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AD 667 000

ABSTRACTING SCIENTIFIC AND TECHNICAL REPORTS
OF DEFENSE-SPONSORED RDT/E

Defense Documentation Center
Alexandria, Virginia

March 1968

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U. S. DEPARTMENT OF COMMERCE / NATIONAL BUREAU OF STANDARDS / INSTITUTE FOR APPLIED TECHNOLOGY

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AD - 667 000

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AD No. AD 667000
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Defense Documentation Center
Cameron Station
Alexandria, Virginia 22314

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Purpose

This publication provides guidance for the preparation of abstracts of technical reports. It is intended to point out the requirements an abstract must meet and to standardize its content and make it more adaptable to the automatic methods of information processing.

Scope

This publication is for use by persons required by their organization or by contract to prepare reports on the progress and findings of Government-sponsored research.

BY ORDER OF THE DIRECTOR, DEFENSE SUPPLY AGENCY

OFFICIAL


ROBERT B. STEGMAIER, JR.
Administrator
Defense Documentation Center

**"Write not that your reader may
understand you if he wants to,
but that he must understand you
whether he wants to or not."**

**Foerster and Steadman
Sentences and Thinking**

Introduction

The word abstract is derived from the Latin *abstractus* meaning to draw from or separate. It is defined by Webster as "that which comprises or concentrates in itself the essential qualities of a larger thing or of several things." Therefore the abstract of a technical report should collect the essential aspects of the long paper and present them to the reader for his use.

With the volume of technical reports that is available to the scientist to accelerate his efforts in research and development, it is particularly important that he determine quickly the "essential qualities" of these reports and make a proper decision as to whether he should take the time to pursue their content in detail. The main purpose of the abstract should be to show the reader if he needs the full report by presenting a clear, concise, factual summary which is both an elaboration of the title and a condensation of the report.

The present trend toward automatic processing has created a second purpose for the abstract which may soon become the primary purpose. More and more the developers of automatic information processing techniques are relying on the abstract for their input and retrieval data. The reports are subject-indexed by the terms in the abstract based on their frequency, usage, and/or relative positions in sentences. If the abstract expresses the content of the document badly or inadequately the whole document and its valuable findings are lost.

Another major consideration of the abstract is its role in the current standardization programs. With the interchange of information being planned for complex communication networks, all contributors to this interchange should abide by certain standard rules so that all readers may understand and rely on what is written.

Based on all these facts, the following do's and don'ts are presented, not to change the style of any writer, but to try to make him aware of the requirements of a present-day abstract in the computer age and to let him know what is expected of him so that his contribution can be of optimum value to scientific and technical research and development.

Elements of Abstracts

An abstract should appear in every technical report. It should contain no more than 200-250 words, but these words individually and in combinations should reflect clearly, concisely and completely the subject of the report because they will probably be used to represent the report in an announcement journal or in a bibliographic listing, to anyone who reads the abstract or who wants to pigeonhole the report for future reference.

Since this abstract is to be a reflection of the substance of the report, it should be accurate and complete in itself. As much care should be given to writing the abstract as to writing the report because readers will decide from it whether they want to read the whole paper and because it may be used in lieu of the parent document for other purposes. It should be written in straightforward English making every word count. The sentences should be concise; subordinate clauses should be used only if they do not impair the ease of reading. To shorten, phrases should be used instead of clauses, and words instead of phrases, always keeping in mind that the final product must convey an accurate meaning.

Basically there are two kinds of abstracts, the descriptive and the informative. The descriptive abstract, as the name implies, is usually a statement of the general nature and scope of the report and should be used only when the complete document is such that it does not lend itself to an informative summarization. This type of abstract is usually supplied for bibliographies or collections of papers such as a symposium record.

More valuable is the informative abstract which succinctly informs the reader of the salient features of the subject studied. If properly written it reflects the organization of the report giving the objectives of the investigation, the methods employed in the research, and the conclusions reached and/or results obtained with special emphasis on any new data or discoveries which would affect or be useful to other similar research or applications. These three elements can be expressed as follows:

- The objectives and/or purpose of the investigation are important because they set down the area under observation and immediately tell the reader whether the research concerns him. One brief sentence should be sufficient.
- The methods employed and the kind of treatment given -- mentioning materials, conditions, restrictions and limits -- should be pointed out specifically and selectively without going into detail.
- Results obtained and/or conclusions reached represent the essential part of the effort described in the document; therefore, most of the abstract should be devoted to this element. If the results include numerous specific data, a general statement should be made; or, if the scattered nature of data allows no such statement, this fact should be mentioned. If possible, all new findings should be clearly stated including any important numerical values. Conclusions which interpret the results should also appear.

