRY | 525 | 115 | 92 | 25 | **757** |
| | 70500 | RADIATION & NUCLEAR CHEMISTRY | 168 | 105 | 35 | 1 | **309** |
| | 70600 | POLYMER CHEMISTRY | 280 | 107 | 80 | 12 | **479** |
| | | **TOTALS** | **2,099** | **602** | **406** | **106** | **3,213** |

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 8 | | EARTH SCIENCES & OCEANOGRAPHY | | | | | |
| | 80100 | BIOLOGICAL OCEANOGRAPHY | 258 | 87 | 95 | 9 | **449** |
| | 80200 | CARTOGRAPHY &AERIAL PHOTOGRAPHY | 787 | 198 | 122 | 97 | **1,204** |
| | 80300 | PHYSICAL & DYNAMIC OCEANOGRAPHY | 559 | 431 | 320 | 155 | **1,465** |
| | 80400 | GEOMAGNETISM | 312 | 115 | 40 | 8 | **475** |
| | 80500 | GEODESY | 224 | 128 | 86 | 7 | **445** |
| | 80600 | GEOGRAPHY | 175 | 111 | 55 | 31 | **372** |
| | 80700 | GEOLOGY,GEOCHEMISTRY & MINERALOGY | 274 | 110 | 64 | 15 | **463** |
| | 80800 | HYDROLOGY,LIMNOLOGY & POTAMOLOGY | 258 | 89 | 45 | 2 | **394** |
| | 80900 | MINING ENGINEERING | 189 | 101 | 75 | 1 | **366** |
| | 81000 | SOIL MECHANICS | 281 | 117 | 49 | 13 | **460** |
| | 81100 | SEISMOLOGY | 444 | 121 | 101 | 20 | **686** |
| | 81200 | SNOW, ICE & PERMAFROST | 16 | 26 | 33 | 30 | **105** |
| | | **TOTALS** | **3,777** | **1,634** | **1,085** | **388** | **6,884** |



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# TECHNICAL REPORTS CLASSIFIED FIELDS & GROUPS

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 9 | | **ELECTROTECHNOLOGY & FLUIDICS** | | | | | |
| | 90100 | ELECTRICAL & ELECTRONIC EQUIPMENT | 4,420 | 1,312 | 525 | 178 | **6,435** |
| | 90200 | FLUIDICS & FLUERICS | 8 | 26 | 2 | - | **36** |
| | 90300 | LASERS & MASERS | 597 | 1,428 | 1,070 | 156 | **3,251** |
| | 90400 | LINE, SURFACE & BULK ACOUSTIC WAVE DEVICES | - | 5 | 4 | 1 | **10** |
| | 90500 | ELECTROOPTICAL & OPTOELECTRONIC DEVICES | 360 | 142 | 75 | 80 | **657** |
| | 90600 | ACOUSTOOPTIC & OPTOACOUSTIC DEVICES | 1 | 2 | 12 | 25 | **40** |
| | 90700 | ELECTROMAGNETIC SHIELDING | 15 | 13 | 34 | 138 | **200** |
| | | **TOTALS** | **5,401** | **2,928** | **1,722** | **578** | **10,629** |

| FIELD | GROU | POWER PRODUCTION & ENERGY CONVERSION | | | | | |
|---|---|---|---|---|---|---|---|
| 10 | 100100 | NON-ELECTRIC ENERGY CONVERSION | 340 | 17 | 4 | 6 | **367** |
| | 100200 | ELECTRIC POWER PRODUCTION & DISTRIBUTION | 1,183 | 121 | 96 | 55 | **1,455** |
| | 100300 | ELECTROCHEMICAL ENERGY STORAGE | 131 | 62 | 19 | 8 | **220** |
| | 100400 | ENERGY STORAGE | 37 | 12 | 8 | - | **57** |
| | | **TOTALS** | **1,691** | **212** | **127** | **69** | **2,099** |

# TECHNICAL REPORTS CLASSIFIED FIELDS & GROUPS

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 11 | | **MATERIALS** | | | | | |
| | 110100 | ADHESIVES, SEALS & BINDERS | 63 | 32 | 18 | 15 | **128** |
| | 110200 | CERAMICS,REFRACTORIES & GLASS | 213 | 80 | 89 | 49 | **431** |
| | 110201 | REFRACTORY FIBERS | 16 | 15 | 5 | 2 | **38** |
| | 110300 | COATINGS, COLORANTS & FINISHES | 126 | 134 | 124 | 66 | **450** |
| | 110400 | LAMINATES & COMPOSITE MATERIALS | 203 | 390 | 328 | 124 | **1,045** |
| | 110500 | TEXTILES | 129 | 28 | 35 | 7 | **199** |
| | 110600 | METALLURGY & METALLOGRAPHY | 310 | 147 | 134 | 68 | **659** |
| | 110601 | PROPERTIES OF METALS & ALLOYS | 122 | 55 | 73 | 35 | **285** |
| | 110602 | FABRICATION METALLURGY | 94 | 66 | 41 | 8 | **209** |
| | 110700 | MISCELLANEOUS MATERIALS | 169 | 45 | 11 | 10 | **235** |
| | 110800 | LUBRICANTS & HYDRAULIC FLUIDS | 52 | 20 | 4 | 2 | **78** |
| | 110900 | PLASTICS | 244 | 74 | 62 | 16 | **396** |
| | 111000 | ELASTOMERS | 100 | 23 | 25 | 6 | **154** |
| | 111100 | SOLVENTS, CLEANERS & ABRASIVES | 4 | 2 | 1 | - | **7** |
| | 111200 | WOOD, PAPER & RELATED FORESTRY PRODUCTS | 30 | 2 | 2 | - | **34** |
| | | **TOTALS** | **1,875** | **1,113** | **952** | **408** | **4,348** |

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 12 | | **MATHEMATICAL & COMPUTER SCIENCES** | | | | | |
| | 120100 | NUMERICAL MATHEMATICS | 93 | 90 | 166 | 14 | **363** |
| | 120200 | THEORETICAL MATHEMATICS | 16 | 40 | 65 | 7 | **128** |
| | 120300 | STATISTICS & PROBABILITY | 96 | 105 | 145 | 27 | **373** |
| | 120400 | OPERATIONS RESEARCH | 887 | 75 | 72 | 39 | **1,073** |
| | 120500 | COMPUTER PROGRAMMING & SOFTWARE | 201 | 1,281 | 854 | 600 | **2,936** |
| | 120600 | COMPUTER HARDWARE | 138 | 769 | 314 | 43 | **1,264** |
| | 120700 | COMPUTER SYSTEMS | 32 | 79 | 111 | 76 | **298** |
| | 120800 | COMPUTER SYSTEMS MANAGEMENT & STANDAR | - | 3 | 7 | 18 | **28** |
| | 120900 | CYBERNETICS | 161 | 207 | 57 | 55 | **480** |
| | | **TOTALS** | **1,624** | **2,649** | **1,791** | **879** | **6,943** |

# TECHNICAL REPORTS CLASSIFIED FIELDS & GROUPS

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTAL |
|---|---|---|---|---|---|---|---|
| 13 | | MECHANICAL, INDUSTRIAL, CIVIL & MAR E ENGINEERING | | | | | |
| | 130100 | AIR CONDITIONING, HEATING, LIGHTING & VENTILATING | 127 | 74 | 50 | 23 | 274 |
| | 130200 | CIVIL ENGINEERING | 114 | 51 | 102 | 22 | 289 |
| | 130300 | CONSTRUCTION EQUIPMENT, MATERIALS & SUPPLIES | 17 | 12 | 25 | 5 | 59 |
| | 130400 | CONTAINERS AND PACKAGING | 60 | 51 | 30 | 10 | 151 |
| | 130500 | COUPLERS, FASTNERS & JOINTS | 53 | 38 | 35 | 13 | 139 |
| | 130600 | SURFACE TRANSPORTATION & EQUIPMENT | 182 | 97 | 95 | 40 | 414 |
| | 130601 | SURFACE EFFECT VEHICLES & AMPHIBIOUS VEHICLES | 62 | 114 | 53 | 4 | 233 |
| | 130700 | HYDRAULIC & PNEUMATIC EQUIPMENT | 45 | 28 | 27 | 27 | 127 |
| | 130800 | MANUFACTURING & INDUSTRIAL ENGINEERING & CONT | 299 | 63 | 89 | 30 | 481 |
| | 130900 | MACHINERY & TOOLS | 81 | 38 | 32 | 15 | 166 |
| | 131000 | MARINE ENGINEERING | 1,269 | 1,166 | 870 | 1,446 | 4,751 |
| | 131001 | SUBMARINE ENGINEERING | 1,159 | 1,057 | 992 | 780 | 3,988 |
| | 131100 | PUMPS, FILTERS,PIPES,TUBING,FITTINGS,& VALVES | 101 | 39 | 23 | 51 | 214 |
| | 131200 | SAFETY ENGINEERING | 83 | 79 | 44 | 32 | 238 |
| | 131300 | STRUCTURAL ENGINEERING & BUILDING TECHNOLOGY | 418 | 16 | 119 | 31 | 684 |
| | | | 4,070 | 3,023 | 2,586 | 2,529 | 12,208 |

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTAL |
|---|---|---|---|---|---|---|---|
| 14 | | TEST EQUIPMENT, RESEARCH FACILITIES & REPROGRAPHY | | | | | |
| | 140100 | HOLOGRAPHY | 11 | 2 | 4 | 7 | 24 |
| | 140200 | TEST FACILITIES,EQUIPMENT & METHODS | 1,266 | 517 | 681 | 136 | 2,600 |
| | 140300 | RECORDING & PLAYBACK DEVICES | 95 | 37 | 17 | 36 | 185 |
| | 140400 | PHOTOGRAPHY | 257 | 86 | 17 | 10 | 370 |
| | 140500 | PRINTING & GRAPHIC ARTS | 120 | 17 | 6 | 1 | 144 |
| | | TOTAL | 1,749 | 659 | 725 | 190 | 3,323 |

# CLASSIFIED FIELDS AND GROUPS

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 15 | | **MILITARY SCIENCES** | | | | | |
| | 150100 | MILITARY FORCES & ORGANIZATIONS | 30 | 54 | 126 | 203 | **413** |
| | 150200 | CIVIL DEFENSE | 93 | 42 | 32 | 13 | **180** |
| | 150300 | DEFENSE SYSTEMS | 1,284 | 1,601 | 1,263 | 676 | **4,824** |
| | 150301 | ANTIMISSILE DEFENSE SYSTEMS | 2,257 | 3,876 | 2,086 | 833 | **9,052** |
| | 150302 | ANTIAIRCRAFT DEFENSE SYSTEMS | 1,568 | 1,267 | 550 | 166 | **3,551** |
| | 150303 | ANTISATELLITE DEFENSE SYSTEMS | 141 | 188 | 169 | 41 | **539** |
| | 150400 | MILITARY INTELLIGENCE | 2,467 | 1,821 | 907 | 523 | **5,718** |
| | 150500 | LOGISTICS,MILITARY FACILITIES & SUPPLIES | 760 | 497 | 708 | 307 | **2,272** |
| | 150600 | MILITARY OPERATIONS, STRATEGY & TACTICS | 3,846 | 2,687 | 3,193 | 1,306 | **11,032** |
| | 150601 | NAVAL SURFACE WARFARE | 366 | 587 | 652 | 591 | **2,196** |
| | 150602 | UNDERSEA & ANTISUBMARINE WARFARE | 1,373 | 2,340 | 1,139 | 874 | **5,726** |
| | 150603 | CHEMICAL, BIOLOGICAL & RADIOLOGICAL WARF | 3,055 | 1,421 | 999 | 416 | **5,891** |
| | 150604 | NUCLEAR WARFARE | 1,556 | 1,095 | 869 | 284 | **3,804** |
| | 150605 | SPACE WARFARE | 89 | 61 | 55 | 43 | **248** |
| | 150606 | LAND MINE WARFARE | 25 | 37 | 77 | 82 | **221** |
| | 150607 | UNCONVENTIONAL WARFARE | 571 | 382 | 95 | 27 | **1,075** |
| | | **TOTALS** | **19,481** | **17,956** | **12,920** | **6,385** | **56,742** |

