FINAL REPORT

STANDARD INTEREST PROFILES

Development of Technical Subjects

NASA Contract NSR-15-003-055

Project #5

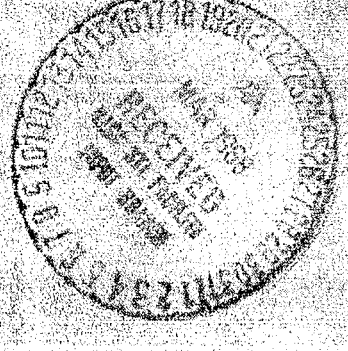
by

Joseph DiSalvo
Director
and
Robert W. Hall

February 25, 1968

AEROSPACE RESEARCH APPLICATIONS CENTER

Aerospace Research Applications Center
Indiana University Foundation
Bloomington, Indiana



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Technical Subjects

HISTORY OF DEVELOPMENT:

During 1966, it became apparent both to ARAC and other organizations involved with the NASA Technology Utilization Program that the expense of current awareness service on a custom basis was too great for many users. The easiest feasible approach to reducing the costs of current awareness service was by standardizing the product--sending the same abstracting service output to many users. Thus the idea and name of the Standard Interest Profiles (SIP's) were born, and the first 32 SIP topics were announced to ARAC's member companies on November 1, 1966.

This first group of SIP's were easily and quickly developed because 20 - 25 of them were taken directly from combining the interests of ARAC clients who were receiving nearly identical output for their custom profile requests. Succeeding additions to the list required more imagination and more development time. As of February 1968, the development of SIP topics has proceeded about as far as possible within the limits of experience provided by the current set of ARAC companies. Of the 56 topics, five are in areas developed separately as part of the Management Science Service experiment, and two others are topics listed as SIP's for extra promotional exposure, but which are really COMPUTER INFORMATION SERVICE and MARKETING INFORMATION SERVICE, both developed much earlier in ARAC history, leaving a total of 49 technical topic areas developed by this program.

Table I

Chronology of SIP Development

Date	No. of Technical SIP's	Management Science Service (MSS) Experiment	Comments
Nov. 1, 1967	32		
Jan. 1, 1968	41		
June 1, 1968	38	3	Commence Management Science Service Development
Aug. 15, 1968	46	3	
Feb. 1, 1968	56		Terminate Management Science Service Development

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During an audit in August 1967 of ARAC member companies, the most frequent spontaneous suggestion by users was that ARAC broaden the literature base from which they are being served. Several months earlier, in March 1967, some preliminary work had been done to see if this was feasible. It was, and the decision to increase coverage was made in October 1967, and it is now being implemented. The announcement of increased coverage was made on Feb. 1, 1968.

Besides STAR/IAA, the increased coverage includes United States Government Research and Development Reports and Nuclear Science Abstracts. Only two SIP topics required substantial revision in order to implement this. The increased coverage has resulted in an average of 30% more abstracts being added to SIP abstract mailings.

Reception to SIP's so far has been good enough that ARAC plans to embark on an extensive marketing program.

METHOD OF TOPIC DEVELOPMENT:

The logic behind each SIP topic outlined has been to segment a potential market for current awareness service to match areas in which a sufficient volume of reports are regularly released in the government literature base so as to make service feasible. The goals for each SIP topic are:

1. To provide reports on topics known to be of interest to someone working in private industry. In many cases, we know people who want and can use the material. In others, the selection of SIP topics was done by inference--an ARAC staff member knowing by experience that someone out there ought to be interested in a set or series of reports he had seen.

2. To provide mailings of convenient size. The objective was to have each profile mailing average not less than 5 nor more than 50 abstracts so that recipients would neither feel cheated nor overwhelmed.

3. To provide prospective users with accurate descriptions of what they could really expect to see as a result of using the Standard Interest Profile. In other words, we have tried to group technical interests into areas where a stream of literature appears to be coming from the government literature base, and describe what this stream is as accurately as we can.

All of this is a subjective process which has incorporated in it all of the pitfalls of sterotyping prospective users, making compromises which do not entirely satisfy the needs of any individual users, and making relevant judgements which may not be universally accepted. On the other hand, the SIP's help a great deal with three of the major problems of a current awareness abstract service which is done completely on a custom basis:

1. The establishing and maintaining of a congruence between a user's interests and what is in fact available to him, is a tedious business. Few clients know enough about the literature base ARAC uses to match its contents to their problems for current awareness. They frequently want to be told what they should ask for. The SIP descriptions have helped considerably in outlining to non-aerospace personnel what is available for them to select. New Custom Interest Profiles are now rare, and are developed only on the suggestion of the ARAC staff or by persons with knowledge of the literature base and whose self-definition of their technical interests is unusually well-developed.

2. Keeping the scope of customized topics within reasonable bounds has often been difficult. Users like to route them--then add to the subjects covered to "provide something for George." Sometimes this process evolves to a point where the user abandons interest or is transferred, leaving "George" with a profile which cites a great many reports, few of which are really of interest, and "George" does not know what to do with it. By having ARAC staff members define the topic areas, the size of the profiles stays reasonable, and the sub-topics retain a logical relationship between each other.

3. Because of the problems given in points 1 and 2, custom abstract service for current awareness is expensive. ARAC experience has shown that there are few economies of scale in servicing current awareness profiles on a custom basis. This is the biggest advantage of Standard Interest Profiles--low cost per customer.

A minimal amount of client contact is required to assure that the reports being cited by SIP's are satisfactorily related to user interests. Checking a few recipients once each six months appears adequate for revision and feedback on the relevance of report citation selections. Nonetheless, the basic objective of SIP's has been market-oriented. Each profile began by assembling a profile of a typical user's interests in a particular technical subject area. Then the literature base was reviewed to determine if there was a sufficient quantity and quality of literature to satisfy the typical user's interests. The points of match became Standard Interest Profiles. The record of this process is briefly summarized in Appendix 2.

EVALUATION OF USEFULNESS:

The Standard Interest Profiles appear to have been well-accepted. At the end of January, 1968, there were 372 paid copies of Standard

Interest Profiles being produced for each issue of STAR/IAA. They have been substituted for Custom Interest Profiles by many companies, and the rate of document orders shows that they are in fact being read.

Table II

Period Ending	Custom Profiles	SIP's (paid copies)	Resulting Document Orders	
Dec. 1966	297	11		
Mar. 1967	178	111		
June 1967	173	217		
Sept. 1967	170	324		
Dec. 1967	167	342	Aug.-Oct. '67	609
Jan. 1968	167	372	Nov. '67-Jan. '68	1070

To illustrate the typical reaction to SIP's, a quotation from a trip report to Owen-Illinois Corporation seems typical: "Several people indicated that they would like to see changes made, but they were satisfied when we explained the difference between custom and standard profiles and the difference in cost." No user has reverted back to a custom profile after taking a SIP substitute. At least so far, SIP's have not been discontinued for not being useful, but there have been some cases of topic substitution.

Reactions to the format in which SIP abstracts are presented has been favorable. During the recent audit of ARAC member companies, we found three users who commented that the 8½ x 11 format was much preferred to the deck of single abstracts because it is easier to handle. (The decision to use abstracts rather than computer-listed titles was made at the beginning. The nature of the topics requires editing the computer output, and if only the results of an edit are to be the final output, then abstracts cost little more to print than titles, and they are far more satisfactory to both editor and client.)

It is still too early to assess the reactions of ARAC clientele to the increased literature base now being covered by the SIP's. Adverse reaction is not expected, but rather it is a matter of whether this change will be received enthusiastically.

APPENDIX I

SUMMARY OF STATUS OF
STANDARD INTEREST PROFILES

January 31, 1968

PROFILE NUMBER	TITLE AS OF JAN. 31 - 1968	DATE INITIATED	# OF PAID COPIES	# OF UNPAID COPIES	TOTAL COPIES	DOCUMENT ORDERS 4th Q, '67	COMMENTS: EXPECTED FUTURE OF PROFILE
SIP-01	Inorganic Fiber Technology	Jan 1 '68	4	1	5	16	Discontinued. Incorporated into SIP-19
SIP-02	Crystal Growth	Jan 1 '67	3	0	3	10	Slow growth. Of some interest to electronic manufacturers
SIP-03	Carbon And Graphite	Jan 1 '67	1	2	3	12	Slow growth. Not a wide interest in carbon products.
SIP-04	Physical Metallurgy	Nov 1 '66	7	0	7	19	Growth. Surprised it has not done better
SIP-05	Powder Metallurgy	Jan 1 '67	10	5	15	15	Slow growth.
SIP-06	High-Temperature Applications of Metals	Nov 1 '66	6	3	9	21	Hold about even. Not enough non-aerospace metals discussed
SIP-07	Materials Joining Tech.	Jan 1 '67	17	3	20	50	Growth.
SIP-08	Materials Forming and Machining	Jan.1 '67	16	8	24	71	Growth.
SIP-09	Microanalysis and Properties of Engineering Materials	Nov 1 '66	13	0	13	46	Growth.
SIP-10	Non-Destructive Testing	Nov 1 '66	13	2	15	57	Growth. ND testing just now gaining popularity.
SIP-11	Corrosion and Protective Coatings	Nov 1 '66	17	1	18	18	Growth.
SIP-13	Bearing And Lubricants	Nov 1 '66	15	3	18	51	Growth. But the amount of material on subject has decreased.
SIP-15	Fluid Flow Analysis	Jan 1 '67	9	2	11	72	Slow Growth. Too theoretical for most of the market.
SIP-16	Hydrocarbon Fuels & Combustion	Jan 1 '67	3	0	3	13	Just enough interest to retain it. Not much material.
SIP-17	Air-Water Pollution And Industrial Safety	Nov 1 '66	13	1	14	10	Hold even. Not enough material to be highly valuable.

SIP-18	Analytical Chemistry	Nov 1 '66	11	0	11	61	Growth.	An area to be marketed. (The only one in chemistry.)
SIP-19	Reinforced Composite Materials	Nov.1 '66	12	3	15	16	Growth.	Of interest to both manufacturers and designers.
SIP-20	Polymer Technology	Nov 1 '66	10	2	12	49	Limited Growth.	Of interest mostly to large chemical companies.
SIP-21	Temperature Measurement	Nov 1 '66	6	1	7	0	Hold even.	Very "far-out" reports, and not one to push widely.
SIP-22	Vacuum Technology	July 31 '67	3	0	3	5	Slow growth.	
SIP-24	Laser Developments	Nov 1 '66	12	1	13	13	Growth.	
SIP-25	Laser Research	Nov 1 '66	6	0	6	7	Hold even.	Not enough interest in this kind of detail.
SIP-26	Cryogenics and Super-conductors	Jan 1 '67	3	0	3	24	Slow growth.	No wide industrial interest.
SIP-27	Logic Circuits	Jan 1 '67	14	0	14	16	Growth.	
SIP-28	Infrared Technology	Nov 1 '66	8	0	8	14	Slow growth.	Not of much interest except to instrumentation people.
SIP-29	Photography	Nov 1 '66	1	0	1	1	Don't know.	Keeping the profile just as a risk venture.
SIP-30	Display Systems	Nov 1 '66	15	0	15	76	Growth.	
SIP-31	Data Transmission	Nov 1 '66	6	1	7	2	Growth.	
SIP-33	Recording Systems	Jan 1 '67	9	0	9	24	Slow growth.	Of interest only to people in recording.
SIP-34	Semiconductor Devices and Microcircuit Fabrication	Nov 1 '66	21	0	21	88	Growth.	Good acceptance now. One to push for more.
SIP-35	Microwave Systems	Nov 1 '66	8	0	8	14	Hold even.	Generally only big firms interested.
SIP-36	Radio Antennas, Trans-mission and Propagation	Nov 1 '66	8	0	8	9	Growth.	

