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OPERATION OF A NASA TECHNOLOGY UTILIZATION REGIONAL DISSEMINATION CENTER

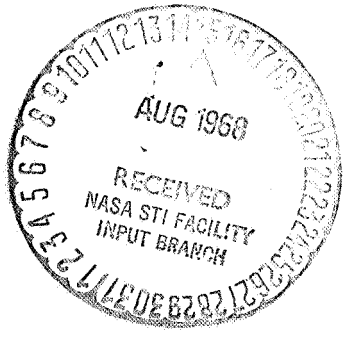
Regional Utilization of NASA-Generated Space Technology

FINAL REPORT

VOLUME II

Task Order Contract Nos. NASr-63(03) and NASr-63(12)

MRI Project Nos. 2563-M and 3064-E



For

Technology Utilization Division
Office of Technology Utilization
Code UTD
National Aeronautics and Space Administration
Washington, D. C. 20546

MIDWEST RESEARCH INSTITUTE

425 VOLKER BOULEVARD/KANSAS CITY, MISSOURI 64110/AC 816 LO 1-0202

OPERATION OF A NASA TECHNOLOGY UTILIZATION REGIONAL DISSEMINATION CENTER

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by

Lawrence Rosine

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PREFACE

This is Volume II of the Final Report for Contract Nos. NASr-63(03) and NASr-63(12). It describes the organization, business and operational procedures, management and technical services of ASTRA, a regional dissemination center conducted by Midwest Research Institute. Mr. Paul C. Constant, Jr., Manager of Technology Utilization of Midwest Research Institute, conceived the philosophy of operation, the basic management, business and technical operations, and the technical services for clients of the regional dissemination center (RDC) described herein. He was responsible for the establishment of the RDC under this philosophy, etc. Its operation was under his general management and under the direction of Mr. Lawrence Rosine, Director of ASTRA.

Approved for:

MIDWEST RESEARCH INSTITUTE

Harold L. Stout

Harold L. Stout, Director
Engineering Division

5 August 1968

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I. INTRODUCTION

The NASA Technology Utilization (TU) Program was created to:

1. Increase the return on the national investment in aerospace research by encouraging additional use of the results;

2. Shorten the time gap between the discovery of new knowledge and its effective use in the market place;

3. Aid the movement of new knowledge across industrial, disciplinary, and regional boundaries; and

4. Contribute to the development of better means of transferring knowledge from its points of origin to other points of potential use.

As part of the TU program, NASA established regional dissemination centers (RDC's)--see Figure 1--to help transfer NASA-generated aerospace technology principally to industry. ASTRA*, an RDC, started in November 1961 and served generally a seven-state area (Arkansas, Iowa, Kansas, Minnesota, Missouri, Nebraska and Oklahoma). (See Volume 1 of this report for the history on the evaluation of ASTRA.)

During the seven years of ASTRA's operation, it has developed an effective organizational structure, technical services, and business and technical operating procedures. (The organization, services, and procedures of ASTRA are the result of its operation by Midwest Research Institute, an independent, not-for-profit institution, under contract with NASA.) These are covered in this document which outlines the steps Midwest Research Institute deems necessary in setting up an operational RDC. Examples of the forms used in the office procedures and of public relations materials will also be included. The report is divided into the following basic sections: Assumptions Underlying Organization of an RDC, Business Structure, Technical Services, Resources Needed to Supply Technical Services, Marketing, Techniques of Sales, General Operations, and Basis for Predicting Future Needs. While an attempt will be made to consider the operation of an RDC under a variety of institutional conditions, much of the information presented here is a result of working with the ASTRA Regional Dissemination Center that has been located at Midwest Research Institute.

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* ASTRA - Applied Space Technology = Regional Advancement.

Figure 1 - NASA Established Regional Dissemination Centers

II. BASIC ASSUMPTIONS UNDERLYING ORGANIZATION OF AN RDC

A. Goals

The goals of an RDC are largely dependent upon the parent organization of the center and may differ, depending upon this organization. Certainly the primary goal of any RDC is to serve as a technology transfer medium. However, the goal of an RDC may also be interwoven with the parent organization in more subtle ways. For example, an RDC operating within the confines of a state-supported school may be inclined to serve just that state in preference to other surrounding states. Such an RDC may also serve as a training arena for use by the faculty in teaching students to better utilize existing technology.