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 16 | | **GUIDED MISSILE TECHNOLOGY** | | | | | |
| | 160100 | GUIDED MISSILE LAUNCHING & BASING SUPPOR | 2,429 | 311 | 362 | 157 | **3,259** |
| | 160200 | GUIDED MISSILE TRAJECTORIES,ACCURACY & B | 1,275 | 390 | 246 | 164 | **2,075** |
| | 160201 | GUIDED MISSILE DYNAMICS, CONFIGURATIONS | 478 | 182 | 96 | 64 | **820** |
| | 160300 | GUIDED MISSILE WARHEADS AND FUZES | 1,837 | 651 | 379 | 173 | **3,040** |
| | 160400 | GUIDED MISSILES | 4,474 | 841 | 802 | 413 | **6,530** |
| | 160401 | AIR & SPACE-LAUNCHED GUIDED MISSILES | 1,347 | 1,396 | 1,171 | 610 | **4,524** |
| | 160402 | SURFACE-LAUNCHED GUIDED MISSILES | 4,655 | 3,227 | 1,690 | 560 | **10,132** |
| | 160403 | UNDERWATER-LAUNCHED GUIDED MISSILES | 356 | 320 | 99 | 59 | **834** |
| | 160500 | GUIDED MISSILE REENTRY VEHICLES | 1,784 | 2,252 | 754 | 186 | **4,976** |
| | | **TOTAL** | **18,635** | **9,570** | **5,599** | **2,386** | **36,190** |

# TECHNICAL REPORTS CLASSIFIED FIELDS & GROUPS

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 17 | | **NAVIGATION, DETECTION & COUNTERMEASURES** | | | | | |
| | 170100 | ACOUSTIC DETECTION &DETECTORS | 2897 | 3459 | 1763 | 1789 | **9908** |
| | 170200 | NON-ACOUSTIC & NON-MAGNETIC SUBMARINE D | 1 | 6 | 29 | 16 | **52** |
| | 170300 | DIRECTION FINDING | 550 | 291 | 182 | 33 | **1,056** |
| | 170400 | COUNTERMEASURES | 2,297 | 1,481 | 1,873 | 822 | **6,473** |
| | 170401 | RADIO COUNTERMEASURES | 714 | 449 | 246 | 114 | **1,523** |
| | 170402 | ACOUSTIC COUNTERMEASURES | 42 | 169 | 69 | 118 | **398** |
| | 170403 | RADAR COUNTERMEASURES | 4,235 | 1,869 | 675 | 526 | **7,305** |
| | 170404 | OPTICAL COUNTERMEASURES | 190 | 619 | 709 | 570 | **2,088** |
| | 170500 | OPTICAL DETECTION & DETECTORS | 1,455 | 1,725 | 673 | 303 | **4,156** |
| | 170501 | INFRARED DETECTION & DETECTORS | 2,358 | 2,609 | 1,800 | 628 | **7,395** |
| | 170502 | ULTRAVIOLET DETECTION & DETECTORS | 212 | 140 | 64 | 24 | **440** |
| | 170600 | MAGNETIC & ELECTRIC FIELD DETECTION & DETE | 246 | 220 | 160 | 96 | **722** |
| | 170700 | NAVIGATION & GUIDANCE | 549 | 435 | 292 | 168 | **1,444** |
| | 170701 | LAND & RIVERINE NAVIGATION & GUIDANCE | 138 | 85 | 13 | 1 | **237** |
| | 170702 | UNDERWATER & MARINE NAVIGATION & GUIDAN | 159 | 151 | 75 | 428 | **813** |
| | 170703 | AIR NAVIGATION & GUIDANCE | 4,277 | 969 | 715 | 216 | **6,177** |
| | 170704 | SPACE NAVIGATION & GUIDANCE | 537 | 69 | 68 | 20 | **694** |
| | 170800 | MISCELLANEOUS DETECTION & DETECTORS | 7 | 9 | 38 | 68 | **122** |
| | 170900 | ACTIVE & PASSIVE RADAR DETECTION & EQUIPM | 12,044 | 6,227 | 3,059 | 1,595 | **22,925** |
| | 171000 | SEISMIC DETECTION &DETECTORS | 149 | 135 | 67 | 46 | **397** |
| | 171100 | TARGET DIRECTION,RANGE & POSITION FINDING | 123 | 93 | 173 | 226 | **615** |
| | | **TOTAL** | **33,180** | **21,210** | **12,743** | **7,807** | **74,940** |

# TECHNICAL REPORTS CLASSIFIED FIELDS & GROUPS

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 18 | | NUCLEAR SCIENCE AND TECHNOLOGY | | | | | |
| | 180100 | FUSION DEVICES (THERMONUCLEAR) | 2 | 9 | 0 | 1 | **12** |
| | 180200 | ISOTOPES | 19 | 13 | 5 | 10 | **47** |
| | 180300 | NUCLEAR EXPLOSI N & DEVICES(NONMILITARY) | 223 | 370 | 78 | 5 | **676** |
| | 180400 | NUCLEAR INSTRUMENTATION | 286 | 145 | 39 | 43 | **513** |
| | 180500 | NUCLEAR POWER PLANTS & FUSION REACTOR EN | 183 | 8 | 12 | 4 | **207** |
| | 180501 | NUCLEAR FISSION REACTORS(POWER) | 13 | - | 13 | 1 | **27** |
| | 180502 | NUCLEAR FISSION REACTOR(NON-POWER) | 18 | 2 | - | 1 | **21** |
| | 180600 | NUCLEAR RADIATION SHIELDING,PROTECTION & S | 287 | 561 | 326 | 81 | **1,255** |
| | 180700 | RADIOACTIVITY, RADIOACTIVE WASTES & FISSION | 761 | 942 | 181 | 17 | **1,901** |
| | 180800 | SNAP(SYSTEMS FOR NUCLEAR AUXILIARY POWER) | 22 | 2 | 1 | 15 | **40** |
| | 180900 | FISSION REACTOR PHYSICS | 10 | - | - | 1 | **11** |
| | 181000 | FISSION REACTOR MATERIALS | 76 | 3 | - | 18 | **97** |
| | | **TOTALS** | **1,900** | **2,055** | **655** | **197** | **4,807** |

# TECHNICAL REPORTS CLASSIFIED FIELDS & GROUPS

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| **19** | | **ORDNANCE** | | | | | |
| | 190100 | AMMUNITION & EXPLOSIVES | 3,560 | 2,427 | 1,621 | 742 | **8,350** |
| | 190101 | PYROTECHNICS | 327 | 198 | 359 | 184 | **1,068** |
| | 190200 | AERIAL BOMBS | 275 | 516 | 253 | 106 | **1,150** |
| | 190300 | COMBAT VEHICLES | 442 | 525 | 686 | 325 | **1,978** |
| | 190400 | ARMOR | 911 | 242 | 347 | 205 | **1,705** |
| | 190500 | FIRE CONTROL & BOMBING SYSTEMS | 2,574 | 1,455 | 750 | 566 | **5,345** |
| | 190600 | GUNS | 785 | 582 | 560 | 223 | **2,150** |
| | 190700 | ROCKETS | 890 | 338 | 158 | 84 | **1,470** |
| | 190800 | UNDERWATER ORDNANCE | 1,068 | 447 | 256 | 96 | **1,867** |
| | 190801 | TORPEDOES | 985 | 955 | 822 | 329 | **3,091** |
| | 190900 | EXPLOSIONS | 995 | 396 | 348 | 183 | **1,922** |
| | 191000 | BALLISTICS | 643 | 561 | 288 | 210 | **1,702** |
| | 191100 | NUCLEAR WEAPONS | 3,296 | 2,331 | 1,292 | 568 | **7,487** |
| | 191200 | DIRECTED ENERGY WEAPONS | 19 | 161 | 331 | 223 | **734** |
| | 191300 | GUIDED MUNITIONS | 20 | 37 | 80 | 123 | **260** |
| | | **TOTAL** | **16,790** | **11,171** | **8,151** | **4,167** | **40,279** |

# TECHNICAL REPORTS CLASSIFIED FIELDS & GROUPS

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 20 | | PHYSICS | | | | | |
| | 200100 | ACOUSTICS | 987 | 1,434 | 720 | 550 | **3,691** |
| | 200200 | CRYSTALLOGRAPHY | 65 | 15 | 16 | 1 | **97** |
| | 200300 | ELECTRICITY & MAGNETISM | 341 | 165 | 167 | 73 | **746** |
| | 200400 | FLUID MECHANICS | 1,432 | 563 | 477 | 208 | **2,680** |
| | 200500 | ATOMIC & MOLECULAR PHYSICS & SPECTROSCOPY | 54 | 69 | 49 | 12 | **184** |
| | 200600 | OPTICS | 527 | 498 | 465 | 140 | **1,630** |
| | 200601 | FIBER OPTICS & INTEGRATED OPTICS | 9 | 12 | 43 | 40 | **104** |
| | 200700 | PARTICLE ACCELERATORS | 69 | 49 | 108 | 19 | **245** |
| | 200800 | NUCLEAR PHYSICS & ELEMENTARY PARTICLE PHYS | 1,095 | 370 | 89 | 20 | **1,574** |
| | 200900 | PLASMA PHYSICS & MAGNETOHYDRODYNAMICS | 187 | 204 | 63 | 8 | **462** |
| | 201000 | QUANTUM THEORY & RELATIVITY | 32 | 7 | 3 | - | **42** |
| | 201100 | MECHANICS | 113 | 189 | 279 | 56 | **637** |
| | 201200 | SOLID STATE PHYSICS | 155 | 84 | 71 | 9 | **319** |
| | 201300 | THERMODYNAMICS | 168 | 98 | 63 | 79 | **408** |
| | 201400 | RADIOFREQUENCY WAVE PROPAGATION | 908 | 701 | 473 | 155 | **2,237** |
| | 201500 | ELECTROMAGNETIC PULSES | 55 | 151 | 246 | 97 | **549** |
| | | **TOTALS** | **6,197** | **4,609** | **3,332** | **1,467** | **15,605** |

# TECHNICAL REPORTS CLASSIFIED FIELDS & GROUPS

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 21 | | PROPULSION,ENGINES & FUELS | | | | | |
| | 210100 | AIR BREATHING ENGINES(UN ONVENTI NAL) | 68 | 39 | 59 | 32 | **198** |
| | 210200 | COMBUSTION & IGNITION | 215 | 171 | 238 | 105 | **729** |
| | 210300 | ELECTRIC & ION PROPULSION | 59 | 13 | 16 | 4 | **92** |
| | 210400 | FUELS | 150 | 84 | 106 | 60 | **400** |
| | 210500 | JET & GAS TURBINE ENGINES | 966 | 482 | 390 | 383 | **2,221** |
| | 210600 | NUCLEAR PROPULSION | 510 | 18 | 10 | 13 | **551** |
| | 210700 | RECIPROCATING &ROTATING ENGINES | 73 | 22 | 23 | 16 | **134** |
| | 210800 | ROCKET ENGINES | 822 | 322 | 199 | 93 | **1,436** |
| | 210801 | LIQUID PROPELLANT ROCKET ENGINES | 473 | 159 | 85 | 40 | **757** |
| | 210802 | SOLID PROPELLANT ROCKET ENGINES | 806 | 625 | 321 | 67 | **1,819** |
| | 210900 | ROCKET PROPELLANTS | 114 | 85 | 71 | 39 | **309** |
| | 210901 | LIQUID ROCKET PROPELLANTS | 343 | 104 | 60 | 31 | **538** |
| | 210902 | SOLID ROCKET PROPELLANTS | 896 | 362 | 253 | 78 | **1,589** |
| | | TOTAL | **5,495** | **2,486** | **1,831** | **961** | **10,773** |

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 22 | | SPACE TECHNOLOGY | | | | | |
| | 220100 | ASTRONAUTICS | 325 | 41 | 87 | 48 | **501** |
| | 220200 | UNMANNED SPACECRAFT | 2,575 | 873 | 810 | 179 | **4,437** |
| | 220300 | SPACECRAFT TRAJECTORIES & REENTRY | 540 | 106 | 42 | 19 | **707** |
| | 220400 | GROUND SUPPORT SYSTEMS & FACILITIES F | 1,007 | 33 | 18 | 25 | **1,083** |
| | 220500 | MANNED SPACECRAFT | 491 | 125 | 22 | 46 | **684** |
| | | TOTAL | **4,938** | **1,178** | **979** | **317** | **7,412** |

# TECHNICAL REPORTS CLASSIFIED FIELDS & GROUPS

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 23 | | **BIOTECHNOLOGY** | | | | | |
| | 230100 | BIOMEDICAL INSTRUMENTATION & BIOENGINEERIN | 5 | 2 | 1 | 0 | **8** |
| | 230200 | HUMAN FACTORS ENGINEERING & MAN MACHINE S | 135 | 115 | 148 | 36 | **434** |
| | 230300 | BIONICS | 29 | 11 | 8 | 2 | **50** |
| | 230400 | PROTECTIVE EQUIPMENT | 181 | 93 | 62 | 81 | **417** |
| | 230500 | LIFE SUPPORT SYSTEMS | 184 | 19 | 32 | 19 | **254** |
| | 230600 | ESCAPE, RESCUE & SURVIVAL | 55 | 40 | 14 | 21 | **130** |
| | | **TOTALS** | **589** | **280** | **265** | **159** | **1,293** |