Some documents, such as those on evaluation or qualification tests, can be abstracted by summarizing the results and recommendations for the disposition of the items. Abstracts of bibliographies should cite the scope of the work, time period covered, method of arrangement and the number of entries.

The terminology, particularly the technical terminology, in the abstract should be the same as that in the report. New concepts and procedures of automatic processing are utilizing the abstract for indexing. The technical terms which appear in the abstract may become the subject terms used for storage and retrieval of information about the report. If they are inadequate or different (e.g., optical masers for lasers) or more generic (e.g., steel for martensite) than those used in the document, they may not be effective if used to retrieve the document by subject content.

Some other factors should also be considered in preparing a good abstract. Unconventional or rarely used symbols and characters should not be used because they cannot be introduced into certain automatic data processing systems (see sample, Appendix I). In fact, considering the coming use of optical scanners for input processing, complete verbalization is desirable.

Illustrations, preliminaries, descriptive details, examples, numbered equations and footnotes are to be avoided. Descriptive cataloging information should be omitted as, for example, corporate authors, contract numbers, report numbers, and reporting dates. Precise measurements should be expressed by numerals except at the beginning of a sentence; abbreviations, on the

On the other hand, should be limited to those in frequent use among professionals engaged in the research under discussion.

After the abstract is written to incorporate the elements enumerated above, it should be reviewed carefully and shortened through economy of phrasing and elimination of idle words. The final product should be approximately 200-250 words long (see examples, Appendix II).

Security Classification

It is highly desirable that the abstract be unclassified even if it summarizes a classified report. However, if it is necessary for complete and intelligible context to include specific data the unauthorized disclosure of which would be detrimental to the defense interests of the United States, such information must be classified. The classification guidance should reflect the latest applicable security regulations, as for example, DoD 5220.22M, "Industrial Security Manual for Safeguarding Classified Information," or DoD Instruction 5210.47, "Security Classification of Official Information." The abstract may be given a lower classification than the report, particularly if the results obtained can be reported in the abstract only in general terms. The security classification should never decide the nature of the abstract. It is better to have a classified abstract that is illuminating than to have an unclassified but ineffectual abstract.

Controlled Distribution Statements

To provide maximum information in the abstract, the author must sometimes include facts about proprietary matters and other interests of the issuing organization. To protect such information and prevent its unauthorized release through some announcement medium, a statement should be included in the report as to the restrictions to be imposed on the dissemination of the abstract per se. This is in addition to and distinct from any

limitation imposed on the report as a whole, and can be indicated on the DD Form 1473 (Document Control Data - R&D) which must be incorporated into every technical report generated for DoD (DoD Instruction 3200.8, "Standards for Documentation of Technical Reports under the DoD Scientific and Technical Program"). It can be made as a parenthetical statement at the end of the abstract until such time as other space is provided for it. A distribution limitation, like a security classification, should only be used when a specific reason for it exists. Limited reports do not necessarily require limited abstracts.



Outline

In brief:

1. Always an informative abstract if possible
2. 200-250 words
3. Same technical terminology as in report
4. Contents
 - a. Objectives or purpose of investigation
 - b. Methods of investigation
 - c. Results of investigation
 - d. Validity of results
 - e. Conclusions
 - f. Applications
5. Numerals for numbers when possible
6. Phrases for clauses, words for phrases when possible
7. No unconventional or rare symbols or characters (see Appendix I, Verbalization Chart)
8. No uncommon abbreviations
9. No equations, footnotes, preliminaries
10. No descriptive cataloging data
11. Security Classification
12. Dissemination controls, if any
13. Review it.