SIP-37	Radio Communications Equipment	Nov 1 '66	8	0	8	25	Growth.
SIP-38	Reliability	Nov 1 '66	13	2	15	58	Slow growth. Of interest mostly to large manufacturers.
SIP-39	Operations Research	Jan 1 '67	8	2	10	197	Growth. As much to academicians as to industry.
SIP-40	Computer Information Service	Nov 1 '66	12	0	12	53	Growth prospects very good.
SIP-41	Personnel Management & Behavioral Science	Jan 1 '67	7	1	8	30	Hold even.
SIP-42	Human Response to Environment	Jan 1 '67	0	0		0	Must market to Med. Centers.
SIP-43	Biomedical Technology	Nov 1 '66	1	0	1	0	Must market to Med. Centers.
SIP-44	Radiobiology	Nov 1 '66	1	0	1	45	Must market to Med. Centers.
SIP-45	Turbine Technology	Nov 1 '66	3	0	3	37	Limited market. Aircraft and engine manufacturers.
SIP-47	Physical Properties of Ceramics	July 31 '67	1	1	2	0	Potential market with pigment, glass and insulator firms.
SIP-49	Control Systems Analysis	July 31 '67	5	0	5	7	Growth prospects good. Should receive broad marketing.
SIP-52	Sensory Devices for Instrumentation	July 31 '67	5	0	5	1	Growth. Market to instrument users and manufacturers.
SIP-55	Industrial Systems Mgmt.	Jan 1 '68	1	1	2	7	Growth. Broad Applicability.
SIP-56	Research and Engineering Management	Jan 1 '68	1	0	1	36	Growth. Broad Applicability.
SIP-60	Space Age Energy Sources	July 31 '67	0	1	1	0	Limited growth. Of interest to power and oil companies.
SIP-63	Industrial Mathematics	July 31 '67	2	0	2	0	Limited growth. For math consultants to R & D Labs.
SIP-68	Heat transfer	July 31 '67	2	0	2	1	Growth. Should be broad interest in this.
SIP-69	Dielectric Technology	Jan 1 '68				0	Growth. Electronics manufacturers should be interested.

SIP-70	Holography	July 31 '67	2	0	2	1	Limited growth. Only big firms would be interested.
SIP-71	Human Factors Engineering	July 31 '67	2	2	4	0	Slow growth. Subject just now gaining acceptance with designers.
SIP-73	Advances in Geophysics, Geology & Oceanography	Jan 1 '68	1	1	2	0	Growth. Exploration and cceanography are becoming more popular.
SIP-74	Marketing Information Service	Jan 1 '65				0	Growth.
SIP-75	Structural Analysis Techniques	Jan 1 '68				0	Growth. For design engineers.
SIP-76	Psychophysiology	Jan 1 '68				0	Must market to Medical Centers.
SIP-77	Neurochemistry And Biochemistry	Jan 1 '68				0	Must market to Medical Centers.
		TOTALS	375	50	42	1398, of which 328 must be attributed to Management Science Service.	

APPENDIX II

Notes on The

STANDARD INTEREST PROFILES

SIP-02 CRYSTAL GROWTH. Most of the work reported deals with growth of crystalline materials for lasers or for electronic components.

SIP-03 CARBON AND GRAPHITE. Production and application of carbon, graphite and carbide materials, usually for structural use.

SIP-04 PHYSICAL METALLURGY. This was designed for the metallurgist engaged in examination of the microstructure of metals, particularly laboratory analysis. Much material concentrates on methods of analysis.

SIP-05 POWDER METALLURGY. The profile is thought to be useful to persons designing parts made from powdered materials and to firms engaged in the manufacture of powdered metals and products formed from them.

SIP-06 HIGH TEMPERATURE APPLICATIONS OF METALS. The reports identified have been found useful to engineers designing or constructing high-temperature process equipment.

SIP-07 MATERIALS JOINING TECHNOLOGY. Design engineers usually find this of most benefit. Welding and brazing techniques are discussed in most reports, but reports on structural adhesives or unique joining methods are also included.

SIP-08 MATERIAL FORMING AND MACHINING. Chemical milling, laser machining, ultrasonic drilling and cutting, electron beam machining, and lathe operations. Explosive forming, magnetic forming and other novel forming techniques. The profile is of most value to designers or to machinists working with difficult-to-fabricate materials.

SIP-09 MICROANALYSIS AND PROPERTIES OF ENGINEERING MATERIALS. This profile identifies reports on properties of materials which should be of interest to metallurgists and design engineers. Typical reports discuss crack propagation, creep, fatigue, plastic deformation and effects of thermal or mechanical loads on materials properties.

SIP-10 NON-DESTRUCTIVE TESTING. This area is growing in popularity. Organizations deriving the most benefit from the profile are those which must test expensive items of equipment, whether these items be products sold or equipment used in processing. Reports are found relating to both electronic and mechanical equipment.

SIP-11 CORROSION AND PROTECTIVE COATINGS. This SIP includes all forms of metallic corrosion, corrosion mechanisms and corrosion detection. Most protective measures involve coatings, both

organic and inorganic. Many reports are an excellent source of ideas for dealing with corrosion measurement and prevention.

SIP-13 BEARINGS AND LUBRICANTS. All kinds of bearings and lubricants which are developed by federal programs are discussed. Most reports deal with problems in unusual environments and they are a source of ideas for bearing design and lubricant selection in very difficult applications.

SIP-15 FLUID FLOW ANALYSIS. The profile is intended for persons taking an analytical approach to problems of fluid flow. Gaseous, liquid, and two-phase flow. Flow measurement problems. Techniques of mathematical analysis. Applications in fuel flow, hydraulic systems and pneumatic controls. Includes reports on fluid amplification and fluid logic system.

SIP-16 HYDROCARBON FUELS AND COMBUSTION. Fuel composition and blending, storage properties, contamination--sometimes by micro-organisms, and analysis of combustion products. Combustion studies and instrumentation used. Most reports are on aviation fuels, but do not discuss exotic rocket fuels.

SIP-17 AIR-WATER POLLUTION AND INDUSTRIAL SAFETY. Detection and measurement of foreign substances in air and water, water reclamation systems, radiation hazards and chemical toxicity studies. Most studies refer to environmental purification and safety requirements in small systems, aircraft and submarines, for example, and a few deal with pollution of industrial complexes.

SIP-18 ANALYTICAL CHEMISTRY. Both instrumental analysis and wet chemistry methods are discussed in reports, but the best reports describe instrumentation for making analyses either more accurately or more quickly than has previously been done. Reports are selected for the analytical chemist.

SIP-19 REINFORCED COMPOSITE MATERIALS. All types of reinforced materials are discussed--metallic, ceramic and plastic; but most of the writing is on reinforced plastics. Analysis of properties, preparation and testing. Reinforcement material selection and manufacture.

SIP-20 POLYMER TECHNOLOGY. This profile identifies all reports dealing with polymer technology except those appearing in SIP-19, REINFORCED COMPOSITE MATERIALS. Reports usually discuss polymers developed and tested for difficult applications, structural adhesives, membranes, dielectric materials, etc.

SIP-21 TEMPERATURE MEASUREMENT. Techniques and devices for temperature measurement, probes, thermocouples, thermistore, pyrometers. Errors in measurement and problems of data acquisition under difficult

conditions. Reports should be of most interest to persons working at cryogenic temperatures or at temperatures above 2000° F.

SIP-22 VACUUM TECHNOLOGY. The profile is particularly valuable as a continuing survey of the properties of materials in a vacuum, and of the instrumentation used for vacuum work.

SIP-24 LASER DEVELOPMENTS. Applications of lasers. Intended for the reader who wants to stay informed of what lasers can be used for without reading detailed research work in the field. New applications for lasers, state-of-the-art reports, surveys and bibliographies.

SIP-25 LASER RESEARCH. Exhaustive coverage of theory and experimentation related to lasers. Together with SIP-24, complete coverage of unclassified government reports on lasers is obtained, and there is excellent coverage of foreign work.

SIP-26 CRYOGENICS AND SUPERCONDUCTIVITY. Liquefaction processes, handling of cryogenic fluids, usually fuels or oxidizers. About half the reports identified deal with theory or applications of superconductivity.

SIP-27 LOGIC CIRCUITS. Reports deal with both electronic and fluidic circuits of the type being used in digital computers and, more broadly, in digital control systems.

SIP-28 INFRARED INSTRUMENTATION. A device-oriented profile which cites reports on instrumentation making use of the infrared portion of the electromagnetic spectrum. The profile has value for providing ideas for instrumentation in many areas--whether infrared radiation is employed or not.

SIP-29 PHOTOGRAPHY. The profile is designed to service people engaged in the development or modification of photographic equipment. Most applications are the visual records of testing, and also aerial photography. Photography appears to be used more in government-sponsored scientific work than is generally true in industry.

SIP-30 DISPLAY SYSTEMS. A profile to cite reports about the design and development of display systems, and also the unique materials used. Reports are usually concerned with reports employing cathode ray tubes, but systems for data printing, xerography, or optical projection are also discussed. Manufacturers of display equipment may be particularly interested.

SIP-31 DATA TRANSMISSION. Reports are selected for their general applicability to data transmission problems, and they generally discuss the transmitting of experimental data from remote locations, usually by telemetry, but sometimes by wire.

SIP-33 RECORDING SYSTEMS. Data recording is the subject of most reports, and all kinds of recording instrumentation are discussed; magnetic systems predominate, but some reports also discuss graphic recording.

SIP-34 SEMICONDUCTOR DEVICES AND MICROCIRCUIT FABRICATION. This profile is primarily intended to service persons engaged in the design and fabrication of microelectronic components and devices. Reports discuss materials used, fabrication methods, and reliability testing.

SIP-35 MICROWAVE SYSTEMS. Development and design of microwave equipment, particularly for communication and radar. Microwave transmission technology.

SIP-36 RADIO ANTENNAS, TRANSMISSION AND PROPAGATION. The profile is intended to be of maximum benefit to persons concerned with commercial radio communications. Attenuation, noise, reflection, antenna design, refraction, information theory, signal reception and related topics.

SIP-37 RADIO COMMUNICATIONS EQUIPMENT. Most of the reports discuss components used in r.f. communications equipment, and the profile is intended to service persons designing and producing radio equipment.

SIP-38 RELIABILITY. The majority of reports discuss reliability in the design of products with a few reports on quality control in production. Electronic equipment is usually involved.

SIP-39 OPERATIONS RESEARCH. This profile is intended to service professionals in this field. Most reports are mathematical, and they are selected because they describe quantitative techniques of current interest in operations research.