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 24 | | **ENVIRONMENTAL POLLUTION & CONTROL** | | | | | |
| | 240100 | AIR POLLUTION & CONTROL | 5 | 9 | 7 | 3 | **24** |
| | 240200 | NOISE POLLUTION & CONTROL | 0 | 1 | 0 | 2 | **3** |
| | 240300 | SOLID WASTES POLLUTION & CONTROL | 0 | 0 | 1 | 2 | **3** |
| | 240400 | WATER POLLUTION & CONTROL | 2 | 9 | 6 | 8 | **25** |
| | 240500 | PESTICIDES POLLUTION & CONTROL | 3 | 1 | 1 | 0 | **5** |
| | 240600 | RADIATION POLLUTION & CONTROL | 8 | 1 | 2 | 3 | **14** |
| | 240700 | ENVIRONMENTAL HEALTH & SAFETY | 0 | 3 | 2 | 7 | **12** |
| | | **TOTALS** | **18** | **24** | **19** | **25** | **86** |

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 25 | | **COMMUNICATIONS** | | | | | |
| | 250100 | TELEMETRY | 225 | 46 | 41 | 28 | **340** |
| | 250200 | RADIO COMMUNICATIONS | 2,647 | 1,060 | 992 | 350 | **5,049** |
| | 250300 | NON-RADIO COMMUNICATIONS | 669 | 813 | 796 | 35 | **2,313** |
| | 250400 | VOICE COMMUNICATIONS | 128 | 174 | 70 | 17 | **389** |
| | 250500 | COMMAND, CONTROL & COMMUNICATIONS SYSTEM | 387 | 786 | 1,367 | 558 | **3,098** |
| | | **TOTALS** | **4,056** | **2,879** | **3,266** | **988** | **11,189** |

# Technical Report Document Orders By Fields & Groups
# 1960-1997

# DOCUMENT ORDERS BY FIELD & GROUPS

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 1 | | **AVIATION TECHNOLOGY** | | | | | |
| | 10100 | AERODYNAMICS | 43,060 | 60,046 | 51,080 | 67,254 | **221,440** |
| | 10200 | MILITARY AIRCRAFT OPERATIONS | 8,714 | 16,072 | 35,410 | 66,927 | **127,123** |
| | 10300 | AIRCRAFT | 56,243 | 185,720 | 221,594 | 110,128 | **573,685** |
| | 10301 | HELICOPTERS | 43,565 | 137,676 | 113,423 | 51,918 | **346,582** |
| | 10302 | BOMBERS | 34,095 | 85,897 | 41,764 | 20,048 | **181,804** |
| | 10303 | ATTACK & FIGHTER AIRCRAFT | 52,102 | 199,475 | 128,240 | 60,553 | **440,370** |
| | 10304 | PATRO & RECONNAISSANCE AIRCRAFT | 21,992 | 59,627 | 34,422 | 10,711 | **126,752** |
| | 10305 | TRANSPORT AIRCRAFT | 29,309 | 55,545 | 35,813 | 23,230 | **143,897** |
| | 10306 | TRAINING AIRCRAFT | 3,429 | 10,217 | 9,758 | 3,891 | **27,295** |
| | 10307 | V/STOL | 26,224 | 46,048 | 29,137 | 5,788 | **107,197** |
| | 10308 | GLIDERS & PARACHUTES | 8,273 | 16,351 | 9,935 | 5,235 | **39,794** |
| | 10309 | CIVILIAN AIRCRAFT | 7,376 | 8,272 | 7,781 | 3,559 | **26,988** |
| | 10310 | PILOTLESS AIRCRAFT | 5,371 | 44,478 | 20,528 | 9,836 | **80,213** |
| | 10311 | LIGHTER-THAN-AIR AIRCRAFT | 4,223 | 10,438 | 7,042 | 1,721 | **23,424** |
| | 10312 | RESEARCH & EXPERIMENTAL AIRCRAFT1 | 8,134 | 10,636 | 12,101 | 45,051 | **75,922** |
| | 10400 | FLIGHT CONTROL & INSTRUMENTATION | 16,516 | 34,148 | 39,812 | 29,405 | **119,881** |
| | 10500 | TERMINAL FLIGHT FACILITIES | 22,635 | 71,436 | 57,646 | 31,078 | **182,795** |
| | 10600 | COMMERCIAL & GENERAL AVIATION | 5,543 | 12,354 | 15,800 | 13,533 | **47,230** |
| | | **TOTALS** | **396,804** | **1,064,436** | **871,286** | **559,866** | **2,892,392** |

# DOCUMENT ORDERS BY FIELD & GROUPS

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 2 | | **AGRICULTURE** | | | | | |
| | 20100 | AGRICULTURAL CHEMISTRY | 6,957 | 4,084 | 4,654 | 3,101 | **18,796** |
| | 20200 | AGRICULTURAL ECONOMICS | 7,330 | 4,585 | 3,606 | 907 | **16,428** |
| | 20300 | AGRICULTURAL ENGINEERING | 6,141 | 7,344 | 4,696 | 686 | **18,867** |
| | 20400 | AGRONOMY,HORTICULTURE,AQUICULTURE | 7,735 | 7,098 | 6,686 | 2,291 | **23,810** |
| | 20500 | ANIMAL HUSBANDRY,& VETERINARY MED | 8,817 | 10,225 | 6,799 | 1,395 | **27,236** |
| | 20600 | FORESTRY | 5,198 | 6,812 | 6,244 | 1,747 | **20,001** |
| | | **TOTALS** | **42,178** | **40,148** | **32,685** | **10,127** | **125,138** |
| 3 | | **ASTRONOMY & ASTROPHYSICS** | | | | | |
| | 30100 | ASTRONOMY | 7,181 | 8,943 | 12,726 | 8,328 | **37,178** |
| | 30200 | ASTROPHYSICS | 21,180 | 25,796 | 30,142 | 17,296 | **94,414** |
| | 30300 | CELESTIAL MECHANICS | 5,228 | 6,045 | 5,751 | 2,438 | **19,462** |
| | | **TOTALS** | **33,589** | **40,784** | **48,619** | **28,062** | **151,054** |
| 4 | | **ATMOSPHERIC SCIENCES** | | | | | |
| | 40100 | ATMOSPHERIC PHYSICS | 51,784 | 130,170 | 138,750 | 26,790 | **347,494** |
| | 40200 | METEOROLOGY | 66,705 | 135,213 | 189,901 | 109,330 | **501,149** |
| | | **TOTALS** | **118,489** | **265,383** | **328,651** | **136,120** | **848,643** |

# DOCUMENT ORDERS BY FIELD & GROUPS

| FIELD | GROUP | NAME | DATABASE RANGES | | | | |
|---|---|---|---|---|---|---|---|
| | | | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
| 5 | | **BEHAVIOR & SOCIAL SCIENCE** | | | | | |
| | 50100 | ADMINISTRATION & MANAGEMENT | 115,105 | 273,118 | 606,443 | 343,279 | **1,337,945** |
| | 50200 | INFORMATION SCIENCE | 137,443 | 172,616 | 282,658 | 202,031 | **794,748** |
| | 50300 | ECONOMICS AND COST ANALYSIS | 83,516 | 155,997 | 172,270 | 160,513 | **572,296** |
| | 50400 | GOVERNMENT & POLITICAL SCIENCE | 38,467 | 91,050 | 115,150 | 163,401 | **408,068** |
| | 50500 | SOCIOLOGY & LAW | 34,007 | 48,499 | 82,646 | 56,677 | **221,829** |
| | 50600 | HUMANITIES AND HISTORY | 95,264 | 247,524 | 337,110 | 86,663 | **766,561** |
| | 50700 | LINGUISTICS | 20,114 | 18,179 | 30,325 | 12,298 | **80,916** |
| | 50800 | PSYCHOLOGY | 98,159 | 168,153 | 208,862 | 103,428 | **578,602** |
| | 50900 | PERSONNEL MANAGEMENT & LABOR RELATIONS | 34,338 | 118,982 | 231,475 | 201,235 | **586,030** |
| | | **TOTALS** | **656,413** | **1,294,118** | **2,066,939** | **1,329,525** | **5,346,995** |
| 6 | | **BIOLOGICAL & MEDICAL SCIENCES** | | | | | |
| | 60100 | BIOCHEMISTRY | 16,584 | 27,642 | 59,586 | 67,409 | **171,221** |
| | 60200 | GENETIC ENGINEERING & MOLECULAR BIOLOGY | 9 | 15 | 10,632 | 9,775 | **20,431** |
| | 60300 | BIOLOGY | 13,593 | 14,997 | 33,102 | 39,747 | **101,439** |
| | 60400 | ANATOMY & PHYSIOLOGY | 50,428 | 70,849 | 92,838 | 86,711 | **300,826** |
| | 60500 | MEDICINE & MEDICAL RESEARCH | 39,691 | 78,527 | 156,255 | 189,705 | **464,178** |
| | 60600 | ECOLOGY | 662 | 1,612 | 3,600 | 16,558 | **22,432** |
| | 60700 | RADIOBIOLOGY | 13,262 | 36,070 | 43,205 | 17,787 | **110,324** |
| | 60800 | FOOD, FOOD SERVICE & NUTRITION | 4,247 | 11,389 | 13,689 | 9,585 | **38,910** |
| | 60900 | HYGGIENE & SANITATION | 1,198 | 1,449 | 4,398 | 1,354 | **8,399** |
| | 61000 | STRESS PHYSIOLOGY | 19,070 | 47,404 | 73,664 | 32,349 | **172,487** |
| | 61100 | TOXICOLOGY | 7,386 | 33,370 | 68,927 | 40,063 | **149,746** |
| | 61200 | MEDICAL FACILITIES, EQUIPMENT & SUPPLIES | 8,377 | 24,697 | 20,012 | 23,357 | **76,443** |
| | 61300 | MICROBIOLOGY | 31,431 | 31,140 | 33,658 | 31,981 | **128,210** |
| | 61400 | WEAPONS EFFECT(BIOLOGICAL) | 7,210 | 11,238 | 14,387 | 5,229 | **38,064** |
| | 61500 | PHARMACOLOGY | 13,644 | 29,372 | 69,039 | 29,319 | **141,374** |
| | | **TOTALS** | **226,792** | **419,771** | **696,992** | **600,929** | **1,944,484** |

# DOCUMENTS ORDERS BY FIELD & GROUPS

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 7 | | CHEMISTRY | | | | | |
| | 70100 | INDUSTRIAL CHEMISTRY & CHEMICAL PROCESSING | 8,854 | 22,839 | 26,154 | 12,080 | 69,927 |
| | 70200 | INORGANIC CHEMISTRY | 21,050 | 48,059 | 78,462 | 208,744 | 356,315 |
| | 70300 | ORGANIC CHEMISTRY | 30,402 | 62,575 | 106,292 | 132,051 | 331,320 |
| | 70400 | PHYSICAL CHEMISTRY | 56,260 | 113,043 | 179,000 | 242,182 | 590,485 |
| | 70500 | RADIATION & NUCLEAR CHEMISTRY | 14,941 | 27,570 | 38,977 | 23,807 | 105,295 |
| | 70600 | POLYMER CHEMISTRY | 18,542 | 47,315 | 86,779 | 91,445 | 244,081 |
| | | TOTALS | 150,049 | 321,401 | 515,664 | 710,309 | 1,697,423 |

| FIELD | GROUP | | | | | | |
|---|---|---|---|---|---|---|---|
| 8 | | EARTH SCIENCES & OCEANOGRAPHY | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
| | 80100 | BIOLOGICAL OCEANOGRAPHY | 16,268 | 26,110 | 35,957 | 9,134 | 87,469 |
| | 80200 | CARTOGRAPHY &AERIAL PHOTOGRAPHY | 38,295 | 61,180 | 60,524 | 24,791 | 184,790 |
| | 80300 | PHYSICAL & DYNAMIC OCEANOGRAPHY | 61,582 | 134,260 | 161,648 | 104,970 | 462,460 |
| | 80400 | GEOMAGNETISM | 11,110 | 21,811 | 23,886 | 4,705 | 61,512 |
| | 80500 | GEODESY | 14,992 | 31,940 | 47,700 | 12,836 | 107,468 |
| | 80600 | GEOGRAPHY | 5,617 | 19,221 | 15,335 | 41,524 | 81,697 |
| | 80700 | GEOLOGY,GEOCHEMISTRY & MINERALOGY | 25,537 | 53,608 | 53,405 | 28,423 | 160,973 |
| | 80800 | HYDROLOGY,LIMNOLOGY & POTAMOLOGY | 11,849 | 32,146 | 97,589 | 42,564 | 184,148 |
| | 80900 | MINING ENGINEERING | 5,890 | 20,702 | 16,802 | 2,783 | 46,177 |
| | 81000 | SOIL MECHANICS | 16,855 | 40,888 | 39,403 | 24,697 | 121,843 |
| | 81100 | SEISMOLOGY | 23,469 | 42,376 | 47,886 | 20,944 | 134,675 |
| | 81200 | SNOW, ICE & PERMAFROST | 9,468 | 26,264 | 33,245 | 19,480 | 88,457 |
| | | TOTALS | 240,932 | 510,506 | 633,380 | 336,851 | 1,721,669 |