An RDC operating within the confines of a not-for-profit research organization may be committed to primary service to industry within the technical scope and geographic coverage of that organization. An RDC in such an organization may have to depend more heavily on support from industry than an RDC that benefits from an academic environment.

An independent RCD, operating autonomously, may be required to show a profit to reimburse investors. While there are no RDC's in the NASA TU program operating under this latter condition, it is conceivable that such a business could be formed as the utility of technology transfer is realized.

Thus, the goals of an RDC are intricately tied into the parent organization. Certainly if an RDC is to become completely self-supporting, the term completely must be explained. Is the RDC expected to financially support the data source? If support of the data source is mandatory, how far should this support go? Should the RDC support the research effort of the data source, or should the RDC only support the information effort of the data source?

Assuming that a goal of an RDC is to become self-supporting in a certain period of time, one must have some indicators that the RDC is sufficently on its way to this goal after predetermined months and years of operation. Is the center supporting itself at the 25 percent level after one year? Fifty percent after two years? A timetable of goal achievement should be made, and any falling short or exceeding of the preset intermediate levels should be considered.

B. Values

The value of an RDC may be measured in various ways. Certainly the number of worthwhile technology transfers made in a period of time is a very effective measure of the worth of an RDC. If an RDC continually fails to provide client firms with useful information, or continually supplies information of little relevance to the client's problem, then the value of the center is nil.

Another way of measuring the value of an RDC is to compare the worth of the information disseminated to the cost of operating the center. If transfers are made that continually show a dollar value to the recipients, and these dollar values exceed the cost of the program to the recipient, the operation can be considered of some value.

The value of an RDC may also be measured in achievement of particular goals by the information source. Government operated or supported RDC's may not be measured by the same profit or break-even system used by RDC's that must maintain a self-supporting status. Technology transfer may be a desirable goal of a federal project regardless of the immediate dollar return to the agency involved. Thus, a government agency that supplies information for the general welfare through an RDC system may not be required to meet the same operating criteria as a center operating as a private profit-seeking business.

III. BUSINESS STRUCTURE

A. Managerial Organization

The managerial structure of ASTRA is shown in Figure 2. While ASTRA is the only RDC operating within a not-for-profit research organization, indications are that this structure is suitable for centers in the academic institution.

Policy Committee

The policy advisory committee is essentially a board of directors for the RDC. The members of this committee are not working staff members of the center, but they are selected from within the parent organization for their business and technical skills. The policy advisory committee of an RDC can be helpful in directing the efforts of the operation in