SIP-40 COMPUTER INFORMATION SERVICE. Actual computer programs are announced by this profile. There are three to five per month selected for generality of application and completeness of documentation. Besides the programs, abstracts of reports on software are announced. All programs announced are available from the ARAC program library on cards or on tape.

SIP-41 PERSONNEL MANAGEMENT AND BEHAVIORAL SCIENCE. There are many reports pertinent to the behavior of man in an industrial work environment--both managerial and non-managerial. Most reports are at an advanced level so that persons deriving benefit are usually industrial psychologists.

SIP-43 BIOMEDICAL TECHNOLOGY. Instrumentation for medical uses, computer simulation of physiological processes, analyses of biomedical

test data. The profile is intended for persons designing biomedical equipment or making extensive use of it.

SIP-44 RADIOBIOLOGY. The medical effects of radiation. Effects of radiation on tissue. Radiation therapy and use of radiation for diagnosis. Health physics. Chiefly intended for medical researchers.

SIP-45 TURBINE TECHNOLOGY. All reports dealing explicitly with gas or steam turbines and their basic components.

SIP-47 PROPERTIES OF CERAMIC MATERIALS. Physical properties, structural phenomena, and analytical methods for ceramics. Most reports deal with basic research, and the profile should chiefly interest firms doing development work with ceramic materials.

SIP-49 CONTROL SYSTEMS ANALYSIS. The theory and design of control systems, mathematical analysis techniques. Intended for scientists and engineers developing control systems for moving bodies.

SIP-52 SENSORY DEVICES FOR INSTRUMENTATION. Devices used to detect, observe or measure a physical property or quantity. Reports are excellent suggestions for ways to obtain measurements more accurately, more quickly or under more extreme conditions than has previously been possible. The profile is for those interested in instrumentation.

SIP-55 INDUSTRIAL SYSTEMS MANAGEMENT. Planning and control of manufacturing operation with emphasis on the use of computerized information systems. Articles are taken from both open and government literature. The result is a selected program of current reading directed toward managers in manufacturing firms. Minimum of mathematics.

SIP-56 RESEARCH AND ENGINEERING MANAGEMENT. Oriented towards managers of scientific and engineering activities. Articles are taken from both open literature and from government reports to provide the manager with a selected program of the best in current reading.

SIP-60 SPACE-AGE ENERGY SOURCES. A continuing review of the latest work on battery developments, fuel cells solar cells, thermionic power conversion, etc. The purpose of the profile is to keep the reader abreast of the latest developments in power sources and provide reports concerning directions of future work.

SIP-63 INDUSTRIAL MATHEMATICS. Reports will cover differential equations, applied complex variables, functional analysis, numerical analysis and statistics. Its purpose is to provide reports on mathematical techniques most applied in scientific and engineering work, and the persons most likely to benefit are mathematicians who are consultants to research or engineering groups.

SIP-68 HEAT TRANSFER. The profile is intended for specialists in heat transfer problems. Theory and analyses of heat transfer, the interrelationships between materials properties and heat transfer, and heat transfer problems of unique nature.

SIP-70 HOLOGRAPHY. This area is growing in both popularity and volume of literature. Most reports are still basic research, but applications are increasing.

SIP-71 HUMAN FACTORS ENGINEERING. Reports are selected for the design engineer, discussing man-machine interaction, human responses to control systems, prediction of performance, error possibilities, and physical capabilities. The emphasis is on designing systems to fit human limitations.

SIP-73 ADVANCES IN GEOPHYSICS, GEOLOGY AND OCEANOGRAPHY. The profile is intended to service geologists engaged in work--either research or practice--related to oil and mineral exploration. Instrumentation is discussed, and the interpretation of subsurface structures by physical and chemical analysis.

SIP-74 MARKETING INFORMATION SERVICE. Most of the reports announced are from open literature. The profile provides a monthly review of selected reading for marketing executives and analysts, particularly those who are concerned with marketing technical products.

SIP-75 STRUCTURAL ANALYSIS TECHNIQUES. Reports are selected for mechanical and civil design engineers. Effects of mechanical and thermal loads on structures, stress analysis, creep and deflection of structure, computer-assisted design, and safety analysis.

SIP-76 PSYCHOPHYSIOLOGY. The profile is intended to service researchers interested in the interrelationship between physiological conditions and psychological reactions in humans. Testing systems for intelligence, fatigue, learning. Effects of drugs on psychological processes. Visual and auditory responses, perception, etc.

SIP-77 NEUROCHEMISTRY AND BIOCHEMISTRY. Of interest to research workers concerned with metabolism and biochemistry of the brain, blood chemistry, protein composition of man, or the effects of drugs on neural processes.

1968 GUIDE TO ARAC

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AEROSPACE RESEARCH APPLICATIONS CENTER

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GUIDE TO THE STANDARD INTEREST PROFILES

January 31, 1968

Since the inception of Standard Interest Profiles (SIP) in November, 1966, they have been widely accepted by ARAC member companies. For 1968 we are making several changes in these profiles, which we think will improve their usefulness for keeping scientists and engineers currently aware of the results of government sponsored research and development.

SIP's provide abstracts of recently released government reports grouped in topic areas selected to be of interest to scientists and engineers engaged in non-government research. These profiles are mailed to recipients either once a month or twice a month, depending on the sources of the abstracts and the frequency of their release. Full copies of the reports described by the abstracts may be obtained from ARAC except those marked, "NOT AVAILABLE FROM ARAC." With most profiles, 50% or more of the reports cited are available at a cost of 6¢ per page, with a minimum of $3.00 per report. Most member companies have an arrangement with ARAC whereby document costs are accumulated and billed once each six months so that individuals ordering documents need not be personally involved with the billing details.

The ARAC staff defines the SIP topic areas and selects report announcements appropriate to them. The subjects covered reflect five years of experience in matching the interests of scientists and engineers with the type of technical reports which are generated by NASA, the Department of Defense, the Atomic Energy Commission, or contractors of these agencies. The number of topic areas, or profiles as we call them, now offer very complete coverage of these sources of technical work. As a result, one of the benefits of these SIP descriptions is that they allow scientists and engineers to quickly determine what segments of government supported technical literature may be of value to them. Most of the SIP's are designed so that report announcements will be selected that are of interest to scientists, engineers and managers working in industrial research and development.

In contrast to the Standard Interest Profiles, ARAC also offers Custom Interest Profiles (CIP). The name designates that the topic areas are defined by the recipients themselves, usually with the aid of consultation from the ARAC staff. For persons who may wish to see announcements of government reports on a combination of subjects which do not correspond with the SIP topics, we recommend a Custom Interest Profile. The cost is higher, but is sometimes worth it for special interests. ARAC staff members are able to discuss your interests and give you some preliminary ideas about whether a sufficient number of reports on relevant subjects have been observed to warrant the development of a Custom Interest Profile.

For 1968 the literature base has been expanded for all SIP's to include:

1. Scientific and Technical Aerospace Reports (STAR), covering NASA reports, NASA contractor reports, selected DoD and AEC reports, and selected foreign literature. Twenty-four issues per year. Approximately 1200 report announcements per issue at present.

2. International Aerospace Abstracts (IAA), covering selected announcements from over eight hundred technical journals, both domestic and foreign. Selections are made based on aerospace interests, but reports of interest to non-aerospace activities are often cited. Twenty-four issues per year. Approximately 1200 report announcements per issue at present.

3. United States Government Research and Development Reports (USGRDR). This is the report announcement journal of the U.S. Department of Commerce. All the unclassified reports generated by the Department of Defense are announced in it, as well as a number of reports from miscellanious government agencies. Twenty-four issues per year. Approximately seven hundred report announcements per issue which do not overlap with STAR or IAA.

4. Nuclear Science Abstracts (NSA), covers reports issued by the Atomic Energy Commission and its contractors, and also cites selections from world literature which may be applicable to the work of the AEC, but many of these reports are also applicable to non-AEC work. Twenty-four issues per year, averaging 2000 report announcements per issue.

5. Aerospace Medicine and Biology. This is a monthly publication which cites reports from world literature which may apply to problems in space and flight medicine. There are about 300 such announcements per month.

6. Open Literature. The ARAC staff surveys non-government literature on a limited basis and for only a few profiles. For details see the descriptions of SIP-39, SIP-55, SIP-56, and SIP-74. All these are management related areas.

In the development of SIP topics, two criteria have been observed. The first criterion is that reports in these areas have been found to be of general interest to scientists and engineers in some sector of private industry. For example, the SIP on "Bearings and Lubricants" has been found useful to a wide variety of companies. The second criterion is that ARAC expects on the average to identify five to fifty reports relevant to each topic for every mailing although there is some variation from one profile to another and often great variation from one mailing to another.

Standard Interest Profiles are available for $80.00 per year for member companies and for $120.00 per year for non-member companies. If you wish to order a Standard Interest Profile, the 'SIP'-prefixed reference number is sufficient to identify it to us. Requests for SIP's

may be sent to ARAC at any time, and for member companies we will check with the company's ARAC coordinator regarding membership status and billing details for both announcement services and document requests. Inquiries about your company's status are welcome and will be promptly answered.

AEROSPACE RESEARCH APPLICATIONS CENTER

STANDARD INTEREST PROFILES
TITLE LIST
1968

SIP-02	CRYSTAL GROWTH
SIP-03	CARBON AND GRAPHITE
SIP-04	PHYSICAL METALLURGY
SIP-05	POWDER METALLURGY
SIP-06	HIGH TEMPERATURE APPLICATIONS OF METALS
SIP-07	MATERIALS JOINING TECHNOLOGY
SIP-08	MATERIAL FORMING AND MACHINING
SIP-09	MICROANALYSIS AND PROPERTIES OF ENGINEERING MATERIALS
SIP-10	NON-DESTRUCTIVE TESTING
SIP-11	CORROSION AND PROTECTIVE COATINGS
SIP-13	BEARINGS AND LUBRICANTS
SIP-15	FLUID FLOW ANALYSIS
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SIP-17	AIR-WATER POLLUTION AND INDUSTRIAL SAFETY
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SIP-20	POLYMER TECHNOLOGY
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SIP-35	MICROWAVE SYSTEMS
SIP-36	RADIO ANTENNAS, TRANSMISSION AND PROPAGATION
SIP-37	RADIO COMMUNICATIONS EQUIPMENT
SIP-38	RELIABILITY*
SIP-39	OPERATIONS RESEARCH*
SIP-40	COMPUTER INFORMATION SERVICE*
SIP-41	PERSONNEL MANAGEMENT AND BEHAVIORAL SCIENCE*
SIP-42	HUMAN RESPONSE TO ENVIRONMENTS
SIP-43	BIOMEDICAL TECHNOLOGY
SIP-44	RADIOBIOLOGY
SIP-45	TURBINE TECHNOLOGY
SIP-47	PROPERTIES OF CERAMIC MATERIALS
SIP-49	CONTROL SYSTEMS ANALYSIS

SIP-52	SENSORY DEVICES FOR INSTRUMENTATION
SIP-55	INDUSTRIAL SYSTEMS MANAGEMENT*
SIP-56	RESEARCH AND ENGINEERING MANAGEMENT*
SIP-60	SPACE-AGE ENERGY SOURCES
SIP-63	INDUSTRIAL MATHEMATICS
SIP-68	HEAT TRANSFER
SIP-69	DIELECTRIC TECHNOLOGY
SIP-70	HOLOGRAPHY
SIP-71	HUMAN FACTORS ENGINEERING
SIP-73	ADVANCES IN GEOPHYSICS, GEOLOGY, AND OCEANOGRAPHY
SIP-74	MARKETING INFORMATION SERVICE*
SIP-75	STRUCTURAL ANALYSIS TECHNIQUES
SIP-76	PSYCHOPHYSIOLOGY*
SIP-77	NEUROCHEMISTRY AND BIOCHEMISTRY

*These profiles are mailed once a month. All others will be mailed twice a month.