# DOCUMENT ORDERS BY FIELD & GROUPS

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 9 | | **ELECTROTECHNOLOGY & FLUIDICS** | | | | | |
| | 90100 | ELECTRICAL & ELECTRONIC EQUIPMENT | 299,620 | 585,029 | 477,220 | 302,052 | **1,663,921** |
| | 90200 | FLUIDICS & FLUERICS | 7,858 | 13,578 | 4,522 | 1,757 | **27,715** |
| | 90300 | LASERS & MASERS | 84,384 | 346,726 | 280,493 | 131,033 | **842,636** |
| | 90400 | LINE, SURFACE & BULK ACOUSTIC WAVE DEVICES | 439 | 16,462 | 12,572 | 2,806 | **31,840** |
| | 90500 | ELECTROOPTICAL & OPTOELECTRONIC DEVICES | 24,445 | 50,513 | 36,593 | 64,988 | **176,539** |
| | 90600 | ACOUSTOOPTIC & OPTOACOUSTIC DEVICES | 7 | 1,929 | 5,910 | 8,623 | **16,469** |
| | 90700 | ELECTROMAGNETIC SHIELDING | 496 | 5,643 | 7,558 | 14,447 | **28,144** |
| | | **TOTALS** | **417,249** | **1,019,880** | **824,868** | **525,706** | **2,787,703** |

| FIELD | GROUP | POWER PRODUCTION & ENERGY CONVERSION | | | | | |
|---|---|---|---|---|---|---|---|
| 10 | 100100 | NON-ELECTRIC ENERGY CONVERSION | 8,630 | 11,633 | 10,879 | 4,322 | **35,464** |
| | 100200 | ELECTRIC POWER PRODUCTION & DISTRIBUTION | 37,389 | 62,512 | 69,703 | 25,898 | **195,502** |
| | 100300 | ELECTROCHEMICAL ENERGY STORAGE | 17,046 | 28,226 | 25,053 | 12,118 | **82,443** |
| | 100400 | ENERGY STORAGE | 568 | 3,800 | 4,919 | 2,234 | **11,521** |
| | | **TOTALS** | **63,633** | **106,171** | **110,554** | **44,572** | **324,930** |

# DOCUMENTS ORDERED BY FIELD & GROUPS

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 11 | | **MATERIALS** | | | | | |
| | 110100 | ADHESIVES, SEALS & BINDERS | 8,912 | 23,472 | 21,790 | 16,036 | **70,210** |
| | 110200 | CERAMICS,REFRACTORIES & GLASS | 34,925 | 74,513 | 75,060 | 52,472 | **236,970** |
| | 110201 | REFRACTORY FIBERS | 6,100 | 10,607 | 7,606 | 5,823 | **30,136** |
| | 110300 | COATINGS, COLORANTS & FINISHES | 22,321 | 53,025 | 60,385 | 45,062 | **180,793** |
| | 110400 | LAMINATES & COMPOSITE MATERIALS | 57,199 | 149,135 | 206,630 | 176,493 | **589,457** |
| | 110500 | TEXTILES | 9,272 | 24,086 | 20,527 | 10,151 | **64,036** |
| | 110600 | METALLURGY & METALLOGRAPHY | 62,621 | 120,563 | 127,510 | 59,290 | **369,984** |
| | 110601 | PROPERTIES OF METALS & ALLOYS | 46,533 | 82,984 | 102,377 | 70,617 | **302,511** |
| | 110602 | FABRICATION METALLURGY | 51,266 | 81,049 | 77,364 | 26,062 | **235,741** |
| | 110700 | MISCELLANEOUS MATERIALS | 19,640 | 20,263 | 12,517 | 15,922 | **68,342** |
| | 110800 | LUBRICANTS & HYDRAULIC FLUIDS | 13,212 | 24,283 | 20,824 | 12,288 | **70,607** |
| | 110900 | PLASTICS | 37,743 | 71,427 | 107,380 | 47,183 | **263,733** |
| | 111000 | ELASTOMERS | 10,570 | 14,540 | 21,487 | 11,239 | **57,836** |
| | 111100 | SOLVENTS, CLEANERS & ABRASIVES | 1,093 | 2,044 | 2,332 | 4,463 | **9,932** |
| | 111200 | WOOD, PAPER & RELATED FORESTRY PRODUCTS | 2,836 | 5,917 | 7,098 | 2,448 | **18,299** |
| | | **TOTALS** | **384,243** | **757,908** | **870,887** | **555,549** | **2,568,587** |

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 12 | | **MATHEMATICAL & COMPUTER SCIENCES** | | | | | |
| | 120100 | NUMERICAL MATHEMATICS | 32,855 | 102,889 | 246,413 | 86,606 | **468,763** |
| | 120200 | THEORETICAL MATHEMATICS | 45,093 | 92,966 | 160,704 | 27,984 | **326,747** |
| | 120300 | STATISTICS & PROBABILITY | 65,966 | 160,598 | 286,650 | 77,241 | **590,455** |
| | 120400 | OPERATIONS RESEARCH | 96,585 | 96,250 | 74,901 | 66,847 | **334,583** |
| | 120500 | COMPUTER PROGRAMMING & SOFTWARE | 197,724 | 610,963 | 778,478 | 506,098 | **2,093,263** |
| | 120600 | COMPUTER HARDWARE | 178,115 | 393,437 | 405,724 | 80,435 | **1,057,711** |
| | 120700 | COMPUTER SYSTEMS | 41,868 | 67,963 | 122,715 | 142,451 | **374,997** |
| | 120800 | COMPUTER SYSTEMS MANAGEMENT & STANDAR | 355 | 14,588 | 9,200 | 20,222 | **44,365** |
| | 120900 | CYBERNETICS | 47,828 | 115,601 | 131,538 | 133,240 | **428,207** |
| | | **TOTALS** | **706,389** | **1,655,255** | **2,216,323** | **1,141,124** | **5,719,091** |

# DOCUMENTS ORDERED BY FIELD & GROUPS

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTAL |
|---|---|---|---|---|---|---|---|
| 13 | | MECHANICAL, INDUSTRIAL, CIVIL & MAR E ENGINEERING | | | | | |
| | 130100 | AIR CONDITIONING, HEATING, LIGHTING & VENTILATING | 16,658 | 38,578 | 42,210 | 27,143 | **124,589** |
| | 130200 | CIVIL ENGINEERING | 12,437 | 88,804 | 207,367 | 60,719 | **369,327** |
| | 130300 | CONSTRUCTION EQUIPMENT, MATERIALS & SUPPLIES | 5,377 | 20,669 | 25,517 | 14,164 | **65,727** |
| | 130400 | CONTAINERS AND PACKAGING | 10,928 | 25,506 | 14,304 | 25,543 | **76,281** |
| | 130500 | COUPLERS, FASTNERS & JOINTS | 9,951 | 26,977 | 21,623 | 13,284 | **71,835** |
| | 130600 | SURFACE TRANSPORTATION & EQUIPMENT | 21,432 | 51,374 | 61,643 | 35,793 | **170,242** |
| | 130601 | SURFACE EFFECT VEHICLES & AMPHIBIOUS VEHICLES | 10,272 | 22,033 | 8,790 | 1,733 | **42,828** |
| | 130700 | HYDRAULIC & PNEUMATIC EQUIPMENT | 10,249 | 20,504 | 17,405 | 12,633 | **60,791** |
| | 130800 | MANUFACTURING & INDUSTRIAL ENGINEERING & CONT | 68,951 | 129,694 | 151,019 | 85,247 | **434,911** |
| | 130900 | MACHINERY & TOOLS | 18,919 | 41,670 | 43,476 | 28,705 | **132,770** |
| | 131000 | MARINE ENGINEERING | 67,238 | 171,067 | 153,607 | 96,175 | **488,087** |
| | 131001 | SUBMARINE ENGINEERING | 22,942 | 50,608 | 50,235 | 34,917 | **158,702** |
| | 131100 | PUMPS, FILTERS,PIPES,TUBING,FITTINGS,& VALVES | 15,915 | 17,899 | 16,740 | 10,283 | **60,837** |
| | 131200 | SAFETY ENGINEERING | 18,072 | 47,471 | 53,289 | 35,221 | **154,053** |
| | 131300 | STRUCTURAL ENGINEERING & BUILDING TECHNOLOGY | 47,641 | 72,310 | 78,672 | 36,541 | **235,164** |
| | | **TOTALS** | **356,982** | **825,164** | **945,897** | **518,101** | **2,646,144** |

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTAL |
|---|---|---|---|---|---|---|---|
| 14 | | TEST EQUIPMENT, RESEARCH FACILITIES & REPROGRAPHY | | | | | |
| | 140100 | HOLOGRAPHY | 8,669 | 10,555 | 10,858 | 7,225 | **37,307** |
| | 140200 | TEST FACILITIES,EQUIPMENT & METHODS | 111,975 | 287,138 | 391,898 | 125,468 | **916,479** |
| | 140300 | RECORDING & PLAYBACK DEVICES | 6,831 | 12,709 | 12,579 | 14,055 | **46,174** |
| | 140400 | PHOTOGRAPHY | 25,590 | 29,767 | 17,767 | 15,627 | **88,751** |
| | 140500 | PRINTING & GRAPHIC ARTS | 4,745 | 9,121 | 15,349 | 6,607 | **35,822** |
| | | **TOTALS** | **157,810** | **349,290** | **448,451** | **168,982** | **1,124,533** |

# DOCUMENT ORDERS BY FIELDS & GROUPS

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 15 | | **MILITARY SCIENCES** | | | | | |
| | 150100 | MILITARY FORCES & ORGANIZATIONS | 683 | 6,354 | 39,402 | 222,145 | **268,584** |
| | 150200 | CIVIL DEFENSE | 11,456 | 16,519 | 10,659 | 3,967 | **42,601** |
| | 150300 | DEFENSE SYSTEMS | 23,220 | 83,741 | 63,919 | 74,692 | **245,572** |
| | 150301 | ANTIMISSILE DEFENSE SYSTEMS | 46,213 | 187,271 | 120,334 | 50,325 | **404,143** |
| | 150302 | ANTIAIRCRAFT DEFENSE SYSTEMS | 30,366 | 94,352 | 35,132 | 11,858 | **171,708** |
| | 150303 | ANTISATELLITE DEFENSE SYSTEMS | 2,666 | 13,717 | 11,695 | 2,502 | **30,580** |
| | 150400 | MILITARY INTELLIGENCE | 56,137 | 156,488 | 81,365 | 59,152 | **353,142** |
| | 150500 | LOGISTICS,MILITARY FACILITIES & SUPPLIES | 71,751 | 202,840 | 333,948 | 283,203 | **891,742** |
| | 150600 | MILITARY OPERATIONS, STRATEGY & TACTICS | 197,793 | 413,640 | 498,929 | 337,903 | **1,448,265** |
| | 150601 | NAVAL SURFACE WARFARE | 17,925 | 57,744 | 56,262 | 25,930 | **157,861** |
| | 150602 | UNDERSEA & ANTISUBMARINE WARFARE | 35,455 | 144,713 | 64,997 | 32,066 | **277,231** |
| | 150603 | CHEMICAL, BIOLOGICAL & RADIOLOGICAL WARF | 79,107 | 103,102 | 199,395 | 108,892 | **490,496** |
| | 150604 | NUCLEAR WARFARE | 32,302 | 61,067 | 63,082 | 21,140 | **177,591** |
| | 150605 | SPACE WARFARE | 1,377 | 3,831 | 6,777 | 5,329 | **17,314** |
| | 150606 | LAND MINE WARFARE | 1,644 | 4,591 | 10,359 | 17,464 | **34,058** |
| | 150607 | UNCONVENTIONAL WARFARE | 74,007 | 56,642 | 32,097 | 25,351 | **188,097** |
| | | **TOTALS** | **682,102** | **1,606,612** | **1,628,352** | **1,281,919** | **5,198,985** |