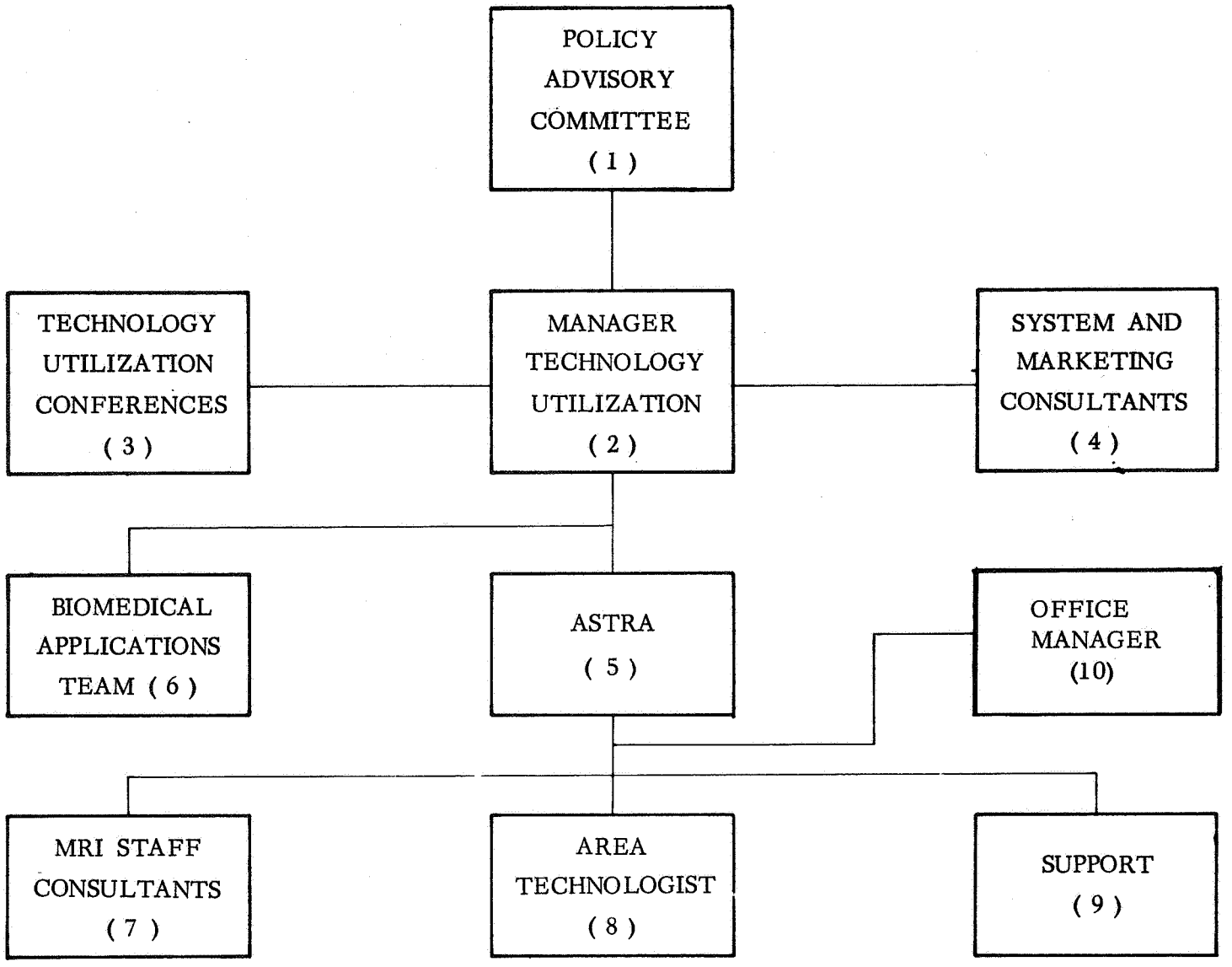


Figure 2 - ASTRA Organizational Chart

the most objective manner as they will not be subjectively influenced by the task to be performed at the dissemination level. Thus, they formulate the process of better utilizing available skills in the organization. Proper selection of the members of this committee can also help the RDC gain support from the scientific and industrial community.

Manager of Technology Utilization

A manager of technology utilization at Midwest Research Institute directs the efforts of various TU programs within the parent organization. The ASTRA RDC director reports to this manager. As other special mission-oriented TU groups are added to the organization they will have directors reporting to the manager of TU.

Director of RDC

The RDC director is responsible for the management of the organization. It is his duty to hire staff personnel, direct their efforts, coordinate the public relations and marketing programs, and control the financial operation of the center. He is also responsible for any special programs undertaken by the RDC. The latter would include seminars, special group marketing efforts, supervision of the preparation of special reports, and liaison efforts with other divisions in the parent organization.

Directors of Special Technology

Special mission directors are the manager of the Biomedical Applications Team (BAT) and the Pollution Application Team--both TU groups with goals in a specific area of technology. These directors are usually specialists in that area of technology and may be assisted by other specialists in the same area. While these groups are vitally involved in the transfer of technology, they work toward a goal of improving techniques in a more channelized system. The special mission groups will use the search facilities of the RDC, but they will be more involved in the interpretation of the search results than in performing the search function. It is conceivable that mission oriented groups could be formed in the areas of crime control, aircraft safety, climate control, etc.