APPENDIX I

VERBALIZING FOR MACHINABILITY*

The following symbols may be used in abstracts, annotations, and titles:

. , : ; ' / ° \$ % () - + = < >

ANGSTROM UNITS ($\text{\AA}$)
Use $\text{\AA}$

CHEMICALS
 H_2SO_4 use H_2SO_4
→ use yields

CUBIC
 cm^3 use cu cm or cc
 ft^3 use cu ft
 m^3 use cu m

DEGREES
 32° use 32 deg
 32°F use 32 F
 $32^\circ 16' 8''$ use 32 deg 16 min 8 sec

EXPONENTS
 $x^{(n+1)}$ use x to the (n+1) power
 ft sec^{-1} use ft/sec
When the exponent is less than 7 and has the base 10, write out the number; e.g.,
 10^2 use 100
 10^{-4} use 0.0001
 2.75×10^{-3} use 0.00275
When the base is 10 and the exponent is 7 or more, write out; e.g.,
 10^7 use 10 to the 7th power
 10^{-9} use 10 to the minus 9th power

See also CUBIC, SQUARE, SUPERSCRIPITS

FRACTIONS
Use the slash (virgule) for the fraction bar; e.g.,

$$x = \frac{a-b}{c} \text{ use } x = (a-b)/c$$

$$x = a - \frac{b}{c} \text{ use } x = a-(b/c)$$

GREATER THAN OR EQUAL TO ($\geq$)
Use $\geq$ or =

GREEK LETTERS
Use their names; e.g.,
 α use alpha
 β use beta
 π use pi

ITALICS
Do not use; see also UNDERSCORING

LESS THAN OR EQUAL TO ($\leq$)
Use $\leq$ or =

LOGARITHMS
 $\log_{10}$ use log
 $\log_e$ use ln

MATHEMATICAL SYMBOLS
See SPECIAL SYMBOLS

MICRO- and MICROMICRO-
 μv use microvolts
 μf use micromicrofarads or picofarads

MICRONS
 μ use micron
 $\text{m}\mu$ use millimicron
 μm use micrometers

PLUS OR MINUS ($\pm$)
Use + or -

QUESTION MARK (?)
Do not use; rephrase sentence

QUOTATION MARKS (")
Use the apostrophe or single quote only; e.g., The term 'overkill'
Where quotation marks are conventionally used as a symbol, abbreviate; e.g.,
 $12''$ use 12 in
 $45''$ use 45 sec
See also DEGREES

*Standard Operating Procedures; DSA, Defense Documentation Center, Alexandria, Va.

APPENDIX I

VERBALIZING FOR MACHINABILITY*

SPECIAL SYMBOLS

- $\approx$ } use approximately
- $\rightarrow$ { use yields (chemistry)
use approaches limit of (mathematics)
- # use no.
- & use and in titles, abstracts, and annotations
- ∞ use infinity
- λ { use wavelength (electronics and physics)
use lambda (all other)
- Ω { use ohms (electricity and electronics)
use omega (all other)
- ϕ { use phase (electricity and electronics)
use phi (all other)

Similarly, spell out or show by acceptable alphanumeric characters increment, varies as, therefore, differential of, variation of, integral, sum, benzene ring, thunderstorm, male, female, fixed star, etc.

SQUARE

- cm² use sq cm
- ft² use sq ft
- m² use sq m

SQUARE ROOT

- $\sqrt{a-b}$
 $(a-b)^{1/2}$ } use square root of (a-b)

SUBSCRIPTS

- V_1 use V sub 1
- B_5 use B (omit the 5, which is the atomic number of boron)
See also CHEMICALS

SUPERSCRIPTS

- H^+ use H (+)
- SO_4^{--} use SO4 (—)
- V^{5+} use V (5+)
- U^{234} use U234
- B^{10} use B10
- $O^{18}(p,n)N^{15}$ use O18(p,n)N15
- d_{25}^{25} use density at 25 deg F referred to water at 25 deg F
- n_D^{20} use index of refraction for 20 deg F and sodium light
- See also CUBIC, EXPONENTS, SQUARE

UNDERSCORING

Do not use underscoring

Escherichia coli use Escherichia coli
to set off special terms use single quotes;

e.g.,

the term quasar use the term 'quasar'

*Standard Operating Procedures. DSA, Defense Documentation Center, Alexandria, Va

APPENDIX II

SAMPLE ABSTRACTS

INFORMATIVE ABSTRACTS:

AD-815 700

A scaled model test was conducted to determine the extent of asymmetrical nozzle flow separation during staging of the Minuteman missile. Tests were conducted at a constant interstage pressure of 20 psig, where possible, and at various stage separation distances using cold air. Configurations tested were as follows: obstruction simulating instrumentation package at the nozzle exit; simulated 1-2 interstage quadrants; and simulated 2-3 interstage quadrants. Test data indicated that there was little or no asymmetrical separation during staging.