NEW AND REVISED PROFILES

There are now 56 Standard Interest Profiles, up from 46 announced in July, 1967. Eleven new topic areas have been added and two have been combined together for a net increase of ten profiles.

SIP-01, INORGANIC FIBER TECHNOLOGY, has been combined into SIP-19 to form a revised profile called REINFORCED COMPOSITE MATERIALS.

The eleven new areas are:

SIP-38 RELIABILITY
SIP-39 OPERATIONS RESEARCH
SIP-41 PERSONNEL MANAGEMENT AND BEHAVIORAL SCIENCE
SIP-55 INDUSTRIAL SYSTEMS MANAGEMENT
SIP-56 RESEARCH AND ENGINEERING MANAGEMENT

SIP-69 DIELECTRIC TECHNOLOGY
SIP-73 ADVANCES IN GEOPHYSICS, GEOLOGY AND OCEANOGRAPHY
SIP-74 MARKETING INFORMATION SERVICE
SIP-75 STRUCTURAL ANALYSIS TECHNIQUES
SIP-76 PSYCHOPHYSIOLOGY
SIP-77 NEUROCHEMISTRY AND BIOCHEMISTRY

The first group of five topics has been established as a result of being a part of our experimental Management Science Service during 1967, and are new only in the sense of now having been stabilized.

STANDARD INTEREST PROFILE DESCRIPTION LIST

The description list, which begins on the following page, is as factual as possible and in outline form for rapid scanning. We have tried to make these descriptions identify as accurately as possible the subjects of the reports to be provided by the profile. Although the descriptions are lengthy, we feel that the detail is useful for telling what is in this literature. Readers who would like to use this guide to help in describing their own custom interest profile may reference either entire profile descriptions or specific paragraphs and sub-paragraphs of the descriptions. The index also may be helpful for this.

No attempt has been made to classify the reports received into mutually exclusive categories. Any given report may be cited in several different SIP's if it is appropriate, and this overlap is reflected in the descriptions. For example, it is possible to see an abstract regarding a structural adhesive in both the MATERIALS JOINING profile, SIP-07, and in REINFORCED PLASTICS, SIP-19, and the same report may even be referenced in SIP-09, STRUCTURAL ANALYSIS AND MECHANICAL PROPERTIES OF MATERIALS, if a stress-strain analysis is part of the discussion.

SIP-02 CRYSTAL GROWTH

Reports are selected for this profile which discuss crystal growth; discussion of crystal structure or properties is included only when crystal growth is mentioned in the same report.

Crystal growth and nucleation

Techniques of crystal growth

Vernueil
Czochralski
Hydrothermal
Other

Mechanisms of crystal growth

Growth of various types of crystals

Single
Clusters
Thin film

Conditions for crystal growth

Pressure
Temperature
Atmosphere
Discussions of variation in conditions

SIP-03 CARBON AND GRAPHITE

This profile focuses on carbon and graphite as a structural or insulating material.

Techniques for production of carbon and graphite

Physical properties of carbon and graphite

Crystal growth of both

Crystal structure and defects of both

Formation, structure, and properties of various carbides

Applications frequently mentioned

- Use as refractory material
- Use as nuclear reactor cores
- Carbon and graphite fibers
- Carbon and graphite coatings

About half the reports concern basic research, and the rest are discussions of development and applications.

SIP-04 PHYSICAL METALLURGY

Most of the reports furnished for this profile deal with the microstructure of metals.

Physical properties of metals

- Crystal structure
- Diffusion mechanisms
- Atomic structure
- Dislocation initiation and movement

Methods of analysis and examination

- Electron microscopy
- X-Ray diffraction
- Micrography
- Occasional reference to sample preparation

Metals usually discussed

- Steel, aluminum, and beryllium alloys
- Pure metals including copper and nickel
- Some reference to high-temperature alloys and refractories
- Limited reference to exotic metals and rare earths
- Numerous references to titanium deleted

This profile will be of primary value to persons in research and development and perhaps quality control. Because the content is generally detailed and supported by data, a majority of these citations will not find immediate process application. They will, however, assist in development and control problems where materials selection and evaluation are concerned.

SIP-05 POWDER METALLURGY

The manufacture of powder products from powdered metals is the primary subject.

Manufacture of powders of following (only a limited number of citations)

- Ferrous metals
- Refractories in addition to cermets and ceramics
- Occasional reference to uranium
- Reference to graphite and sintered aluminum deleted

Manufacture of powder products

- Equipment and processes including compaction, extruding, and forming
- Use of fibers as a strengthening mechanism
- Annealing of powder compacts
- Sintering

Analysis and uses of powders and powder products

Anyone involved in the manufacture of powders or powder products should find this profile useful.

SIP-06 HIGH TEMPERATURE APPLICATIONS OF METALS

Although material development is discussed, the major topic is material application in high temperature environments.

Metals referenced

Metals and alloys used in temperature range (1000^{o} - 3000^{o} F)

Refractories and ceramics

Heat resistant nickel alloys

High-temperature coatings, generally ceramic

Occasional reference to titanium

Fabrication and uses of high-temperature alloys

Properties of these metals

Corrosion resistance, including corrosion prevention

Effects of alloying additions on properties

Although the applicability of this profile is rather specialized, the data contained in these reports should be of substantial value to the design engineer or product development engineer. Anyone desiring information on newly developed high-temperature alloys should also find this profile quite helpful.

SIP-07 MATERIALS JOINING TECHNOLOGY

Materials joining is here interpreted very broadly to include all kinds of materials and fastening methods.

Techniques and processes for joining materials.

- Welding
- Brazing
- Soldering
- Adhesives
- Fasteners

Methods for examining bonds.

- Nondestructive testing for defects.
- Testing for strength of bonds, fatigue strength, etc.

Small amount of information on coating and plating.

Emphasis is usually on new techniques and processes for bonding new or special materials. Some reports also deal with specialized applications (heat shields, etc.). Profile should be useful to the design or product engineer keeping abreast of materials joining techniques and to the individual looking for better or more economical processes for existing joining processes.

SIP-08 MATERIAL FORMING AND MACHINING

Forming and machining processes are usually cited in reference to the fabrication of a particular product. These are the primary subjects.

Forming and machining processes

- Laser machining and laser applications in general
- High-energy-rate forming including explosive forming
- Process oriented articles are frequently cited (i.e., as applied to the manufacture of a particular product)
- Numerically controlled equipment
- Occasional reference to conventional processes (e.g., rolling, EDM, milling, etc.)

Materials usually referenced

- Steel and aluminum alloys and numerous nonferrous metals
- Limited reference to cermets and ceramics
- Occasionally, non-metallic materials including printed circuit laminates and polymerics

Effects of forming and machining on material properties.

Data on the machining and forming of particular materials will be of interest to the product engineer and perhaps the tool design engineer. Process oriented articles will be of value in laying out a machining or forming facility which is in the design stage or in the re-evaluation of an existing one. In addition, machine designers will find the citations on numerical control valuable.

SIP-09 MICROANALYSIS AND PROPERTIES OF ENGINEERING MATERIALS

This profile covers both theoretical and empirical reports dealing with microphenomina of metallic and non-metallic structural materials.

Typical subjects:

Mechanical or thermal loads on materials
Fatigue
Crack propagation
Creep
Plastic deformation

Also data from materials testing when such data are related to structural design. Examples:

Mechanical properties of structural materials (yield point, fatigue limit etc.)
Effect of environment on structural materials

Structural analysis is not the subject of this profile, but is the subject of a separate profile, SIP-75, STRUCTURAL ANALYSIS TECHNIQUES.

SIP-10 NON-DESTRUCTIVE TESTING

Because many of the reports on this subject deal with hardware and methods which are operationally practical, this has been a very useful area for industrial application.

Evaluation and Application of various Non-Destructive Testing Methods:

Methods more frequently discussed:

Ultrasonic and Sonic
Thermal (Infrared)
X-Rays
Optical

Methods less frequently discussed:

Eddy Current
Gamma Rays
Magnetic Particle
Penetrants
Leak

Testing of various types of bonds:

Welds
Brazed Joints
Adhesive-Bonded Joints

Development and Design of New Testing Equipment

Measurement of Stresses and Detection of Flaws in Various Types of Materials

Metals
Polymeric Materials
Plastics

Testing of Electronic Components:

Inspection of Printed-Circuit Boards
Thickness Measurements of Films
High-Reliability Screening of Semiconductor and Integrated Circuit Devices.

This profile is designed to service persons interested in the development, design and application of non-destructive testing methods. To date, the more successful applications have been in the areas of quality control and reliability testing, stress analysis and thickness measurements.

SIP-11 CORROSION AND PROTECTIVE COATINGS

The intent of this profile is to provide reports applicable to the mitigation and prevention of industrial corrosion problems.

Corrosion

Types reported:

General chemical attack
Stress corrosion cracking
Fretting
High-temperature corrosion
Pitting

Corrosion Mechanisms

Detection and measurement techniques

Protective coatings

Types:

Paints, organic and inorganic
Claddings and platings

Evaluation:

Comparison studies
Methods of testing

Application techniques:

Vapor deposition
Spraying

Abstracts discussing new corrosion resistant alloys are included for use of those involved in materials selection. While many of the reports in this area are quite specialized, they provide an excellent source of ideas dealing with test methods and the interpretation of data.

SIP-13 BEARINGS AND LUBRICANTS

Because it is impossible to consider the problems of bearings and lubricants separately, the two subjects are grouped together in this profile.

Types of bearings reported

- Ball and roller bearings
- Journal and sleeve bearings
- Gas bearings
- Self-lubricated bearings
- Non-metallic bearings
- Bearings used in liquid metals (a large volume of this is suppressed)

Types of information reported about bearings

- Bearing design
- Bearings Testing
- Failure analyses--rolling contact studies, etc.
- Wear and corrosion effects
- Effects of vibration, fatigue, stresses--application conditions
- Materials selection and testing for bearings

Types of lubricants reported

- Oils and greases
- Solid lubricants, many of them coatings
- Self-lubricating materials

Types of lubrication information reported

- Wear testing
- Wear and friction phenomena
- Testing of lubricant and bearing combinations under varying loads, speeds and environments
- Analyses of how lubricating phenomena take place, both theory and observation
- Novel lubrication methods, example: turbocooler bearings
- Analyses of lubricant composition

Topic related to bearings and lubricants

- Seals and sealing materials
- Nondestructive test methods
- Reliability analysis

The object of much of the work reported is to develop bearings and lubricants for unusual or extreme operating conditions. Other areas of information deal with theoretical analysis of bearings. This profile is directed toward those individuals seeking the most recent developments in advanced bearing and lubrications technology.