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 16 | | **GUIDED MISSILE TECHNOLOGY** | | | | | |
| | 160100 | GUIDED MISSILE LAUNCHING & BASING SUPPOR | 39,346 | 33,655 | 52,032 | 15,345 | **140,378** |
| | 160200 | GUIDED MISSILE TRAJECTORIES,ACCURACY & B | 19,649 | 27,237 | 21,619 | 10,664 | **79,169** |
| | 160201 | GUIDED MISSILE DYNAMICS, CONFIGURATIONS | 12,861 | 21,347 | 14,036 | 6,393 | **54,637** |
| | 160300 | GUIDED MISSILE WARHEADS AND FUZES | 26,056 | 35,027 | 22,973 | 6,745 | **90,801** |
| | 160400 | GUIDED MISSILES | 78,493 | 81,895 | 88,105 | 34,077 | **282,570** |
| | 160401 | AIR & SPACE-LAUNCHED GUIDED MISSILES | 42,240 | 129,470 | 91,137 | 29,157 | **292,004** |
| | 160402 | SURFACE-LAUNCHED GUIDED MISSILES | 99,488 | 178,513 | 100,057 | 27,743 | **405,801** |
| | 160403 | UNDERWATER-LAUNCHED GUIDED MISSILES | 7,220 | 20,774 | 6,668 | 2,112 | **36,774** |
| | 160500 | GUIDED MISSILE REENTRY VEHICLES | 25,804 | 85,327 | 37,989 | 6,886 | **156,006** |
| | | **TOTAL** | **351,157** | **613,245** | **396,627** | **139,122** | **1,500,151** |

# DOCUMENTS ORDERED BY FIELDS & GROUPS

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 17 | | NAVIGATION, DETECTION & COUNTERMEASURES | | | | | |
| | 170100 | ACOUSTIC DETECTION &DETECTORS | 82,219 | 249,088 | 132,984 | 80,323 | **544,614** |
| | 170200 | NON-ACOUSTIC & NON-MAGNETIC SUBMARINE D | 19 | 480 | 2,171 | 1,363 | **4,033** |
| | 170300 | DIRECTION FINDING | 10,478 | 34,321 | 21,537 | 3,795 | **70,131** |
| | 170400 | COUNTERMEASURES | 34,359 | 130,339 | 141,094 | 46,104 | **351,896** |
| | 170401 | RADIO COUNTERMEASURES | 12,706 | 38,373 | 21,001 | 9,470 | **81,550** |
| | 170402 | ACOUSTIC COUNTERMEASURES | 1,058 | 9,067 | 2,676 | 2,541 | **15,342** |
| | 170403 | RADAR COUNTERMEASURES | 66,109 | 125,043 | 43,210 | 20,138 | **254,500** |
| | 170404 | OPTICAL COUNTERMEASURES | 6,451 | 61,855 | 36,144 | 20,086 | **124,536** |
| | 170500 | OPTICAL DETECTION & DETECTORS | 69,831 | 194,069 | 101,730 | 66,181 | **431,811** |
| | 170501 | INFRARED DETECTION & DETECTORS | 77,837 | 290,851 | 191,302 | 80,289 | **640,279** |
| | 170502 | ULTRAVIOLET DETECTION & DETECTORS | 9,794 | 12,062 | 7,226 | 3,480 | **32,562** |
| | 170600 | MAGNETIC & ELECTRIC FIELD DETECTION & DETE | 8,058 | 20,992 | 15,591 | 7,332 | **51,973** |
| | 170700 | NAVIGATION & GUIDANCE | 8,718 | 33,028 | 31,665 | 38,593 | **112,004** |
| | 170701 | LAND & RIVERINE NAVIGATION & GUIDANCE | 2,436 | 4,651 | 4,038 | 5,883 | **17,008** |
| | 170702 | UNDERWATER & MARINE NAVIGATION & GUIDAN | 2,026 | 7,119 | 6,707 | 13,904 | **29,756** |
| | 170703 | AIR NAVIGATION & GUIDANCE | 51,675 | 117,600 | 83,695 | 38,757 | **291,727** |
| | 170704 | SPACE NAVIGATION & GUIDANCE | 10,006 | 7,020 | 6,038 | 4,594 | **27,658** |
| | 170800 | MISCELLANEOUS DETECTION & DETECTORS | 197 | 549 | 5,744 | 14,930 | **21,420** |
| | 170900 | ACTIVE & PASSIVE RADAR DETECTION & EQUIPM | 249,458 | 523,871 | 361,942 | 153,095 | **1,288,366** |
| | 171000 | SEISMIC DETECTION &DETECTORS | 11,540 | 30,705 | 13,592 | 10,399 | **66,236** |
| | 171100 | TARGET DIRECTION,RANGE & POSITION FINDING | 2,011 | 6,111 | 24,028 | 39,876 | **72,026** |
| | | **TOTALS** | **716,986** | **1,897,194** | **1,254,115** | **661,133** | **4,529,428** |

# DOCUMENT ORDERS BY FIELD AND GROUPS

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 18 | | NUCLEAR SCIENCE AND TECHNOLOGY | | | | | |
| | 180100 | FUSION DEVICES (THERMONUCLEAR) | 867 | 3,931 | 8,722 | 4,861 | **18,381** |
| | 180200 | ISOTOPES | 273 | 516 | 488 | 6,341 | **7,618** |
| | 180300 | NUCLEAR EXPLOSI N & DEVICES(NONMILITARY) | 2,425 | 10,802 | 4,854 | 2,875 | **20,956** |
| | 180400 | NUCLEAR INSTRUMENTATION | 8,298 | 10,711 | 8,741 | 10,226 | **37,976** |
| | 180500 | NUCLEAR POWER PLANTS & FUSION REACTOR EN | 4,031 | 3,522 | 7,082 | 3,973 | **18,608** |
| | 180501 | NUCLEAR FISSION REACTORS(POWER) | 440 | 838 | 2,348 | 1,663 | **5,289** |
| | 180502 | NUCLEAR FISSION REACTOR(NON-POWER) | 619 | 1,386 | 1,112 | 291 | **3,408** |
| | 180600 | NUCLEAR RADIATION SHIELDING,PROTECTION & S | 7,466 | 48,059 | 33,952 | 8,162 | **97,639** |
| | 180700 | RADIOACTIVITY, RADIOACTIVE WASTES & FISSION | 31,008 | 56,407 | 22,122 | 9,135 | **118,672** |
| | 180800 | SNAP(SYSTEMS FOR NUCLEAR AUXILIARY POWER) | 1,330 | 1,042 | 376 | 531 | **3,279** |
| | 180900 | FISSION REACTOR PHYSICS | 899 | 1,184 | 1,375 | 1,429 | **4,887** |
| | 181000 | FISSION REACTOR MATERIALS | 1,830 | 2,493 | 2,012 | 1,373 | **7,708** |
| | | **TOTALS** | **59,486** | **140,891** | **93,184** | **50,860** | **344,421** |

# DOCUMENT ORDERS BY FIELDS & GROUPS

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 19 | | ORDNANCE | | | | | |
| | 190100 | AMMUNITION & EXPLOSIVES | 137,577 | 312,343 | 282,627 | 130,074 | **862,621** |
| | 190101 | PYROTECHNICS | 17,261 | 34,854 | 33,987 | 17,574 | **103,676** |
| | 190200 | AERIAL BOMBS | 22,941 | 57,570 | 26,178 | 16,686 | **123,375** |
| | 190300 | COMBAT VEHICLES | 24,515 | 82,920 | 130,938 | 40,181 | **278,554** |
| | 190400 | ARMOR | 23,132 | 44,627 | 50,933 | 15,196 | **133,888** |
| | 190500 | FIRE CONTROL & BOMBING SYSTEMS | 44,376 | 166,850 | 89,725 | 48,107 | **349,058** |
| | 190600 | GUNS | 34,164 | 91,489 | 92,065 | 56,671 | **274,389** |
| | 190700 | ROCKETS | 28,951 | 42,614 | 21,945 | 12,662 | **106,172** |
| | 190800 | UNDERWATER ORDNANCE | 8,897 | 19,472 | 11,471 | 5,702 | **45,542** |
| | 190801 | TORPEDOES | 12,064 | 34,631 | 25,527 | 7,191 | **79,413** |
| | 190900 | EXPLOSIONS | 40,219 | 70,146 | 59,486 | 29,843 | **199,694** |
| | 191000 | BALLISTICS | 40,607 | 101,798 | 55,641 | 28,958 | **227,004** |
| | 191100 | NUCLEAR WEAPONS | 48,649 | 80,085 | 64,822 | 45,464 | **239,020** |
| | 191200 | DIRECTED ENERGY WEAPONS | 336 | 13,836 | 16,123 | 12,355 | **42,650** |
| | 191300 | GUIDED MUNITIONS | 717 | 3,010 | 3,793 | 7,820 | **15,340** |
| | | **TOTALS** | **484,406** | **1,156,245** | **965,261** | **474,484** | **3,080,396** |

# DOCUMENT ORDERS BY FIELD & GROUPS

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 20 | | PHYSICS | | | | | |
| | 200100 | ACOUSTICS | 65,328 | 167,175 | 149,586 | 95,384 | **477,473** |
| | 200200 | CRYSTALLOGRAPHY | 28,531 | 49,154 | 67,619 | 71,643 | **216,947** |
| | 200300 | ELECTRICITY & MAGNETISM | 40,417 | 85,216 | 149,056 | 145,710 | **420,399** |
| | 200400 | FLUID MECHANICS | 148,858 | 257,541 | 301,189 | 174,532 | **882,120** |
| | 200500 | ATOMIC & MOLECULAR PHYSICS & SPECTROSCOPY | 45,700 | 94,908 | 189,179 | 127,438 | **457,225** |
| | 200600 | OPTICS | 73,707 | 171,716 | 226,272 | 191,180 | **662,875** |
| | 200601 | FIBER OPTICS & INTEGRATED OPTICS | 3,833 | 22,045 | 39,290 | 30,969 | **96,137** |
| | 200700 | PARTICLE ACCELERATORS | 3,516 | 11,012 | 39,394 | 19,927 | **73,849** |
| | 200800 | NUCLEAR PHYSICS & ELEMENTARY PARTICLE PHYS | 36,285 | 49,718 | 52,826 | 36,769 | **175,598** |
| | 200900 | PLASMA PHYSICS & MAGNETOHYDRODYNAMICS | 30,826 | 63,361 | 74,767 | 34,816 | **203,770** |
| | 201000 | QUANTUM THEORY & RELATIVITY | 9,803 | 17,447 | 26,433 | 26,753 | **80,436** |
| | 201100 | MECHANICS | 114,173 | 166,615 | 242,948 | 131,399 | **655,135** |
| | 201200 | SOLID STATE PHYSICS | 65,062 | 164,425 | 171,337 | 69,498 | **470,322** |
| | 201300 | THERMODYNAMICS | 40,896 | 49,498 | 65,850 | 96,749 | **252,993** |
| | 201400 | RADIOFREQUENCY WAVE PROPAGATION | 55,523 | 128,437 | 174,686 | 80,219 | **438,865** |
| | 201500 | ELECTROMAGNETIC PULSES | 2,998 | 24,771 | 36,197 | 10,872 | **74,838** |
| | | **TOTALS** | **765,456** | **1,523,039** | **2,006,629** | **1,343,858** | **5,638,982** |