B. RDC Organization

The organization of an RDC is shown in Figure 2. While this chart shows the staff consultants (technical staff of Midwest Research

Institute), the area technologists, (three in number) and the support staff (eight), reporting to the director of the RDC, it should be noted that some members of these groups may be assigned on an "as-needed" basis. Normally the area technologists and the office manager would be the only permanent members of an RDC. However, it is possible that a very large center would have a full-time support and consulting staff.

Area Technologists

The area technologists in an RDC are persons with a broad purview of science and engineering, and are usually skilled in more than one technical area. It is these technologists who market the services of the RDC, and work with the individual clients after they join the program. The technologist is the person who studies the client's problem or general interests area, compiles this information in computer input information form, and sends the search strategies to the computer center. Upon receiving the abstracts of pertinent documents, he analyzes them for worth of content, calls for complete documents if needed, further analyzes the information available, and makes recommendations as to its use. He then works with the client to apply the information, analyzes feedback from the client and supplies a report on this feedback to the RDC director. In cases where an area technologist finds his capabilities in an area lacking, he will have access to the consultants within the parent organization.

Consultants

Consultants to the RDC effort supply technical know-how that supplements the abilities of the area technologists. In the ASTRA center, special technical consulting was obtained through members of the staff at Midwest Research Institute. By utilizing these people on a need basis, the technical breadth of the team was increased to almost all areas of the sciences. The consultants are also useful in cases where difficulty is experienced in writing computer search strategies and a greater working vocabulary in the problem area is required. It is often easier, and more reliable to ask a consultant to supply search term synonyms than to consult some cross-referencing thesaurus.

Consultants may also be used to judge the worth of information retrieved in a computer search of the data bank. Frequently a person who has been very active in a particular facet of a technology will be more competent to judge the worth of a literature search than an area technologist with a broader technical background. Specialists are also more capable in suggesting possible applications of information turned up in literature searches. These consultants are also in a better position to suggest other information sources to supplement the data bank.

Support Staff

The support staff consists of three groups who may be full-time center employees but are usually found as personnel of the parent organization, and work only as needed by the RDC. These people assist the operation in the areas of marketing, computer programming, and clerical work.

Marketing support (three persons) is received from the public relations and marketing departments of the parent organization. Persons assigned to this effort are responsible, under the supervision of the RDC director, for the preparation of mailers, slide presentations, sales literature, operation manuals, news releases, and other items used by the area technologists in informing potential clients of the worth of technology transfer via such a center. The marketing support group can also be helpful in working with the technologists to tailor presentations to large groups, and can often arrange speaking engagements for the general promotion of technology utilization.

Computer programmers (two in number) may be full-time center employees in a busy RDC, but in most cases they will be employees of the parent institution. It is the duty of these programmers to assist in writing search strategies, file the information tapes, recodify the tapes to operate with the organization's computer, maintain a liaison with computer personnel at the information source, and generally handle all problems that could arise in the computer center. The programmers work closely with the technologists in improving methods of writing search strategies and effecting cost savings by simplifying these methods. Programmers also become familiar with the thesaurus or key work systems used.

The Clerical assistance (two persons) required by an RDC fluctuates with the number of searches being run and the volume of the output of these searches. Clerks pull abstract cards from the computer search output. These cards are then sent to the area technologist involved with the particular search. After the technologist has reviewed the cards, it is the duty of the clerks to Xerox those abstracts of importance and then refile all cards in proper order. If the technologists call for complete documents, the clerks pull the microfiche of these documents and refile after the technologists have reviewed them. If hard copies of the microfiche are required, the clerks produce these copies on the printer and supply them to the technologist.

A good portion of clerical time is spent in updating the files as new abstracts and documents are received from the data source. With thousands of cards and documents arriving at an RDC each month, this task of updating as soon as possible is a formidable and time consuming one.

Office Manager

The office manager at the RDC differs little from an office manager in any business. It is the task of this person to coordinate clerical activities and facilitate the rapid movement of searches through the various steps. The office manager is also responsible for various cost accounting and bookkeeping systems within the confines of the center. A business-oriented person is required in this position and normally an office manager will have little contact with the technical problems of the client.