SIP-15 FLUID FLOW ANALYSIS

All types of fluid flow reports are identified by this profile except those dealing with aerodynamics, particularly in the regions of supersonic and hypersonic flow.

Compressible flow

- Boundary layer conditions
- Vortex flow
- Effects of geometry

Incompressible flow

- Boundary layer conditions
- Vortex flow
- Effects of geometry

Effects of magnetic fields on flow

Thermal effects on flow

Two-phase flow

- Gas-liquid
- Gas-solid
- Liquid-solid

Flow measurement

- Flow velocity measurement--pitot tubes, anemometers, etc.
- Mass flow rate measurement
- Turbulence measurement
- Calculations and correction factors

Flow properties of non-Newtonian fluids

Fluid flow applications

- In hydraulic systems
- Fuel flow in engines and turbines
- Fluid logic systems
  - Fluid amplifiers
  - Gates, switches, other fluid logic elements
  - Design and manufacture of fluid logic components
  - Applications

This profile is designed to be of interest to persons taking an analytical approach to problems of fluid flow. Empahsis is placed on including reports which discuss empirical findings. However, a number of reports dealing with theory are also included.

SIP-16 HYDROCARBON FUELS AND COMBUSTION

This profile identifies reports on fuels for air-breathing engines, with rocket fuels being excluded. Because the literature base comes from aerospace work, many of the fuels discussed are for turbines, but fuels for reciprocating engines are sometimes reported.

Combustion Analysis

- Chemical mechanisms of combustion
- Thermodynamics of combustion--kinetics
- Combustion conditions: velocity, temperature, pressure
- Exhaust analysis
- Vaporization
- Testing--usually of new fuels or additives

Fuel analysis

- Chemical content analysis
- Fluid flow properties
- Corrosion effects, and lubrication effects
- Storage properties--microbial contamination
- Heat transfer properties (without combustion)

Combustion testing

- Test instrumentation
- Test methods

The reports cited by the profile are thought to be of interest to persons interested in internal combustion engine fuels in general, and to persons interested in aviation fuels in particular.

SIP-17 AIR-WATER POLLUTION AND INDUSTRIAL SAFETY

Due to the increasing emphasis placed upon both pollution control and industrial safety, a profile has been initiated to serve those of our members having interest in these fields. The material contained in this profile can be described in the following manner.

Air Pollution

- Effects of stack height and design upon the dispersion of stack gases
- Detection and measurement of foreign substances in the atmosphere
- Atmospheric purification - discussions are usually limited to small systems, i.e. submarines, spacecraft, and clean room facilities

Water Pollution

- Detection and removal of trace elements from water
- Pollutants in large seals supply systems
- Water reclimation for small systems
- Waste management for small self-contained systems - spacecraft

Industrial Safety

- Safety procedures concerning radiation hazards
- Chemical toxicity studies
- Evaluation of fire extinguishing systems
- Alarm meters for detection of toxic gases

SIP-18 ANALYTICAL CHEMISTRY

The reports cited in this profile deal with both qualitative and quantitative methods of the chemical analysis of materials. Abstracts which discuss both instrumental analysis and wet chemistry techniques are included.

Methods of Analysis discussed:

- Electrochemical methods
- Gas chromatography
- Infrared or microwave spectroscopy
- Mass spectroscopy
- Nuclear magnetic resonance and electron spin resonance
- Photometric techniques
- Radioactive tracer techniques
- Titrometric analysis

Materials Treated

- Alloy systems
- Gaseous atmospheres
- Hydrocarbon fuels
- Impurities in liquid metal systems
- Interstitial compounds
- Meteorites
- Trace elements in soils and water
- Other compounds requiring unique approaches to analysis

This profile is designed to aid the analytical chemist in keeping abreast of a new technique of analysis and also to furnish ideas on possible equipment modifications to serve in special situations. A specific example is the adapting of laboratory equipment for continuous on-line analysis.

SIP-19 REINFORCED COMPOSITE MATERIALS

This profile is centered on various methods of metal, ceramic, plastic, or polymer reinforcement including both theoretical and empirical relationships. Also included is the technology used in producing all types of fibers.

Manufacture of Fibers

Growth and production of fibers and whiskers; metallic, ceramic, and plastic
Spinning or drawing of fibers and filaments

Testing of Fibers, Filaments, Flakes, etc.

Structural Application

RFP composites for aircraft structures
Applications of RFP for aerospace use
Reinforced composites for structural use

Uses of Fibers for Reinforcements

Reinforcement of metals and ceramics; fabrication, testing, etc.
Interface properties between matrix and fibers
Filament winding technology

Chemistry and Physics of Reinforced Plastics

Curing of RFP
Mechanical behavior of fiber reinforced plastics
Void detection in fiber reinforced composites
Elastic properties of fiber reinforced materials
Effect of fiber spacing in composites

Articles cited by this profile cover all aspects of composites: preparation, testing, stress analysis, environmental compatibility, etc., and should be of use in design work and also the manufacture of reinforced materials. The information is also of major use in the R & D of structures and of product replacement.

SIP-20 POLYMER TECHNOLOGY

This profile was designed to include practically all material that the source literature contains on the subject of plastics, polymers, rubbers, elastomers, etc. excluding the reinforced plastics area covered in SIP-19: Reinforced Plastics.

Development and synthesis of polymers, rubbers, and plastics

- Improvement of organic resins and study of their thermal behavior
- Curing plastics with gamma radiation
- Development of improved adhesives for use at cryogenic temperatures
- Development of lightweight thermal insulation materials
- Development of improved sterilizable potting compounds and conformal coatings.

Industrial & Aerospace Applications for Plastics, Rubbers and Polymers

- Encapsulations and coatings for aerospace environments
- Temperature limitations of polymeric materials
- Adhesion of encapulants in various semiconductor applications
- Polybenzamidiazole structural adhesives
- Ablative material performance under reentry conditions

Destructive and non-destructive testing of polymers, rubbers and plastics

- Wear of plastics in water
- Microwave in nondestructive testing of polymers

Polymer Chemistry and Physics

- Decomposition kinetics of ablative materials
- Molecular theory for behavior of amorphous polymers
- Principles in radiation chemistry of organic compounds
- Properties of polyester resin binders
- Rheology of viscoelastic medium

The material contained in this profile will be of use to practically anyone concerned with material development. The information varies from basic research to applicability in manufacturing processes. It generates a bimonthly current awareness that includes all major developments in the polymer area that are contained in our literature sources.

SIP-21 TEMPERATURE MEASUREMENT

This profile deals with temperature measurement problems and new techniques for attaching them. Many of the reports concern low temperatures (below -100°F) or high temperatures (above 2000°F).

Temperature measurement techniques

Temperature measurement instruments

- Thermocouples
- Thermistors
- Pyrometers
- Temperature Probes

Discussion of errors involved in measurement

Temperature measurement under usual conditions

Temperature measurement of extreme temperatures

Temperature control systems

High speed temperature measurement techniques

Measurement of temperature is the focus of this profile, and few reports are included which deal primarily with heat transfer since these can be found in SIP-68, HEAT TRANSFER.

SIP-22 VACUUM TECHNOLOGY

The profile concerns equipment and instrumentation used for vacuum and low pressure work, and many reports dealing with materials properties in vacuum.

Devices to measure vacuums, or to make measurement in vacuum

- Vacuum chamber design and instrumentation
- Switches
- Gauges
- Leak detectors

Materials properties

- Methods for testing materials in vacuum
- Lubricant properties in vacuum
- Surface properties
- Outgassing effects
- Seals

The profile should be particularly useful as a continuing survey of properties of materials in a vacuum. Because much materials testing is for space application, the effects of cryogenic temperatures or of radiation is sometimes combined with that of the vacuum.

SIP-24 LASER DEVELOPMENTS

This profile surveys the field of laser technology with emphasis on applications.

Advances in Laser Technology

- New materials for lasers
- New techniques

Surveys and State-of-the-Art Reports

Laser Applications

- Communications
- Displays
- Measurements (primarily interferometry)
  - distance
  - velocity
  - particle size
  - density
- Holography (only survey articles)
- Optical radar
- Machining and Welding

This profile should be useful to those interested in keeping abreast of this rapidly growing field, but who do not wish to read technical research reports, which are included in another profile, Laser Research, SIP-25. Holography is included in SIP-70.

SIP-25 LASER RESEARCH

This profile cites reports dealing with basic phenomena of stimulated emmission of radiation; both solid and gas lasers, semiconductor lasers, Gunn diodes, etc.

Theories of laser action and mathematical models.

Material used.

- Energy level investigations.
- Effects of impurities.
- Dopants.
- Materials preparation and associated problems.

Laser operation.

- Stabilization.
- Efficiencies.
- Q-spoiling techniques.
- Excitation or pumping techniques, and cavity design.
- Laser coupling.
- Control techniques: Modulation and demodulation.

Studies of coherent radiation phenomena.

- Spectral analyses.
- Deflection of laser beams.
- Frequency shifts or other modification of laser beams.

This profile cites a large number of reports each issue (30 or more). Together with SIP-24 on LASER DEVELOPMENTS, the entire area of laser research and development is covered. Many of the reports describe foreign work.

SIP-26 CRYOGENICS AND SUPERCONDUCTORS

About half of the reports cited by this profile deal with superconductors, and many of the rest describe work related to the handling of liquid fuels or oxidizers. Materials testing at low temperatures is also discussed.

Equipment

- Liquefaction Processes
- High Vacuum Equipment
- Diffusion Pumps-Getter Pumps
- Temperature Measurement

Storage of Liquids

- Design of Tanks
- Insulation Materials

Thermodynamics

- Properties of Gases
- Stratification of Liquids
- Boiling Characteristics of Liquified Gases

Superconductors

- Applications
- Theoretical Investigations

SIP-27 LOGIC CIRCUITS

Logic device, as defined in this profile, refers to any device having two stable states and two input terminals, each of which corresponds with one of the two states. Numerous combinations and arrangements of such logic devices are utilized in digital computers and control devices.

Development and Design of Various Types of Logic Devices

- Binary Multipliers
- Gates
- Oscillators
- Adders
- Shift registers
- Memory units
- Fluidic logic circuitry & fluidic amplifiers
- Pneumatic switching circuits
- Trigger circuits
- Timers

Utilization of Microelectronic Components in Computer Hardware

- Large scale integration
- Fabrication of integrated logic circuits

Design of Digital Computers

- Computer organization
- Multiprocessor Computer systems
- Parallel processing computer systems
- Utilization of the computer to design new computer systems
- Redundancy
- Error correction & self repair

Novel Applications of Logic Devices

- Numerical control machines
- Analog-to-digital conversion
- Process control equipment

This profile is designed to service primarily those persons engaged in the development and design of logic devices, primarily electrical but also fluidic and pneumatic devices. In addition, people involved in the design of digital computer systems and in the application of logic devices would derive some benefit from the reports cited in this profile.

SIP-28 INFRARED INSTRUMENTATION

This profile is device-oriented, and abstracts on theory are not announced unless applications of the theory are either obvious or explicitly discussed.