AD-815 770

The objective of this test was to investigate the use of auxiliary parachutes to soften the impact shock of the conventional Parachute Low Altitude Delivery System. Photo theodolite cameras were used to measure the impact velocities of PLADS loads with and without auxiliary parachutes. Auxiliary G-13 parachutes were tested with 600 and 1200 lb loads. The impact velocity with the 1200 lb loads was reduced from 60 FPS to 40 FPS. The reduction achieved with 600 lb loads was negligible. It is recommended that loadmasters receiving C-123 training from the 4410th Combat Crew Training Wing be made familiar with this technique.

DESCRIPTIVE ABSTRACTS:

AD-644 689

This document is an annotated bibliography of the journal and technical report literature (to August 1966) on electromagnetic wave propagation in conducting media, with emphasis on the ocean. References on antenna theory and performance are also included. This work includes 164 references and an author index.

AD-643 937

The report reviews Soviet and Soviet-bloc laser research as reflected in the open scientific literature published in the USSR and the bloc countries. It is the second in the series and is based on 634 research and review papers which cover the period from September 1964 through February 1966. The first appeared as ATD Report P-65-23 (AD-615 177) and covered the period from January 1961 through August 1964. The review is divided into sections, each section covering the work of a particular organization (a research institute, a laboratory, or a university). These sections are, in most cases, subdivided into specialized subject areas. The review sections are arranged in the order in which they are discussed in the sections and are keyed to the appropriate review section by letter designation.

APPENDIX III

REFERENCE CONSULTED

1. Army Regulation 70-31, "Standards for Technical Writing," Headquarters, Dept. of the Army, Washington, D. C. 9 September 1966
2. "Style Manual," American Institute of Physics, New York. Second Edition, 1959
3. "ASTIA Guidelines for Cataloging and Abstracting," Robert L. Murphy, Armed Services Technical Information Agency (Now Defense Documentation Center), Alexandria, Va. June 1962
4. AD-157 134 "Report Writing Guide for Arnold Engineering Development Center (Revised Edition)," C. B. Kestler, Arnold Engineering Development Center, Tullahoma, Tenn. May 1958
5. "Writing at BRL," Ballistics Research Laboratories, Aberdeen Proving Ground, Md. July 1961
6. "Standard Format for Scientific and Technical Reports Prepared by Contractors or Grantees," COSATI, Federal Council for Science and Technology, Washington, D. C. June 1967.
7. PB6, "Style Manual for Research and Development Technical Publication," Frankford Arsenal, Philadelphia, Penna. February 1959
8. "Writing Scientific Papers and Reports," W. Paul Jones, Wm. C. Brown Co., Dubuque, Iowa. Third Edition, April 1957
9. "National Bureau of Standards Publications and Reports Manual," Thos. G. Hereford, U. S. Dept. of Commerce, National Bureau of Standards, Washington, D. C. June 1957
10. "Report Writer's Guide," Donald E. Thackrey, Willow Run Laboratories, University of Michigan, Ann Arbor, Mich. February 1960
11. AD-622 944, "Suggested Criteria for Titles, Abstracts and Index Terms in DoD Technical Reports," A. G. Hoshovsky, Office of Aerospace Research, U. S. Air Force.

UNCLASSIFIED

Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author) Defense Documentation Center Cameron Station Alexandria, Virginia 22314		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE Abstracting Scientific and Technical Reports of Defense-sponsored RDT&E.		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
6. REPORT DATE March 1968	7a. TOTAL NO. OF PAGES 18	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO	8b. ORIGINATOR'S REPORT NUMBER(S) AD-667 000	
9. PROJECT NO		
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		
10. DISTRIBUTION STATEMENT This document has been approved for public release and sale; its distribution is unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT Abstracts of scientific and technical reports must be factual, accurate, clear, and concise so that they can effectively serve the research and development community in the present-day computer age. They must apprise the scientist of the content of the parent document; present to the documentalist appropriate technical terminology for his automatic processing or input and retrieval data; and provide a standardized item of information for easy interchange by the complex communication networks among the members of the R&D community. Abstracts may be informative or descriptive as needed. However, the preferred are the informative which give the objectives or purpose of the research, the methods of investigation, and the results and conclusions. Whenever possible, abstracts should be unclassified with no controls on their distribution.		

DD FORM 1473

UNCLASSIFIED
Security Classification

UNCLASSIFIED

Security Classification

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KEY WORDS

LINK A

LINK B

LINK C

ROLE

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ROLE

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ROLE

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*Abstracts - Processing
Information retrieval
Instruction manuals
Subject indexing
Reports
Documentation

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