IV. TECHNICAL SERVICES

A. Technology Transfer

The primary purpose of the RDC is technology transfer. This transfer may take one of two basic forms, either retrospective or current awareness. Both types of transfer will be reviewed briefly, and other possible RDC services will be discussed.

Retrospective Search

A retrospective search is concerned primarily with historical information or documents that have been published up to this point in time. This is similar in many respects to a library search. A client seeking a bibliography in a certain subject area would be interested in documents compiled since the data bank began. It is this information that is reviewed for relevance in a historical or retrospective search.

Current Awareness

A current awareness search differs from a retrospective search only in its timeliness. In a current awareness search, all new incoming information is reviewed on some periodic basis, usually once a month, for relevance to the problem. In performing a current awareness search, it is assumed that the client is somewhat up to date on the technology available at the inception of the search, but that he is depending upon the RDC to scan the new incoming information for him. A current awareness search is similar to a periodical or magazine. This type of service keeps one up to date, assuming that he has a background in the field.

B. Consulting

Consulting may also be offered by an RDC if the staff is sufficiently large to allow such service. Frequently a client will require the advice of an objective outsider whose fortunes are not intricately involved in the client's problems. An RDC is in an ideal position to provide this service as the area technologist will be familiar with the problem, and usually has already performed searches in the area. During the search procedure, the area technologist will have become cognizant of the amount of available information, and will frequently be in a good position to know of other information sources.

Consulting can also be provided by an RDC on a different basis. Clients who wish to set up their own information transfer centers would do well to work with RDC personnel who have had experience in the field of technology transfer. Data retrieval systems are used throughout industry, and many of these systems could be improved by persons more knowledgeable in the field than a company's in-house employees drafted for the work.

C. Conferences and Seminars

Conferences and seminars are an important part of the RDC function. This method of transferring technology is often desirable where there is a general interest in some area. ASTRA has been successful in bringing qualified parties together in seminars dealing with valve technology, high velocity metalforming, and corrosion. To determine the technical interests of businesses in a region, the RDC should poll clients using some type of questionnaire or personal contact means.

Conferences or seminars are also useful in promotion of the dissemination center and the technology utilization concept, as invitations for attendance can also be sent to other nonclient firms in the area.

D. Special Services

Special services available from an RDC will depend upon the qualifications of the center's staff and the parent organization's personnel. These services can run the gamut from special manual literature searches, wherein an area technologist is assigned to spend a certain amount of time on the task, to assisting a firm to set up technical seminars of its

own. Information systems analysis, special computer programs, definition of problem areas and attendance of technical seminars as a representative of a client firm are a few of the services that can be implemented by an RDC.

V. RESOURCES NEEDED TO SUPPLY TECHNICAL SERVICES

A. Staff

The size and capabilities of an RDC staff will depend on the amount of searching and the number of clients of the center. While it is conceivable that an RDC will have some part-time employees, there are certain members of the staff that will be full-time employees, with all their efforts exerted toward the center's operation.

Full-Time Staff

Full-time staff members would include the director, office manager, and the area technologists. The number of area technologists will be directly dependent upon the number of clients, and prospects, that must be visited on a periodical basis, and on the number of searches required by the clients.

Part-Time Staff

Part-time staff members will include the file clerks needed to handle information incoming from the data source as well as search information. This staff will also include computer programmers, as needed, and promotion and marketing personnel who are not actively engaged in selling the product. Other part-time personnel would include typists, secretaries, and hourly office help.

B. Information Banks

NASA

While this report is concerned primarily with NASA information, other literature sources can be utilized by an RDC. The NASA file is indexed on computer tape by key words. Abstracts and documents for an

information bank of this size may be conveniently stored in metal files adjacent to a microfiche reader-printer. This material (360,000 documents) in conjunction with STAR and IAA cumulative abstracts can be placed in a 300 sq. ft. room without severe crowding. As previously mentioned, the NASA literature covers almost all facets of the sciences, but is necessarily heavily oriented toward aviation and aerospace.