Sensors

- Materials used in infrared detectors
- Detector systems

Absorption and Reflection

Spectroscopy and IR Specta of Various Materials

Applications

- Heat measurement
- Non-destructive testing and quality evaluation
- Image analyzers
- Image intensifiers
- Thermal control coatings
- Horizon finders
- Cloud cover scanners
- Photography and thermography
- IR lasers, filters

The nature of many articles is such that they should provide ideas for instrumentation in many other areas.

SIP-29 PHOTOGRAPHY

This profile covers photography from design to special applications.

Photographic display systems

Photographic method of studying stellar images

Surveyor television photographs

Cameras

Automatic exposure control systems

Photographic measurements of shock waves

Photomap production

Minimization of non-uniform photographic plate fog

Aerial photography (high resolution)

Calibration of cameras for simultaneous observations

High speed photography

Resolving power of photographic infrared films

Photographic reproduction of cellulose nitrate plates

Laser photography

Photographic data processing

Image transfer for printed circuits

Lunar photography

This profile is designed for people engaged in research, development, and design of photographic equipment. Although applications are included, it is not intended for the amateur photographer.

SIP-30 DISPLAY SYSTEMS

The new technological advances and applications of display systems are the subjects covered in this profile.

Display symbol legibility

Solid state display techniques

Display applications (various and wide)

Solid state display devices

Pictorial information displays

CRT displays

Radar display system

Standard radio and telephone daylight display system

Computer driven displays

Integrated film reading and display system

Weather information remoting and display system

Predictor display techniques

Pattern recognition

Computer data displays

This profile is intended for people working in research design and development of information displays or CRT's. It may also be useful to persons interested in applications such as computer information displays or air traffic control. This profile does not include racks, stands, easels, or store displays. Holography is the subject of SIP-70.

SIP-31 DATA TRANSMISSION

The emphasis of most reports is on telemetry systems, but reports on wire transmission are also included.

Telemetry of spacecraft navigational and experimental data

Telemetry of monitored biological data

Transmission of experimental data from remote locations.

Telemetry data processing systems

Data coding and decoding

Data modulation and demodulation

Information theory

The majority of the reports are oriented toward spacecraft, but they have industrial applicability. Reports are selected for their general applicability to data transmission problems, not for their discussion of specialized hardware for space use.

SIP-33 RECORDING SYSTEMS

The recording systems discussed are nearly all for the recording of experimental data, but many types are sometimes discussed--audio, video and graphic.

Multi channel tape recording

High density digital recording systems

Magnetic recording systems

Digital and analog recording techniques

High definition star spectra recording instrument

Wind recording instruments

Multi-audio video tape recording

Mechanical recorders

This profile is designed for persons in research and development as well as for people who use recording systems since reports covering the spectrum from design to applications are included.

SIP-34 SEMICONDUCTOR DEVICES AND MICROCIRCUIT FABRICATION

Technical information concerning fabrication techniques and reliability analysis applicable to the miniaturization and integration of active circuit elements (diodes, transistors, etc.) and passive components (resistors, capacitors, inductors) receives primary emphasis in this profile.

Research and Development of Microcircuit/Semiconductor Materials

- Silicon Compounds
- Germanium
- Gallium Compounds
- Indium Compounds

Fabrication of Microelectronic Devices

- Doping
- Deposition
- Encapsulation
- Interconnection
- Packaging

Reliability Testing of Microelectronic Devices

- Voltage Breakdown Analysis
- Step Stress Analysis
- Radiation Effects Analysis
- Screening Programs

Partial List of the Types of Microelectronic Devices Included in the Profile

- Transistors
- Diodes
- Rectifiers
- Integrated Circuits
- Microcircuits
- Thin Film Resistors and Capacitors
- Logic Circuits
- Optoelectronic Devices (No Lasers or Masers)
- Monolithic
- Hybrid Circuits
- Organic Semiconductors
- Large Scale Integration
- Field Effect Transistors

This profile is designed to service primarily those persons engaged in the design and fabrication of various microelectronic devices. In addition, those people involved in the research and development of microelectronic devices would benefit from some of the reports cited in this profile. Reports discussing applications of microelectronic devices have been eliminated.

SIP-35 MICROWAVE SYSTEMS

Technical information concerning microwave communication equipment, components and microwave transmission technology receive primary emphasis in this profile.

Development and Design of Microwave Equipment

- Transmitters
- Receivers
- Transceivers
- Transponders
- Antennas

Development and Design of Microwave Circuit Components

- Gunn Diodes
- Oscillators
- Resonators
- Frequency Multipliers
- Phase Shifters
- Parametric Amplifiers
- Circulators
- Mixers
- Detectors
- Varactor Diodes
- Filters
- Travelling Wave-Tubes
- Klystron Tubes

Research and Development of Microwave Transmission Technology

- Noise Measurement and Analysis
- Radar Transmission
- Video Data Transmission
- Digital Data Transmission
- Analog Data Transmission
- Interference and Shielding Analysis

This profile is designed to service primarily those persons engaged in the development and design of microwave devices, especially those devices utilized in communication and radar equipment. In addition, reports concerning important developments in microwave transmission technology are also included as are reports representing novel applications of microwave devices.

SIP-36 RADIO ANTENNAS, TRANSMISSION AND PROPAGATION

Radio frequency transmission and propagation is emphasized in order to make this profile of maximum benefit to persons concerned with commercial radio communications. Persons with more interest in microwave frequency propagation can receive this in SIP-35, MICROWAVE SYSTEMS.

- Antennas
  - Mechanical Design
    - Configuration design
    - Reflectors
    - Dimensions and dimensional stability
    - Selection of materials
  - Properties
    - Signal distortion
    - Geometry of radiation reflection
    - Gain and bandwidth characteristics
    - Arrays and phasing
- Transmission and propagation
  - Field strength measurements
  - Loss measurements
  - Attenuation and interference
  - Effects of nature--weather, solar wind, etc.
  - Transmission line properties and design
- Signal reception and processing
  - Modulation and demodulation
  - Multiplexing
- Information theory
  - Encoding and decoding
  - Error probabilities
  - Signal-to-noise ratios

SIP-37 RADIO COMMUNICATIONS EQUIPMENT

The intent of the profile is to select reports about equipment useful for voice transmission, leaving the transmission of data to the TELEMETRY profile, SIP-31. Most of the reports are concerned with components rather than communication systems.

Components frequently mentioned:

- Mixers
- Transceivers
- Transmitters
- Transponders
- Receivers
- Amplifiers
- Modulators, demodulators
- Multivibrator systems

Topics excluded:

- Microwave and radar equipment
- Aero-navigation equipment
- Antennas and propagation

The profile is intended to be of interest to the communications industry, particularly businesses involved in design and production of radio equipment.

SIP-38 RELIABILITY

The majority of abstracts will be found to concern reliability in the design of products, but a few reports will also pertain to quality control processes in production. Emphasis is on reliability and quality control of electronic equipment, but new work regarding the reliability of mechanical systems is also cited.

Besides government reports each mailing will also include abstracts from Reliability Abstracts and Technical Reviews, a NASA-sponsored review of all open literature concerning reliability. RATR contains not only abstracts, but brief critiques of each article.

Product Reliability

- Product Assurance
- Performance Characteristics
- Life Prediction
- System Reliability
- Failure Analysis
- Product Design
- Accelerated Testing
- Reliability Models
- Statistical Distributions
  (e.g. Weibull, Exponential)

Reliability Management

- Project Quality Performance
- Reliability Specifications and Procedures
- Reliability & Quality Assurance Plans and Programs
- Quality Reporting Systems

Industrial Quality Control

- Inspection Methods
- Process Inspection & Control
- Production Test Equipment
  (Applications, Procedures, & Devices)
- Statistical Methods
  (e.g. Sampling Plans, Control Charts)

*Announcements are mailed once a month.

SIP-39 OPERATIONS RESEARCH*

"Operations Research" is defined as consisting of various quantitative or analytical techniques and approaches required to formulate and solve problems of interest to management. This profile will contain a high percentage of reports requiring advanced knowledge in the understanding and application of mathematical techniques.

Established Operations Research & Quantitative Techniques

- Monte Carlo Methods
- Queuing Theory
- Programming (Linear, Non-Linear, Dynamic, Integer)
- Simulation Techniques
- Markov Processes
- Decision Theory
- Game Theory
- Maximization of Minimization Techniques
- Mathematical Modeling
- Linear Algebra
- Optimization Techniques
- Stochastic Processes
- Sequential Analysis
- Bayesian Analysis
- Matrix Algebra
- Sensitivity Analysis

Management Problem Areas -- Examples of Application of Quantitative Approaches to:

- Forecasting
- Scheduling
- General Allocation of Resources Problems
- Inventory Control
- Distribution
- Marketing

The majority of reports found will belong in the first category, discussions of established quantitative tools. The profile is intended for the specialist in Operations Research.

*Announcements will be mailed monthly.

SIP-39 OPERATIONS RESEARCH (Continued)

Besides the government report literature, each mailing will list a notation of contents of leading journals in Operations Research. This listing includes the following information for each article:

1. Title and Authors
2. A list of the principal references cited by authors in the text of the articles. The purpose of this is to let our readers know from what previous work the article was primarily developed.
3. Occasionally, a one sentence description may be used.

The list of journals being covered by this profile in January, 1968, is below. Other journals may be added during the course of the year.

MANAGEMENT SCIENCE
OPERATIONS RESEARCH
ECONOMETRICA
OPERATIONS RESEARCH QUARTERLY
INDUSTRIAL MANAGEMENT REVIEW, M.I.T.
JOURNAL OF FINANCIAL AND QUANTITATIVE ANALYSIS
THE JOURNAL OF INDUSTRIAL ENGINEERING
JOURNAL OF THE ASSOCIATION OF COMPUTING MACHINERY
THE NAVAL LOGISTICS RESEARCH QUARTERLY
THE ANNALS OF MATHEMATICAL STATISTICS

SIP-40 COMPUTER INFORMATION SERVICE*

The unique feature of this profile is that 3-5 selected computer programs announced each month can be made available to recipients. Abstracts of the programs explain what the program does and designate the programming language and the operating system for which the program was written. Programs are selected based on the generality of the applications for which they can be used and on the completeness of documentation. Examples of the programs made available are:

ROMBRG, A general purpose routine for numerical integration
RSSR ROUTINE, A root-squaring and sub-resultant procedure for finding zeros of real polynomials
Vibration transient analysis program
Kellog Piping Analysis Program
Digital Simulation for Control System Design

Programs and documentation can be obtained from ARAC on magnetic tape, which clients copy and return to us. The cost is $14.00 per program.

Besides the programs announced for client use, this profile also includes abstracts of government reports which are computer-related, discussing new and novel ideas, techniques, and innovations in the computer field with special emphasis on software. These abstracts are selected by ARAC's systems analysts for their general interest to computer personnel in industry. Full reports cited by these abstracts are available from ARAC except where noted. (Better than 50% are available.)

Because of the large number of persons interested in COMPUTER INFORMATION SERVICE, we offer the announcement service for $60.00 per year, a price below that of the other profiles.

*Announcements are mailed monthly.