# DOCUMENT ORDERS BY FIELD & GROUPS

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 21 | | **PROPULSION,ENGINES & FUELS** | | | | | |
| | 210100 | AIR BREATHING ENGINES(UN ONVENTI NAL) | 3,669 | 2,408 | 6,615 | 3,598 | **16,290** |
| | 210200 | COMBUSTION & IGNITION | 30,551 | 59,314 | 82,671 | 47,522 | **220,058** |
| | 210300 | ELECTRIC & ION PROPULSION | 4,249 | 5,510 | 7,451 | 5,895 | **23,105** |
| | 210400 | FUELS | 13,400 | 35,124 | 52,146 | 28,864 | **129,534** |
| | 210500 | JET & GAS TURBINE ENGINES | 48,978 | 121,703 | 114,101 | 56,073 | **340,855** |
| | 210600 | NUCLEAR PROPULSION | 3,740 | 2,397 | 3,049 | 1,756 | **10,942** |
| | 210700 | RECIPROCATING &ROTATING ENGINES | 4,735 | 11,281 | 14,571 | 7,006 | **37,593** |
| | 210800 | ROCKET ENGINES | 29,553 | 27,588 | 28,151 | 15,550 | **100,842** |
| | 210801 | LIQUID PROPELLANT ROCKET ENGINES | 22,447 | 15,981 | 9,532 | 4,661 | **52,621** |
| | 210802 | SOLID PROPELLANT ROCKET ENGINES | 33,750 | 49,229 | 38,038 | 13,018 | **134,035** |
| | 210900 | ROCKET PROPELLANTS | 9,192 | 6,767 | 8,778 | 8,740 | **33,477** |
| | 210901 | LIQUID ROCKET PROPELLANTS | 26,926 | 15,353 | 10,063 | 5,445 | **57,787** |
| | 210902 | SOLID ROCKET PROPELLANTS | 42,389 | 48,406 | 34,119 | 11,667 | **136,581** |
| | | **TOTAL** | **273,579** | **401,061** | **409,285** | **209,795** | **1,293,720** |

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 22 | | **SPACE TECHNOLOGY** | | | | | |
| | 220100 | ASTRONAUTICS | 11,974 | 10,287 | 37,702 | 28,339 | **88,302** |
| | 220200 | UNMANNED SPACECRAFT | 80,183 | 125,483 | 141,089 | 52,870 | **399,625** |
| | 220300 | SPACECRAFT TRAJECTORIES & REENTRY | 21,987 | 18,742 | 19,857 | 10,335 | **70,921** |
| | 220400 | GROUND SUPPORT SYSTEMS & FACILITIES F | 25,405 | 7,608 | 6,244 | 4,659 | **43,916** |
| | 220500 | MANNED SPACECRAFT | 18,136 | 10,393 | 10,120 | 18,823 | **57,472** |
| | | **TOTAL** | **157,685** | **172,513** | **215,012** | **115,026** | **660,236** |

# DOUCMENT ORDERS BY FIELD & GROUPS

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 23 | | **BIOTECHNOLOGY** | | | | | |
| | 230100 | BIOMEDICAL INSTRUMENTATION & BIOENGINEERIN | 2,870 | 7,356 | 5,491 | 3,072 | **18,789** |
| | 230200 | HUMAN FACTORS ENGINEERING & MAN MACHINE S | 46,180 | 91,058 | 162,392 | 56,840 | **356,470** |
| | 230300 | BIONICS | 27,726 | 28,256 | 43,013 | 7,512 | **106,507** |
| | 230400 | PROTECTIVE EQUIPMENT | 11,853 | 26,176 | 39,275 | 33,801 | **111,105** |
| | 230500 | LIFE SUPPORT SYSTEMS | 9,981 | 11,936 | 14,474 | 8,844 | **45,235** |
| | 230600 | ESCAPE, RESCUE & SURVIVAL | 4,277 | 17,004 | 17,351 | 12,185 | **50,817** |
| | | **TOTALS** | **102,887** | **181,786** | **281,996** | **122,254** | **688,923** |

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 24 | | **ENVIRONMENTAL POLLUTION & CONTROL** | | | | | |
| | 240100 | AIR POLLUTION & CONTROL | 3,221 | 24,759 | 16,424 | 18,479 | **62,883** |
| | 240200 | NOISE POLLUTION & CONTROL | - | 926 | 1,596 | 7,884 | **10,406** |
| | 240300 | SOLID WASTES POLLUTION & CONTROL | - | 28 | 6,987 | 47,595 | **54,610** |
| | 240400 | WATER POLLUTION & CONTROL | 2,643 | 43,024 | 39,488 | 61,446 | **146,601** |
| | 240500 | PESTICIDES POLLUTION & CONTROL | 66 | 874 | 1,259 | 4,666 | **6,865** |
| | 240600 | RADIATION POLLUTION & CONTROL | 220 | 281 | 3,656 | 6,257 | **10,414** |
| | 240700 | ENVIRONMENTAL HEALTH & SAFETY | 1,612 | 7,617 | 13,338 | 43,863 | **66,430** |
| | | **TOTALS** | **7,762** | **77,509** | **82,748** | **190,190** | **358,209** |

| FIELD | GROUP | NAME | 1960-1970 | 1970-1980 | 1980-1990 | 1990-1997 | TOTALS |
|---|---|---|---|---|---|---|---|
| 25 | | **COMMUNICATIONS** | | | | | |
| | 250100 | TELEMETRY | 13,493 | 13,887 | 11,717 | 13,724 | **52,821** |
| | 250200 | RADIO COMMUNICATIONS | 98,799 | 173,511 | 160,147 | 98,720 | **531,177** |
| | 250300 | NON-RADIO COMMUNICATIONS | 55,278 | 206,859 | 26,277 | 20,085 | **308,499** |
| | 250400 | VOICE COMMUNICATIONS | 14,328 | 46,537 | 42,924 | 16,444 | **120,233** |
| | 250500 | COMMAND, CONTROL & COMMUNICATIONS SYSTEM | 15,897 | 95,099 | 193,627 | 115,190 | **419,813** |
| | | **TOTALS** | **197,795** | **535,893** | **434,692** | **264,163** | **1,432,543** |

# APPENDIX 4

# NEW FIELD AND GROUP CHART
# FIELD & GROUP MAPPING CHART

# Proposed Changes to Subject Categories (Adkins)

01/00/00 **Aviation Technology**
01/01 Aerodynamics
01/02 Military Aircraft Operations
01/03 Aircraft
01/03/01 Helicopters
01/03/02 Bombers
01/03/03 Attack and Fighter Aircraft
01/03/04 Patrol & Reconnaissance Aircraft
01/03/05 Transport Aircraft
01/03/06 Training Aircraft
01/03/07 V/STOL
01/03/08 Gliders and Parachutes
01/03/09 Civilian Aircraft
01/03/10 Pilotless Aircraft
01/03/11 Lighter-than-Air Aircraft
01/03/12 Research and Experimental Aircraft
01/04 Flight Control and Instrumentation
01/05 Terminal Flight Facilities
01/06 Commercial and General Aviation

02a **Earth Sciences**
02/ Agriculture
02/01 Agricultural Chemistry
02/02 Agricultural Economics
02/03 Agricultural Engineering
02/04 Agronomy, Horticulture and Aquiculture
02/05 Animal Husbandry and Veterinary Medicine
02/06 Forestry

08/04 Geomagnetism
08/05 Geodesy
08/06 Geography
08/07 Geology Geochemistry and Mineralogy
08/08 Hydrology, Limnology and Potamology
08/09 Mining Engineering
08/10 Soil Mechanics
08/11 Seismology
08/12 Snow, Ice and Permafrost

03a/00 **Space Technology and Astronomy**
22/00 Space Technology
22/01 Astronautics
22/02 Unmanned Spacecraft
22/03 Spacecraft Trajectories and Reentry
22/04 Ground Support Systems and Facilities for Space Vehicles
22/05 Manned Spacecraft

03/01 Astronomy
03/03 Celestial Mechanics

**Life Sciences**
23/01 Biomedical Instrumentation and Bioengineering
23/02 Human Factor Engineering and Man Machine Systems
23/03 Bionics
Biotechnology
23/04 Protective Equipment
23/05 Life Support Systems
23/06 Bioscience
06/01 Biochemistry
06/02 Genetic Engineering and Molecular Biology
06/03 Biology
06/06 Ecology
06/07 Radiobiology
06/08 Food, Food Service and Nutrition

04a **Atmospheric and Ocean Sciences**
04/00 Atmospheric Sciences
04/01 Atmospheric Physics
04/02 Meteorology

**Oceanology**
08/01 Biological Oceanography
08/03 Physical and Dynamic Oceanography

05b **Social Sciences and Psychology**
05/04 Government and Political Science
05/05 Sociology and Law
05/06 Humanities and History
05/07 Behavior Sciences
05/08 Psychology

**Management Sciences and Technology**
Management Sciences
05/01 Administration and Management
05/03 Economics and Cost Analysis
05/09 Personnel Management and Labor Relations

06a **Medical and Pharmaceutical Sciences**
06/05 Medicine and Medical Research
06/09 Hygiene and Sanitation
06/10 Stress Physiology
06/11 Toxicology
06/12 Medical Facilities, Equipment and Supplies
06/13 Microbiology
06/14 Weapons Effects (Biological)
06/15 Pharmacology
Anatomy and Physiology

07 **Chemistry**
07/0 Industrial Chemistry and Chemical Processing
07/02 Inorganic Chemistry
07/03 Organic Chemistry
07/04 Physical Chemistry
07/05 Radiation and Nuclear Chemistry
07/06 Polymer Chemistry

10 **Power Production and Energy Conversion (Nonpropulsive)**
10/01 Non-electrical Energy Conversion
10/02 Electric Power Production and Distribution
10/03 Electrochemical Energy Storage
10/04 Energy Storage

12a **Mathematical Sciences and Modeling Technology**
12/01 Numerical Mathematics
12/02 Theoretical Mathematics
12/03 Statistics and Probability
12/04 Operations Research
Models
Mathematical Models

11 **Materials Sciences and Technology**
11/01 Adhesives, Seals and Binders
11/02 Ceramics, Refractories and Glass
11/02/01 Refractory Fibers
11/03 Coatings, Colorants and Finishes
11/04 Laminates and Composite Materials
11/05 Textiles
11/06 Metallurgy and Metallography
11/06/01 Properties of Metals and Alloys
11/06/02 Fabrication Metallurgy
11/07 Miscellaneous Materials
11/08 Lubricants and Hydraulic Fluids
11/09 Plastics
11/10 Elastomers and Rubber
11/11 Solvents, Cleaners and Abrasives
11/12 Wood, Paper and Related Forestry Products

12b **Computers and Information Systems**
05/01 Information Systems Technology
05/02 Information Sciences
Information Systems
05/07 Linguistics
12/05 Computer Programming and Software
12/06 Computer Hardware
12/07 Computer Systems/Computer Networking Technology
12/08 Computer Systems Management and Standards
12/09 Cybernetics
12/10 Decision Support System Technology
12/11 Knowledge Base and Expert Systems

13 **Mechanical, Industrial, Civil and Marine Engineering**
13/01 Systems and Subsystems Engineering
13/02 Civil Engineering
13/08 Manufacturing and Industrial Engineering and Control of Production Systems
13/10 Marine Engineering
13/10/01 Submarine Engineering
13/12 Safety Engineering
13/13 Structural Engineering and Building Technology

13a **Machinery, Tooling, and Packaging Technology**
13/01 Air Conditioning, Heating, Lighting and Ventilating
13/03 Construction Equipment, Materials and Supplies
13/04 Containers and Packaging
13/05 Couplers, Fasteners and Joints
13/06 Surface Transportation and Equipment
13/07 Hydraulic and Pneumatic Equipment
13/09 Machinery and Tools
13/10 Metal Working and Machining Technology
13/11 Pumps, Filters, Pipes, Tubing, Fittings and Valves

14 **Test Equipment, Research Facilities and Reprography**

14/01 Holography
14/02 Test Facilitie, Equipment and Methods
14/03 Recording and Playback Devices
14/04 Photography
14/05 Printing and Graphic Arts
08/02 Cartography and Aerial Photography

15 **Military Sciences**
15/01 Military Forces and Organizations
15/02 Civil Defense
15/03 Defense Systems
15/03/01 Antimissile Defense Systems
15/03/02 Antiaircraft Defense Systems
15/03/03 Antisatellite Defense Systems
15/04 Military Intelligence
15/05 Logistics, Military Facilities and Supplies
15/06 Military Operations Strategy and Tactics
15/06/01 Naval Surface Warfare
15/06/02 Undersea and Antisubmarine Warfare
15/06/03 Chemical, Biological and Radiological Warfare
15/06/04 Nuclear Warfare
15/06/05 Space Warfare
15/06/06 Land Mine Warfare
15/06/07 Unconventional Warfare

17 **Detection and Countermeasures**
17/01 Acoustic Detection and Detectors
17/02 Non-acoustic and Non-magnetic Submarine Detection
17/03 Direction Finding
17/04 Countermeasures
17/04/01 Radio Countermeasures
17/04/02 Acoustic Countermeausres
17/04/03 Radar Countermeasures
17/04/04 Optical Countermeasures
17/05 Optical Detection and Detectors
17/05/01 Infrared Detection and Detectors
17/05/02 Ultraviolet Detection and Detectors
17/06 Magnetic and Electric Field Detection and Detectors