Open Literature

Open literature scanning is a useful adjunct to the NASA file and should be seriously considered by an RDC. ASTRA is located a few blocks from the Linda Hall Library of Science and this source is excellent for an open literature repository. Midwest Research Institute also has a library that can acquire material through interlibrary loan. On occasion, personnel within the Institute will have texts available that deal with subjects of interest.

C. Data Processing Machinery

The data processing machinery needed by an RDC will depend to some extent on the format of the material available on computer tapes from the information source. NASA presently supplies documents coded on nine track tapes at 800 bits per inch which are compatible with most of the newer computers. Tapes of the seven track variety with 556 bits per inch are also available for older equipment. If an RDC plans to use the computer tapes available through NASA, the personnel would do well to review, "Guide to the Processing, Storage, and Retrieval of Bibliographic Information at the NASA Scientific and Technical Information Facility," by W. T. Brandhorst and Philip F. Eckert. This document is available under NASA CR-62033 (N66-34085) from Documentation Incorporated, College Park, Maryland, at a cost of $3.25.

The computer in use at ASTRA is an IBM 360-30. Tests have been made on an IBM 360-40 and it was determined that the reduction of search time was offset by the increased cost of the equipment. Other computers have been used by RDC's across the country and all apparently operate effectively and efficiently. However, it would be advisable to use hardware that requires a minimum of re-formatting of the tapes.

VI. MARKETING

A. Analyzing the Market

Operational RDC's

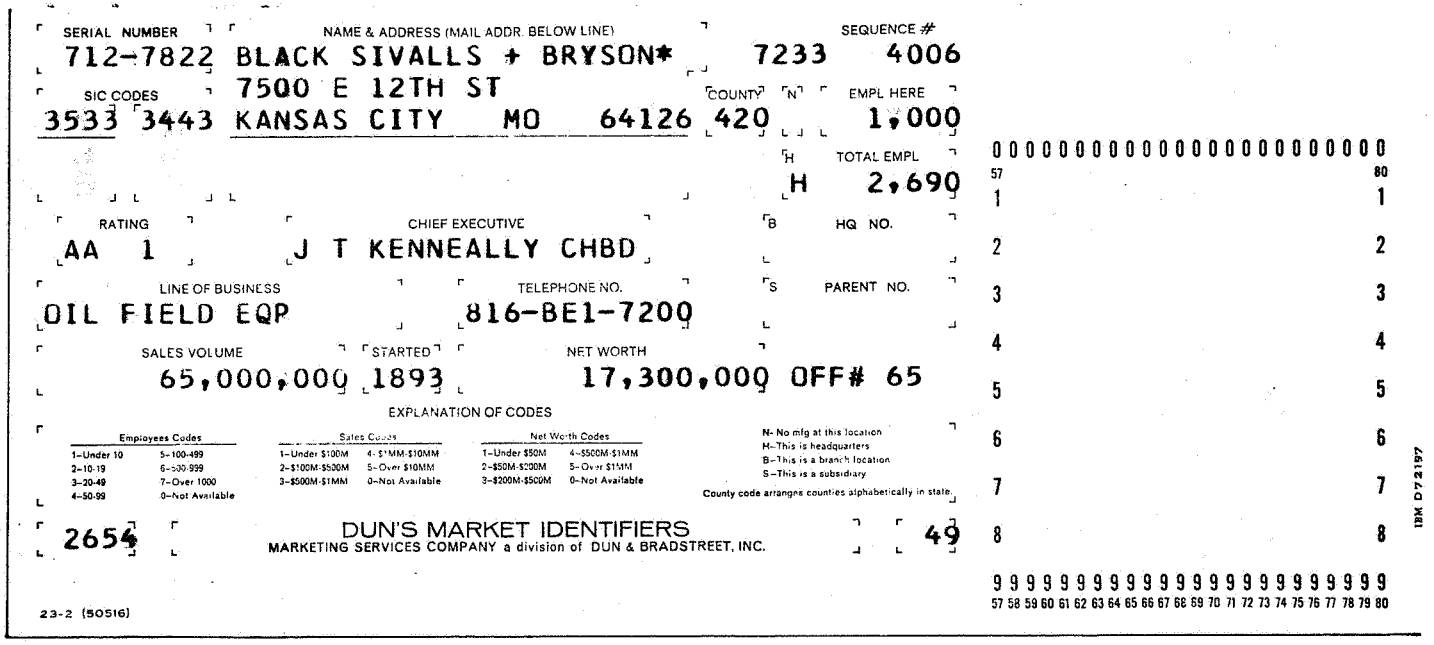
While it is assumed that an operational RDC will have performed some market research prior to its inception, there are some checks that may be performed to indicate changes in the market, distribution of the market areas, possibilities of service to other centers, and possibilities of expansion of present services. As with any service organization, a constant testing of the market is necessary to pace the growth of the center to the growth of the industrial environment.