SIP-41 PERSONNEL MANAGEMENT AND BEHAVIORAL SCIENCE*

The object of this profile is to cite behavioral science reports which are pertinent to the behavior of man in an industrial work environment -- either as a management or as a non-management employee. The intention is to provide reports to the professional specialist in personnel management

Behavioral Science

- Group Dynamics
- Task Satisfaction vs. Performance
- Interpersonnel Relations
- Theory of Formal Organizations
- Motivation
- Human-Problem Solving Behavior
- Decision-Making Behavior
- Communication Networks
- Perception
- Leadership
- Cultural Adaptations

Training of Personnel

- Programmed Instruction
- Computer Assisted Instruction
- Training Models - Training Effectiveness
- Teaching Methods

Personnel Management

- Job Analysis
- Task Rating
- Task Evaluation

*Announcements are mailed once a month.

SIP-42 HUMAN RESPONSE TO ENVIRONMENTS

This profile covers the effects of various environmental conditions on an organism and the reaction of the organism to such conditions, whether real or simulated.

Topics covered include:

Human response to stress, such as decreased and increased oxygen availability, high and low ambient temperatures, varying salt ingestion, noise; caloric requirements in different individuals and environments; protective mechanisms.

High altitude and submarine physiology. This will also include psychological reactions, as sensory deprivation and its effects, and body functions as altered by rigidly controlled and fixed environmental conditions.

Control systems for maintaining fixed environments, including sterilization, decontamination, monitoring by telemetry with servomechanisms for control.

Life support systems in isolated environments; water and fecal waste detoxification and reclamation.

This profile is intended for those centers interested in psychological and behavioral reactions of an individual to any environmental conditions, either normal or abnormal. It should also be of interest to those who would like to control an immediate environment for comfort and safety.

SIP-43 BIOMEDICAL TECHNOLOGY

This is an interdisciplinary profile programmed for those interested in biomedical technological advances.

Reports include:

Bioelectronics - servomechanisms and remote control devices, artificial organs.

Biotelemetry - cardiovascular, gastrointestinal, pulmonary, temperature, electroencephologic and behavioral changes as monitored by remote sensors. These are from body interior to body surface, or from remote distances.

Biosimulation - development of both mathematical and hardware models and of computer programs for simulation of physiological functions to diminish the need for human testing until advanced prototypes of equipment are ready.

Biological Computer Applications - analysis of drug and patient data, data reduction systems.

It is felt that this profile would be useful not only to firms developing biomedical equipment, but also to those centers directly engaged in the use of such equipment, to those interested in remote control systems and the testing of these facilities.

SIP-44 RADIOBIOLOGY

Because of the large number of reports to be cited, this profile will be divided into two distinct sections:

1. Medical Aspects

Effects of radiation on biological tissues

Biochemical effects in radiation damage
Effects of laser radiation and ultrasound on tissues
Radiation - induced chromosomal aberrations

Diagnosis

Radiography
Ultrasonic devices for tumor detection
Use of isotopes in blood volume measurement

Radiotherapy

Radiation immunology
Use of lasers in retinal detachment surgery
Megavolt therapy in gynecology

2. Personnel Safety, Health Physics

Neutron monitoring for personnel protection
Anti contamination protective clothing
Dosimetry for radiation protection
Safeguards against laser hazards
Standards of health physics to be considered in handling radioactive materials

These reports might be of interest to people directly concerned with radiation damage, as in certain industries, to pharmaceutical firms, and to those interested in various medical aspects of radiation.

SIP-45 TURBINE TECHNOLOGY

All reports explicitly dealing with gas or steam turbines and their basic components are identified.

Compressors

Combustion in turbines

Bearings and lubricants

High temperature materials for turbines

Fuels and fuel control

Corrosion

Fluid mechanics and heat transfer in fuels

Regenerators

Stress and vibrations

Acoustics

SIP-47 PROPERTIES OF CERAMIC MATERIALS

The selected reports cover structural phenomena, means of analyses, and physical properties of ceramics.

Crystalline Structure of Ceramics

- Classification
- Identification
- Correlation with properties

Structural Defects of Ceramics

- Dislocations
- Creep
- Fracture
- Cracks
- Cleavage

Analysis of Ceramic Samples

- Election Microscopy
- X-ray Diffraction
- Fractography
- Petrography
- Sample Preparation
- Etchants

Physical Properties of Ceramics

- Transverse Strength
- Tensile Strength
- Expansion Coefficients
- Optical Properties
- Thermal Conductivity
- Emissivity

The reports deal with all types of ceramic materials including glass. When reports on metals contain information closely related to properties of ceramics, they also are included. Most of these reports deal with basic research.

SIP-49 CONTROL SYSTEMS ANALYSIS

This profile identifies reports dealing with the theory and design of control systems. Although coverage is heavily oriented toward mathematical analysis techniques, information on control hardware is included when applicable to the design of whole systems.

Control Theory

- Adaptive control
- Stochastic control analysis
- Stability analysis

Control System Design

- Optimizing systems
- Reliability analysis
- Properties of control hardware

SIP-49 is related to SIP-27, LOGIC CIRCUITS. The difference between the two is that this profile does not emphasize the circuitry, but rather the analysis and design of a complete system.

SIP-52 SENSORY DEVICES FOR INSTRUMENTATION

Sensing devices, as defined in this profile, denotes any device designed to detect, observe or measure a physical property or quantity. Research and development of sensing devices seeks to attain higher accuracies, greater sensitivities, greater capability for measuring extreme values, applicability under more extreme conditions of use, or capability of capturing effects occuring at higher speeds than the state-of-the-art has permitted previously. The emphasis is on the detection of phenomena.

Development and Design of Measuring Devices or Techniques

Types of Devices

- Transducers
- Force balance accelerometers
- Rate gyroscopes
- Thermocouples
- Manometers
- Flowmeters
- Anemometers
- A/D and D/A devices for all of the above

Types of Physical Properties or Quantities being Measured

- Noise
- Vibration
- Pressure
- Shock
- Strain
- Displacement
- Acceleration
- Velocity
- Force
- Liquid levels
- Shaft rotation rates
- Optical parameters
- Electrical parameters
- Physical dimensions
- Gas concentrations
- Density
- Flow rates

Calibration Techniques for Sensory and Measuring Devices

Applications for these Devices

This profile is designed to primarily service persons engaged in the design and development of sensing devices and techniques. In addition, persons involved in plant instrumentation work who design their own equipment for special application may benefit from the profile.

SIP-55 INDUSTRIAL SYSTEMS MANAGEMENT

This profile covers the planning and control of manufacturing operations with emphasis on the use of computerized information systems. It is intended to present reports and articles of interest to line and staff managers in manufacturing firms.

Production Management Systems

- Inventory Control Methods and Procedures
- Scheduling Systems
- Production Planning
- Forecasting Production (or Sales)
- Maintenance Planning
- Safety Program Management
- Methods Improvement
- Management of Quality Control -- Quality Control Systems

Distribution Systems

- Traffic Management
- Warehousing
- Materials Handling Problems

Industrial Information Systems

- Applications of Information Systems
- Data Management
- Decision-Making Techniques Using Information Systems

Occasionally, articles or reports will be cited which describe technical advances if these are predicted in the article to have "major" impact on management of production processes. For example, an article describing significant advances in numerically controlled machining would be included.

Besides government reports, there will be 4-8 abstracts each month which the ARAC staff will select as being pertinent to the subject area of this profile. An article announced in this way may be selected from any one of over 100 journals, but the most recent issues of the following journals are reviewed regularly in order to select the best articles:

SIP-55 INDUSTRIAL SYSTEMS MANAGEMENT

AUTOMATION
BUSINESS AUTOMATION
BUSINESS HORIZONS
COMPUTERS AND AUTOMATION
DATAMATION
DATA PROCESSING MAGAZINE
FACTORY
HARVARD BUSINESS REVIEW
JOURNAL OF DATA MANAGEMENT
JOURNAL OF INDUSTRIAL ENGINEERING
MATERIAL HANDLING ENGINEERING
MILL & FACTORY
MODERN MATERIALS HANDLING
PRODUCTION AND INVENTORY MANAGEMENT
SYSTEMS
SYSTEMS AND PROCEDURES JOURNAL
THE INTERNATIONAL JOURNAL OF PRODUCTION RESEARCH

Reprints of these articles may be ordered from ARAC if they are inconvenient to obtain for yourself. All reprints ordered require a $1.50 handling charge to cover postage, reproduction costs and royalties if these are required. Billing will be handled through aggregate billing of the member companies so that individuals in these companies need not be troubled with billing or budget details.

SIP-56 RESEARCH AND ENGINEERING MANAGEMENT*

This profile is oriented towards managers of research and development work, and managers of engineering. Many of the articles will deal with long range planning, research and development planning, costs and budgeting, and investment analysis. Most government articles deal with studies of NASA or Department of Defense management of research and engineering programs.

Management of Projects

- Allocation of Resources Among R & D Projects
- Interface Management (Between Multiple Organizations on the Same Project)
- Configuration Management (e.g. Management of Engineering Changes)
- Development of Project Time Schedules (e.g. Trend Line Analysis)
- Contract Administration
- Milestone Techniques (e.g. PERT, CPM)
- Technical Forecasting

Management Planning Methods

- Long-range Forecasting
- Systems Analysis Applications
- Cost-benefit Analysis
- Cost-effectiveness
- Planning-Programming-Budgeting
- Project & Program Scheduling
- Economic Evaluation of Projects & Programs

Management of Scientists & Engineers

- Organizational Problems in R & D
- Information Channels in R & D
- Innovation & Creativity
- Personnel Management in R & D Environment

Financial & Cost Analysis

- Capital Budgeting
- Program Cost Performance
- Financial Models
- Value Engineering
- Value Analysis
- Cost Measurement Methods

*Announcements will be mailed monthly.

SIP-56 RESEARCH AND ENGINEERING MANAGEMENT

The volume of government reports in this area which may be of general interest is not high, and ARAC is therefore including four to eight abstracts each month which our staff selects from current issues of management journals as being pertinent to the subject area of this profile and also one of the best of the current articles. An article announced in this way may be selected from any one of over one hundred journals, but the most recent issues of the following journals are reviewed regularly in order to select the best articles:

MANAGEMENT SCIENCE
HARVARD BUSINESS REVIEW
DATAMATION
DESIGN NEWS
DUN'S REVIEW
BUSINESS HORIZONS
BUSINESS MANAGEMENT
AMERICAN ECONOMIC REVIEW
MICHIGAN BUSINESS REVIEW
ACADEMY OF MANAGEMENT JOURNAL
IRON AGE
RESEARCH MANAGEMENT
COMPUTERS & AUTOMATION
IEEE TRANSACTIONS ON ENGINEERING MANAGEMENT
CONSULTING ENGINEER
CHEMICAL ENGINEERING
CHEMICAL AND ENGINEERING NEWS
ELECTRONIC NEWS
INTERNATIONAL SCIENCE AND TECHNOLOGY
SCIENTIFIC AMERICAN
RESEARCH/DEVELOPMENT
MANAGEMENT SERVICES
CALIFORNIA MANAGEMENT REVIEW
INDUSTRIAL RESEARCH
MIT INDUSTRIAL MANAGEMENT REVIEW
PRODUCT ENGINEERING
MACHINE DESIGN

Reprints of these articles may be ordered from ARAC if they are inconvenient to order for yourself. All reprints ordered require a $1.50 handling charge to cover postage, reproduction costs and royalties if these are required. Billing will be handled through aggregate billing of the member companies so that individuals in these companies need not be troubled with billing or budget details.