17a **Navigation, Guidance and Vehicles Control Technology**
17/07 Navigation and Guidance
17/07/01 Land and Riverine Navigation and Guidance
17/07/02 Underwater and Marine Navigation and Guidance
17/07/03 Air Navigation and Guidance
17/07/04 Space Navigation and Guidance
17/08 Miscellaneous Detection and Detectors
17/09 Active and Passive Radar Detection and Equipment
17/10 Seismic Detection and Detectors
17/11 Target Direction, Range and Position Finding

16. **Guided Missile Technology**
16/01 Guided Missile Launching and Basing Support
16/02 Guided Missile Trajectories, Accuracy and Ballistics
16/02/01 Guided Missile Dynamics, Configurations and Control Surfaces
16/03 Guided Missile Warheads and Fuses
16/04 Guided Missiles
16/04/01 Air-and-Space-Launched Guided Missiles
16/04/02 Surface-Launched Guided Missiles
16/04/03 Underwater-Launched Guided Missiles
16/05 Guided Missile Reentry Vehicles

17b **Electronics and Optical (Technology)**
09/01 Electrical and Electronic Equipment
Electrical Component Technology
09/03 Lasers and Masers
09/04 Line, Surface and Bulk Acoustic Wave Devices
09/05 Electrooptical and Optoelectronic Devices
09/06 Acoustooptic and Optoacoustic
09/07 Electromagnetic Shielding
20/06 Optics
20/06/01 Fiber Optics and Integrated Optics
20/12 Solid State Physics
Semiconductor Technology
Magnetic and Optical Storage Technology

18 **Nuclear Science and Technology**
18/01 Fusion Devices (Thermonuclear)
18/02 Isotopes
18/03 Nuclear Explosions and Devices (Non-Military)
18/04 Nuclear Instrumentation
18/05 Nuclear Power Plants and Fission Reactor Engineering
18/05/01 Nuclear Fission Reactors (Power)
18/05/02 Nuclear Fission Reactors (Non-Power)
18/06 Nuclear Radiation Shielding, Protection and Safety
18/07 Radioactivity, Radioactive Wastes and Fission Products
18/08 SNAP (Systems for Nuclear Auxiliary Power) Technology
18/09 Fission Reactor Physics
18/10 Fission Reactor Materials
18/11 Fission Material Enrichment Technology

19 **Ordnance**
19/01 Ammunition
19/01/01 Pyrotechnics
19/02 Aerial Bombs
19/03 Combat Vehicles
19/04 Armor
19/05 Fire Control and Bombing Systems
19/06 Guns
19/07 Rockets
19/08 Underwater Ordnance
19/08/01 Torpedoes
19/09 Explosions
19/10 Ballistics
19/11 Nuclear Weapons
19/12 Directed Energy Weapons
19/13 Guided Munitions

20a **Physics and Astrophysics**
20/01 Acoustics
20/02 Crystallography
20/03 Electricity and Magnetism
20/04 Fluid Mechanics
20/05 Atomic and Molecular Physics and Spectroscopy
20/07 Particle Accelerators
20/08 Nuclear Physics and Elementary Particle Physics
20/09 Plasma Physics and agnetohydrodynamics
20/10 Quantum Theory and Relativity
20/11 Mechanics
20/13 Thermodynamics
20/14 Radiofrequency Wave Propagation
20/15 Electromagnetic Pulses
03/02 Astrophysics
09/02 Fluidics and Fluerics

21 **Propulsion, Engines and Fuels Technology**
21/01 Air Breathing Engines (Unconventional)
21/02 Combustion and Ignition
21/03 Electric and Ion Propulsion
21/04 Fuels
21/05 Jet and Gas Turbine Engines
21/06 Nuclear Propulsion
21/07 Reciprocating and Rotating Engines
21/08 Rocket Engines
21/08/01 Liquid Propellant Rocket Engines
21/08/02 Solid Propellant Rocket Engines
21/09 Rocket Propellants
21/09/01 Liquid Rocket Propellants
21/09/02 Solid Rocket Propellants

24 **Environmental Pollution and Control**
24/01 Air Pollution and Control
24/02 Noise Pollution and Control
24/03 Solid Wastes and Pollution and Control
24/04 Water Pollution and Control
24/05 Pesticides Pollution and Control
24/06 Radiation Pollution and Control
24/07 Environmental Health and Safety

25 **Communications Technology**
25/01 Telemetry
25/02 Radio Communications
25/03 Non-Radio Communications
25/04 Voice Communications
25/05 Command, Control and Communications Systems

# APPENDIX 5

# NEW INDEX TERMINOLOGY SUPPORTING FIELD CHANGES

# APPENDIX 5

## New Indexing Terminology Supporting Field Changes

Defense Acquisition System
Defense Contract Administration
Defense Regulations and Guidance
Defense Resources
Defense Information
Defense Mission
Cost Estimates
Cost Growth
Cost Objectives
Cost overruns
Cost Pricing Data
Cost Savings
Acquisition Life Cycle
Acquisition Planning
Acquisition Program
Acquisition Risk
Acquisition Strategy
Advanced Funding
Advanced Development
Advanced Technology Transition
Allocated Budgets
Allotment
Antideficiency Act
Appeal Process
Apportionment
Authorization
Balanced line
Baseline
Baseline Comparison System
Baseline Cost Estimates
Basic Ordering Agreement
Basic Research
Brassboard Configurations
Breadboard Configurations
Base Year
Break Even Point
Budget Estimates
Budgeted Costs
Budget Resolution

Business and Financial Management
Buyouts
Capacity Analysis
Combat Development
Combat System Test Installation
Comparability Analysis
competitive Prototyping Strategy
Commercial Components Products
Commonality
Competitive proposals
Concept Exploration
Concept Demonstration
Concurrency
Configuration Management
Budget Constraints
Contract Constraints
Contingency Testing
Contract Administration
Contract Authority
Contract Awards
Contract Cost Overruns
Contract Requirements
Contractor Acquired Property
Contractor Furnished Equipment
Contractor Performance Evaluations
Cost Based Budget
Cost Breakdown Structure
Cost Performance
Defense Technology Needs Assessment
Technology Demonstrations
Technology Management
Design To Unit Cost
Developing Activity
Disbursements
DoD Directives
DoD Instructions
Dual Source
Economic Ordering Quantity
Economic Engineering Analysis
Economic Production Rate
Economies of Scale
Engineering Change Proposals
Evaluation Criteria
Defense expenditures
Exploratory Development
Cost Extrapolation
Fatigue Allowance
Federal Acquisition Regulation

Figure of Merit
Fiscal Guidance
Fixed Costs
Flyaway Costs
Force Levels
Formal Qualification Review
Full Scale Development
Functional Analysis
Functional Baseline
Functional Configuration Identification
Functional Support
Functional Management
Gnatt Charts
Government Acquisition Quality Assurance
Government Furnished Equipment
Government Furnished <aterial
Government Furnished Property
Government Owned Contractor Operated
High Priority Programs
Host Nation Support
Incremental Funding
Indefinite Quantity Contracts
Independent Cost Analysis
Indirect Costs
Individual Acceptance Tests.
Industrial Base
Industrial Funds
Industrial Preparedness
Industrial Resources Analysis
Defense Infrastructure
Information Warfare
In process Inventory Control
Integrated Diagnostics
Integrated Logistics Support Management
Integrated Logistics Support Plan
Interchangeability
Intermediate Level Maintenance
Internal Control
Inventory Objectives
Invitation for Bid
Joint Acquisition Programs
Joint Services Operational Requirements
Just In Time Inventory
Labor Standards
Lasped Funds
Learning Curve
Life Cycle Model
Life Cycle Management

Limited Production
Live Fire Tests
Logistic Support Analysis
Long Lead Items
Maintenance Planning
Manufacturing Technology
Manufacturing Engineering
Market Surveys
Material Management
Market Research
Military Critical Technology
Foreign Technology Assessments
Mean Time Between Failures
Measures Of Effectiveness
Methods Engineering
Metrology
Micromanagement
Midyear Reviews
Mission Analysis
Mission Areas
Mission Area Analysis
Mission Critical Assessments
Mission Elements
Mission Needs Analysis
Off the Shelf Items
Operating Budgets
Operations Process Charts
Operational Suitability
Organizational Level Maintenance
oversight
Parameter Cost Estimates
Pert Charts
Defense Acquisition Planning
Planning Programming and Budgeting
Post Production Support
Preliminary Design Reviews
Preventive Maintenance
Prime Contractor
Procurement Plan
Producibility Engineering
Product Configuration Identification
Product Improvement
Product Baseline
Production Engineering
Production Management
Production Readiness
Production Schedules
Productivity Enhancement

Excess Profits
Program Acquisition Costs
Program Management
Program Management Planning
Program Objectives Memorandum
Project Definitions
Proprietary Rights
Rating Factors
Reimbursable Costs
Required Operational Capability
Research and Development Costs
Resource Allocation Process
Risk Analysis
Risk Assessment
Risk Management
Small and Disadvantaged Businesses
Source Selection Plan
SWOT Analysis
Situational Analysis
Statement of Need
Statement Of Work
Statistical Process Control
Sunk Costs
Supplemental Agreements
Supplemental Appropiations
Surge Production
System Acquisition Process
System Design Concepts
System Design Reviews
Systems Engineering
Systems Effectiveness
System Operational Concepts
Technical Data Package
Technical Information Management
Technology Assessment
Technology Base
Technology Modernization
Time Phased Action Planning
Total Quality Management
Turn Around Time
Unit cost Curves
Unscheduled Maintenance
User Friendly Products
Variable Cost Estimates
Warfighting Needs
Warfighting Capability
Wholesale Price Index
Work Package Scheduling

Worst Case Scenario

New Candidate Sub-Language Posting Terms

three dimensional modeling
antitrust regulations
agribusiness
Agency for International Development
advanced wireless communications
advanced metals technology
advanced composite technology
administrative law
administrative management
analog integrated circuits
anti-infectious disease agents
auditory navigation
autofocusing techniques
battle damage prediction
bioelectronic sensors
biological particle detection
biomedical engineering
burst point control
Bankruptcy rules
bankruptcy courts
backpacks
business mergers
business acquisitions
business takeovers
apparel industry
cash management
ceramic matrix composites
chemical and biological decontamination
cloning
coherent processors
compression ignition engines
computational chemistry
computer graphics
computer system testing
constructive simulations
context sensitive reasoning
conventional weapons effects
cost engineering
cost control
cosmetics industry
copyright laws

corporate annual reports
corporate cash flows
consumer electronics
computer banking
computer aided engineering
computer industry
computer design
computer graphics
computer workshops
commercial lending
commercial law
cryptanalytic technologies
Consumer Product Safety Commission
damage tolerance
desynchronosis
drug testing
drug discovery
dry-mounted electrodes
electromyography
electronic digital compasses
electrorheology
embedded signal processing
energy density
environmental contamination
environmental remediation
environmental monitoring
environmental contamination
fault imaging
ferroelectric liquid crystals
financial accounting standards
financial accountability
financial institutions
financial management
financial regulations
Federal Acquisition Regulations
environmental law
employee benefit Plan
engineering management
electronic media
electronic learning
electronic design
electric utility industry
economic indicators
economic development
economic modeling
economic policy
economic risk
east European markets

digital video disks
drug evaluations
drug consultation
drug enforcement administration
drug detection
drug resistance
drug information network
distributed system management
direct marketing
discount merchandise
disclosure analysis
antitrust guidelines
defense technology business
Federal Regulation Codes
Federal Trade commission
Federal Rules of procedure
Federal Reserve Regulations
Federal Reserve Rules
Federal Procurement Regulations
Federal Reserve Banks
Federal Register
Federal Sentencing Guidelines
economic engineering analysis
entry vocabulary
European Communities
Europe environment
Environmental Compliance
environmental remediation
environmental statutes
environmental science and technology
engineering construction
Federal Trade Regulations
Federal Reserve policy
fined-grained manocrystalline materials
force ratio modeling
foreign technology assessment
foil bearings
fragment impact
freeze drying
gallium arsenide integrated circuits
gigahertz sample rate
graphic visualization
gray scale masking
handheld devices
high definition television
high level architecture
high temperature tribology
high impedance electrodes