SIP-60 SPACE-AGE ENERGY SOURCES

A large amount of research is being done at present on new types of energy and power sources. This profile covers the following areas.

Spacecraft non-propulsive power systems

Fuel cells

Battery Developments

Solar cells

Radiant energy cells

Nuclear power sources

Thermionic power conversion

Magnetohydrodynamic conversion

Heat pipes

This profile presents a continuing review of the latest research in this rapidly growing area. It should be useful to research workers and others who would like to keep abreast of new developments in power and energy sources, and conversion systems.

SIP-63 INDUSTRIAL MATHEMATICS

Industrial mathematics is defined here as the set of all applied mathematics excluding that subset of mathematics pertaining to operations research. Because mathematics for operations research is not well defined, no attempt was made to make mathematics for science and technology and mathematics for operations research disjoint sets.

This industrial mathematics profile, covering Science and Technology will include the following areas.

Differential Equations

- Partial differential equations
- Hamilton-Jacobi Theory
- Potential equation
- Boundary value problems

Applied Complex Variables

- Functions of a complex variable
- Integration in the complex plane
- Residue calculus
- Application of analytic function theory
- Fourier transforms
- Laplace transforms
- Asymptotic expansions

Analysis

- Continuous functions
- Differentation and integration
- Infinite series

Mathematical Statistics

- Analysis of variance
- Method of least square and curve fitting
- Correlation and regression
- Multiple and partial correlation
- Theory of sampling
- Test of significance based on different distributions
- Statistical theory of estimation
- Sequential analysis

Functional Analysis

- Theory of vector space, branch space, and Hilbert space
- Linear functions and how they operate in above Spaces

Fluid Mechanics (Mathematical Models)

Compressible fluids
Viscous fluids
Shock theory

Numerical Analysis

Numerical integrations of ordinary differential equations
Numerical integration of partial differential equations
Matrix inversion

Mechanics

Kinetic theory and statistical mechanics
Elasticity
Plasticity
Relativity
Analytic dynamics
Differential geometry

Since mathematics by definition in order to be useful must be rigorous, this profile would have its greatest utility for people in the field of research, advanced design (Model building), and advanced engineering. Most of the reports originate from universities or mathematics groups in industry.

SIP-68 HEAT TRANSFER

This profile focuses on all aspects of heat transfer except those which are very specific to heating upon atmospheric re-entry.

Heat Transfer Processes--all types

- Conductive
- Convective
- Radiative

Material Properties Related to Heat Transfer

- Heat transfer coefficients
- Latent heats
- Enthalpy and entropy characteristics
- Thermal effects of special nature, thermal cycling effects, for example
- Methods for analyzing and calculating these properties

Heat Transfer in Fluid Flow

- Theory of effects in fluid flow
- Methods of analysis and calculations

Hardware Used in Heat Transfer

- Heat exchangers
- Instrumentation for measuring heat flux
- Insulating materials and techniques

Measurement of temperature is not included in this profile, but is the subject of a separate profile, SIP-21, TEMPERATURE MEASUREMENT. Some specialists in heat problems may have interest in both profiles.

SIP-69 DIELECTRIC TECHNOLOGY

Information concerning dielectrics and their use in electronic components is emphasized in this profile, which covers reports on materials selected for application because of their dielectric properties. Also cited, however, are such reports as are available which deal with wire and cable insulation or other high amperage applications.

Industrial applications and developments:

1. Development of dielectric films for cryogenic use
2. Studies on electrical insulation materials
3. Development of a high dielectric strength cable insulation
4. Nonlinear dielectric materials
5. Coaxial cables and dielectric properties

Testing and evaluation:

1. Microwave nondestructive testing of dielectric materials
2. Overlap probability of flaws in a laminated dielectric
3. Radiation effects on thin-film integrated circuit elements
4. Frequency properties of dielectrics
5. Effect of small spacings on radiative transfer between two dielectrics

Processes and procedures:

1. Electron tunneling through thin-film dielectric films
2. Conduction processes in dielectric fluids

This profile is designed to assist primarily those individuals engaged in the design or use of dielectric materials for the development of electronic components.

SIP-70 HOLOGRAPHY

This profile includes applications as well as the technological state of the art in holography.

Holographic reconstruction

Holography resolution

Holography color imagery

Holography imaging

Hologram filtering

Microwave holograms

Hologram aberation

Hologram magnification

Hologram coherence effects

Holographic interferometric measurements

Low spatial frequency holograms

Schlieren holographic - ray tracing

Holographic information for transmission

Holography applications to plasma diagnostics

Synthetic holographic techniques

Holography applications in vibration analysis and flow

This profile is thought to be useful to persons in holographic research, design, and development. Since applications are also included, the profile may be of value to people with a general interest in the use of holography.

SIP-71 HUMAN FACTORS ENGINEERING

Designing equipment to fit people is a growing aspect of engineering, and this profile cites reports dealing with the physical and psychological capabilities of man.

Study of interaction between man and machine.

Human performance and response to a system.

Analysis and prediction of human performance.

Information theory as applied to human factors engineering.

Determination of human factors to be considered in design of equipment.

Human decision-making in manual control systems.

Psychological and physiological factors relevant to display systems.

The reports cited in this profile should be of interest to those concerned with human factors criteria and information applied to design problems. They relate both to human factors to be considered in the design of a system and to the human operator's response to a system.

Much of the work reported in this profile has been done at systems technology firms, aeronautical laboratories, and aircraft companies.

SIP-73 ADVANCES IN GEOPHYSICS, GEOLOGY & OCEANOGRAPHY

This profile presents unified coverage of recent advances and developments in the earth sciences. Particular emphasis is placed on techniques that may be applied to both surface and submarine exploration methods and to research. Of special interest are the properties of materials and the interpretation of subsurface structures through physical and chemical analysis.

Solid Earth

Earth materials
- rocks and minerals
- mineral resources--petroleum, ores, water, etc.

Planetary physics
- gravity
- seismism
- magnetism, electrical properties, & radioactivity
- exploration

Petrophysics
- magnetic and electrical properties
- radioactivity
- density
- thermal properties
- porosity and permeability

Earth processes
- gradation, sedimentation and stratigraphy
- volcanism and diastrophism
- structural geology and geomorphology
- paleontology

Oceanography

Chemical and physical

Biological

Applied

Atmosphere

Meteorology and climatology

These reports will also include subject matter ranging from mathematical models in geology and computer techniques to remote sensing, far infrared, and selected topics on lunar geology.

SIP-74 MARKETING INFORMATION SERVICE
(New Dimensions in Marketing Technology)

Unlike the other standard Interest Profiles, the articles announced by this profile come from open literature journals, and very few abstracts will describe government reports. "New Dimensions in Marketing Technology" is designed to provide marketing managers with information on new developments pertaining to their field. The articles abstracted cover a wide range of subjects dealing with marketing management, market analysis or market research, and some are selected from other areas such as operations research, communications and transportation and which make significant contributions to marketing management.

A package generally consisting of ten abstracts of articles from current journals constitutes the monthly mailing. The ten best articles are selected on the basis of their pertinence and current interest. Some seventy journals are reviewed periodically to provide excellent input to this service. Those journals and magazines reviewed on a regular basis include the following:

BATTELLE TECHNICAL REVIEW
BEHAVIORAL SCIENCE
BUSINESS HORIZONS
CALIFORNIA MANAGEMENT REVIEW
HARVARD BUSINESS REVIEW
IEEE TRANSACTIONS ON ENGINEERING MANAGEMENT
INDUSTRIAL MANAGEMENT REVIEW
INDUSTRIAL MARKETING
INTERNATIONAL SCIENCE & TECHNOLOGY
JOURNAL OF ADVERTISING RESEARCH
JOURNAL OF BUSINESS
JOURNAL OF INDUSTRIAL ENGINEERING
JOURNAL OF MARKETING
JOURNAL OF RETAILING
MANAGEMENT ABSTRACTS
MANAGEMENT SERVICES
MANAGEMENT SCIENCE
MARKETING INFORMATION GUIDE
OPERATIONS RESEARCH
RESEARCH/DEVELOPMENT MAGAZINE
SALES MANAGEMENT
STANFORD BULLETIN

Reprints of these articles may be ordered from ARAC if they are inconvenient to order for yourself. All reprints ordered require a $1.50 handling charge to cover postage, reproduction costs and royalties if these are required. Billing will be handled through aggregate billing of the member companies so that individuals in these companies need not be troubled with billing or budget details.

SIP-75 STRUCTURAL ANALYSIS TECHNIQUES

This profile covers reports which deal with the macroanalysis and design of structures.

Effect of mechanical & thermal loads on structures

Stress analysis for whole structures (trusses, plates, cylinders, columns, etc.)

Creep, deflection, or strain of structures

Some material on fatigue, if general and related to structural design

Optimization of structural parameters

Effect of environment on structures

Analysis of joints if related to structural design

Computer programs for use in structural design

Testing of structures

Safety analysis of structures

Properties of structural materials are not included in this profile, but are treated separately in SIP-09, MICROANALYSIS AND PROPERTIES OF ENGINEERING MATERIALS.

SIP-76 PSYCHOPHYSIOLOGY*

Reports cited in this profile will be concerned with behavioral investigations of performance capabilities, relationships between physiologic and psychologic conditions, and sensory physiology.

Topics covered include:

- Behavioral responses to environmental changes, such as sensory deprivation
- Testing systems for measuring intelligence, judgement, fatigue, learning
- Studies of perceptual processes
- Effects of various drugs on psychological functioning
- Physiologic conditions arising from psychological states
- Neurophysiological factors, including visual and auditory responses, perception, nystagmus, adaptation

This profile could be useful to any firm or center interested in the psychological aspects of various physiological functions, to those in optometry or psycho-pharmacology.

*For more complete coverage of these topics per issue, this profile will be edited and sent out once a month. Each edition will cover two issues each of SCIENTIFIC AND TECHNICAL AEROSPACE REPORTS, INTERNATIONAL AEROSPACE ABSTRACTS, U.S. GOVERNMENT RESEARCH & DEVELOPMENT REPORTS and NUCLEAR SCIENCE ABSTRACTS. AEROSPACE MEDICINE & BIOLOGY will also be included as it is received in our library

SIP-77 NEUROCHEMISTRY AND BIOCHEMISTRY

Sample topics of reports cited include:

Biochemical correlates of learning (this does not include testing systems)

Brain chemistry or nerve chemistry

Chemistry of subcellular fractions

Ultrastructure of brain or nervous tissue, either chemical or microscopic

Proteins, salts (Na, K, Mg, Mn, Co, Cu) lipids, nucleic acids

Membrane structures and/or analysis

This profile should be of interest to those centers concerned with metabolism and biochemistry of the brain, the effects of drugs on learning and memory, blood chemistry, protein composition of man.

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