hearing protection
high level computer architecture
high electron mobility transistors
hetro junction bipolar transistors
Honoraria contributions
horticulture
hospital administration
human dynamics modeling
hybrid electric vehicles
hydrogen absorbing alloys
indexing languages
information superhighway
image formation
image fusion
intellectual property
institutional Investors
insider trading
interactive marketing
internal auditing
international securities
immunotoxicity
inflatable restraint systems
international markets
international finance
interlaminar stresses
ionic contamination
knowledge base training
Lan technology
laser diagnostic equipment
leadership development
legal support
leisure time
library management
long term care management
long shelf life
long term storage
low earth orbit satellites
long shelf life
lithium ion batteries
low melting point
macroevaluations
microevaluations
mainframe computing
manufacturing automation
marine technology
marketing intelligence
marketing management
marketing research

marketing tools
meat processing
metals industry
medical recovery
metal semiconductors
field effect transistors
mehanol fuel cells
maximum likeihood sequence estimator
medical imaging systems
microlaser rangefinders
microelectromechanical systems
microencapsulants
microoptics
microspheres
mischmetals
money laundering
money management
multimedia business
multimedia industry
multinational environment
mortgage banking
free trade agreement
mobile communication networks
mixed signal integrated circuits
moisture corrosion
moisture degradation
combat casualty monitoring
motion detection
motion sensors
multinational organizations
multichip modules
multimission combat vehicles
multipath fading
multiple target tracking
multi-resolution monitors
need assessments
nano-materials
natural language processing
neural control nets
neuro-toxicity
non-crystalline films
noninvasive sensors
nondestructive evaluations
nondestructive inspection
nonlinear control systems
nuclear material processing
object orientated programming
object orientated design

obscurants
occupational hazards
occupational health and safety
off road vehicles
oil and gas exploration
oil marketing
oil spill intelligence network
online libraries
online products
open system communications
organizational dynamics
open system architecture
operational architecture
optical fibers
optical interconnectors
optical microprocessors
optically controlled arrays
organic matrix composites
osmotic changes
ozone depletion
Pacific Rim countries
patent trademark laws
patent appeals
patent designs
patient care
patient care information systems
pediatrics
pension management
pension investments
pension benefits
pest control technology
pharmaceutical manufacturing
pharmaceutical industry
pipeline construction
plant engineering
plastics technology
plastics industry
political risk
political finance
process engineering
product alert
product libility
project management
property management
proprietary systems
public broadcasting systems
public health service
public laws

public opinion polls
public relations
public roads
public works
parafoils
paper industry
parametric difference waves
passive moving target indicators
photon batteries
penetration mechanics
Physiological monitoring
physiological recording systems
physiological sensors
plasmodium faciparum
plastic encapsulated microcircuits
polarmetrics
polarization couplings
polymer electrolytes
power management
power output profiles
power spectrum analysis
pressed powder techniques
producibility
production tooling
protein stability
pulse tubes
quality of life
quantum wells
quantum wires
rapid diagnosis
rapid multiplex lasers
raster conversions
real time signal processing
real estate finance
recyclable material
rechargeable batteries
recombinant proteins
recombinant toxins
remote warfare operations
rendering facilities
retail banking
retiree benefits
risk management
reproductive toxicity
residual life indicators
robust control systems
rotorcraft gearboxes
scene generation

selective dissemination
semiconductor industry
situational analysis
small business set asides
small computer interface systems
social security administration
software market
software industry
solar energy technology
superfund
surface mining
surface mining control
surface mining reclamation
surface modification technology
solid state technology
scene projection
seeback coefficient
sensor fusion
situational awareness
small unit operations
smart actuators
smart fluids
smart materials
smart structures
software testing
spectral analysis
speech enhancement
speech generation
speech intelligibility
speech synthesis
standoff chemical agent detectors
stiffness
stitchless
superlattice
superconducting electronics
superconducting materials
situational awareness
surfactants
switching speeds
synthetic environments
synthetic scene generation
system evaluations
tactical engagement simulation
target marketing
technology insertion
telemaintenance
telemedcine
temperature migration

terrain reasoning
test kits
thermoforms
thermophotovoltaic energy conversion
Transition Industries
user system interfaces
vehicle antitheft devices
vehicle wireless tracking devices
video capture
video compression
viral deactivation
virtual environment
weapon stabilization
weapon systems technology
wireless modems
wireless video transceivers
white light interferometry
work measurement
vehicle dynamics
strategic review
strategic management
strategic evaluation
global competition
foreign cultures
environmental audits
joint venture
entertainment industry
Ultrahigh definition television
satellite television networks
world bank
home satellite dish antennas
domestic pay television
overseas investments
trade deficits
computer industry
competitive advantage
banking industry
retailing industry
nonprofit organizations
small business enterprises
recreation industry
material handling engineering
contingency planning
computer information systems
resource allocations
conflict management
change management
environmental management

work life
home life
corporate fitness programs
strategic business units
financial ratios
customer analysis
marketing research
social responsibility
competitive profile matrix
competitive analysis
business ethics
long term objectives
globalization
Political reforms
operating profits
market shares
early retirement
post employment benefits
accounting changes
post retirement benefits
technology base
customer focused R&D
customer focus
innovation management
cross functional teams
software industry
software development
government regulations
technology needs
technological opportunities
environmental constraints
material shortages
process cost reductions
technological advantages
technological collaboration
research technology management
business relationships
customer relationships
micromanagement
manufacturing technology transfers
research performance evaluation
porductivity management
technology innovations
personnel appraisals
product quality
competitive analysis
technology base
exploratory development

technology transition
return on investment
technical feasibility
employee empowerment
performance appraisals
customer contact
patent recognition
team recognition
group training
off-site meetings
financial achievement awards
productivity measurements
work breakdown structure
customer focused assessments
project assessment
technological requirements
budgetary constraints
software engineering processes
process improvements
product idea generation
product benchmarking
process benchmarking
customer requirements
customer assistance
customer involvement
manufacturing engineering
technology acceptance
multifunctional teams
strategic partnering
strategic partnership
product specifications
commercial needs
commercial applications
material processing
diverging product specifications
common technology base
design engineering
technology assessment
natural disruptive events
technological areas of influence
demographic developments
societal values
consistency analysis
consistency matrix
scenario development
differentiation strategies
diversification strategies
technology acceptance

population mobility
mortgage interest rates
scenario application
technology innovations
innovation management
business operation maintenance
latent customer needs
innovation climate
competitive strategy
profit growth
value creation
resource accesses
strategic direction
core skills
corporate vision
organizational structure
technological exploration
technological capability
technological time horizon
critical success factors
innovation scope
innovation longevity
venture capital investment
technical research liaison
technology acquisition
strategic acquisition
adult education
automatic target monitoring
bulk crystal nitrides
carbon monofluorides
causeway ferries
process certification
code analysis
combat casualty care units
cost benefit analysis
cryoelectronics
degradable materials
digital cameras
distributed cooling elements
electronic materials
environmentally safe procedures
ergonomics
fishing and recreational vessels
forward observers
fuzzy neurals
gallium nitrides
gimbal systems
guided ordnance

hazard material handling
high temperature superconductors
high performance data networks
image analysis
image fusion
indium nitrides
intelligent tutoring systems
literacy
littoral warfare simulation
low cost fiber optics
mission critical success factors
mitigating circumstances
multichip modules
multispectral object detection
nitride source materials
offshore construction
optical backplanes
optical interference
outboard motors
real time communication displays
real time imaging
relative positioning
remotely operated vehicles
reprogramable electronic devices
ruggedized camera components
safety critical design
satellite based tracking
sea based logistics
selective cargo offloading
ship motion forecasting
ship surfaces
shipboard cargo handling
signature control mechanisms
single crystal growth
solar blinds
sound velocity profiles
space environmental sensing
structural health monitoring
substance abuse
trauma care units
computerized tutoring systems
ultrasonic imaging
vapor phase corrosion inhibitors
volatile corrosion inhibitors
wave motions
weapon spotting
wideband signatures
wide gap semiconductors

four dimensional instrumentation
space environmental sensing
lightweight satellite sensors
single crystal piezoelectrics
laser velocity sensors
ultrasonic diagnostics
imaging transducers
self assembly monolayer technology
computer based training
unattended video surveillance
urban environments
strategic mobile targets
multispectral sensor fusion
biologically motivated neural processing
remotely piloted undersea vehicles
kinematic global positioning systems
real time fault detection
emissivity control surfaces
fiber optic sensors
anamorphic lens
high speed optical links
floating platform cranes
radiofrequency identification systems
inflatable boat propulsion systems
space based logistics tracking
disposable food service utensils
team process analysis
team task analysis
multi-team tasking
high energy density batteries
distributed surveillance systems
asynchronous transmission mode
remote machinery conditioning monitoring
frequency adaptive electronics
energy harvesting
nanoelectronic architectures
carbon nanotubes
nanoscale lithography
microstructure fabrication processes
optical memory access
all source region monitoring
security self checking tools
image quality assessment
vehicle motion analysis
open architecture security tools
network performance diagnosis
accelerated network protocols
mobile oceanographic sensors

microelectromechanical sensors
robotic ground vehicles
image quality assessment
portable smoke generators
deep buried target detection
external zip drives
analog voice modems
removable hard drives
high speed pentium processors
ultralight notebook computers
flat panel display systems
pci local bus video
handheld personal computers
digital photography
National Defense Authorization Act
Acquisition workforce
Acquisition Reform
Reduced cycle time
infrastructure
systems development process
commercial business environment
prime vendors
virtual prime vendors
competitive sources
leading edge technology
critical information technology
emerging technologies
joint warfighting
performance benefits
joint architecture design
reduced infrastructure costs
cross-service capabilities
worldwide competition
government held wholesale stock
material support centers
best business practices
Distribution Standard Systems
logistics processes
retail stock inventories
best commercial practices
inventory consignment
Time Definite Delivery
replenishment cycle times
operations and support costs
life cycle logistics support
commercial item inventory
competitive market forces
rule-based thinking

**distributed learning**
**acquisition process improvements**

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## Glossary

**AD -** Accession Documents-identifies technical reports in DTIC

**ADD-** Automatic Document Distribution-Profiles established by users indicating their interest in receiving microfiche of newly acquired technical reports.

**Asterisk Terms-** Terms identifying major topical relevancy

**Automatic Indexing-** Computer indexing without human review

**Boolean Logic-** Boolean functions: And, Or, and Not used as Search functions

**COSATI-** Committee On Scientific And Technical Information

**Constraints-** Bounds or limits established through the definition of system performance features and can be described in terms of tradeoff areas

**Controlled Vocabulary-** Words used as authorized posting terms

**Controlled Identifiers-** Wording that always restricted to one type of entry

**CAB-** Current Awareness Bibliographies

**Database Cleanup-** Removing extraneous terms from database

**Descriptors-** Conceptualized index terms

**DoD-** Department of Defense

**DoD Instruction 3200.12-** Institutes and delineates responsibility for DoD Scientific and Technical Information Program

**Document "Aboutness"-** Indexable content representing important document aspects

**DRIT-** DTIC Retrieval and Indexing Terminology replaced by the DTIC Thesaurus

**DTIC-** Defense Technical Information Center

**DURS-** Defense Users Registration System

**EDMS-** Electronic Document Management System

**Fields and Groups-** DTIC subject categorization scheme that presently consist of 25 broad subject fields and 261 groups(sub-fields)

**Generic Terms-** General terminology not associated with any particular field

**GUI-** Graphic User Interface technology in use at DTIC

**Lexical Dictionary-** Computer resident dictionary of thesaurus terms with reference and lookup tables

**MAI-** Machine Aided Indexing

**MAR-** Machine Aided Retrieval

**MCTL-** Military Critical Technology List

**Meta Rules-** Rules concluded from generalized usages

**Microthesaurus-** Thesaurus entries that include domain, sub-language, associate and generic terms

**Multi-disciplined Database-** Comprised of data from several scientific and technical areas

**NISO-** National Information Standards Organization

**ODAL-** Online Dissemination Authority List

**Phrase selection Routine-** MAI grammar based sub-routine

**Recognition Dictionary-** A lookup table of comparative and associative database terms

**S & T Codes-** Scientific and Technical Area codes

**STIP-** Scientific and Technical Information Program

**Sub-language-** Language used in a restricted or specialized domain, i.e., Bioscience

**SWOT Analysis-** A strategy formulation process that uses an organization's strength and weaknesses to take advantage of opportunities and counter-act

threats

**Technology Codes**- Coding designations identifying critical technology areas assigned by the responsible Technology Working Group(TWG)

**Text Searching**- computerized term-searching in document text

**Variant terms**- Homographs and variations in spelling or languages

**WUIS**- Work Unit Information Systems re-designated TEAMS 1998.