Market size: The determination of market size for an operating RDC presents a problem of some magnitude. There are some aids that a center may obtain to assist in this particular endeavor. Dun and Bradstreet Marketing Services Company has a service called Dun's Market Identifiers that is very useful in determining areas of interest. One product of this service is a breakdown by all counties in the United States showing the number of plants and the density or concentration of plants. This information is also available in map form.

Another Dun and Bradstreet service consists of cards listing each plant in a territory of interest. These cards (see Figure 3) list the name and address of the company, the telephone number (with area code), the SIC number of the plant (this categorizes the business by general type, i.e., electronic, furniture, etc.), the chief executive, exact kind of product, sales volume, net worth, and information as to the function of the facility. The latter information will often provide a lead as to the orientation of the firm, i.e., research, manufacturing, development, branch, etc.

Dun and Bradstreet will also supply mailing labels for companies in specified areas. This low cost service is useful where direct mail campaigns are being conducted by the marketing effort of an RDC.

Composition of market: Much of the information gleaned from the D and B cards is useful in determining the composition of the market. Companies involved in the production of iron fences or gravel are not as receptive to the services of an RDC as firms producing a more complicated item. The ASTRA technologists have also found that a manufacturing branch is not the best prospect for an RDC's services because the research and development branch in the home office will probably house the personnel most capable of broadly utilizing the service.



SERIAL NUMBER: 712-7822
NAME & ADDRESS (MAIL ADDR. BELOW LINE): BLACK SIVALLS + BRYSON*
7500 E 12TH ST
KANSAS CITY MO 64126
SEQUENCE #: 7233 4006
SIC CODES: 3533 3443
COUNTY: 420
N
EMPL HERE: 1,000
H
TOTAL EMPL: H 2,690
RATING: AA 1
CHIEF EXECUTIVE: J T KENNEALLY CHBD
B
HQ NO.
LINE OF BUSINESS: OIL FIELD EQP
TELEPHONE NO.: 816-BE1-7200
S
PARENT NO.
SALES VOLUME: 65,000,000
STARTED: 1893
NET WORTH: 17,300,000
OFF# 65

EXPLANATION OF CODES

Employees Codes
1–Under 10
2–10-19
3–20-49
4–50-99
5–100-499
6–500-999
7–Over 1000
0–Not Available

Sales Codes
1–Under $100M
2–$100M-$500M
3–$500M-$1MM
4–$1MM-$10MM
5–Over $10MM
0–Not Available

Net Worth Codes
1–Under $50M
2–$50M-$200M
3–$200M-$500M
4–$500M-$1MM
5–Over $1MM
0–Not Available

N–No mfg at this location
H–This is headquarters
B–This is a branch location
S–This is a subsidiary
County code arranges counties alphabetically in state.

2654

DUN'S MARKET IDENTIFIERS
MARKETING SERVICES COMPANY a division of DUN & BRADSTREET, INC.

49

23-2 (50516)

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IBM D72197

Figure 3 - Dun's Market Identifier

The dollar sales volume of the market is another useful item from the D and B cards that can direct the efforts of an RDC's marketing group. Companies with sales volumes of $500,000 per year and over seem to be most receptive to using the services of an RDC. From this point, it appears that interest and increased sales volume have some direct correlation. While it is impossible to say that firms with a sales volume of $1 million per year have an interest twice that of the $500,000 per year firm, the difference is notable.

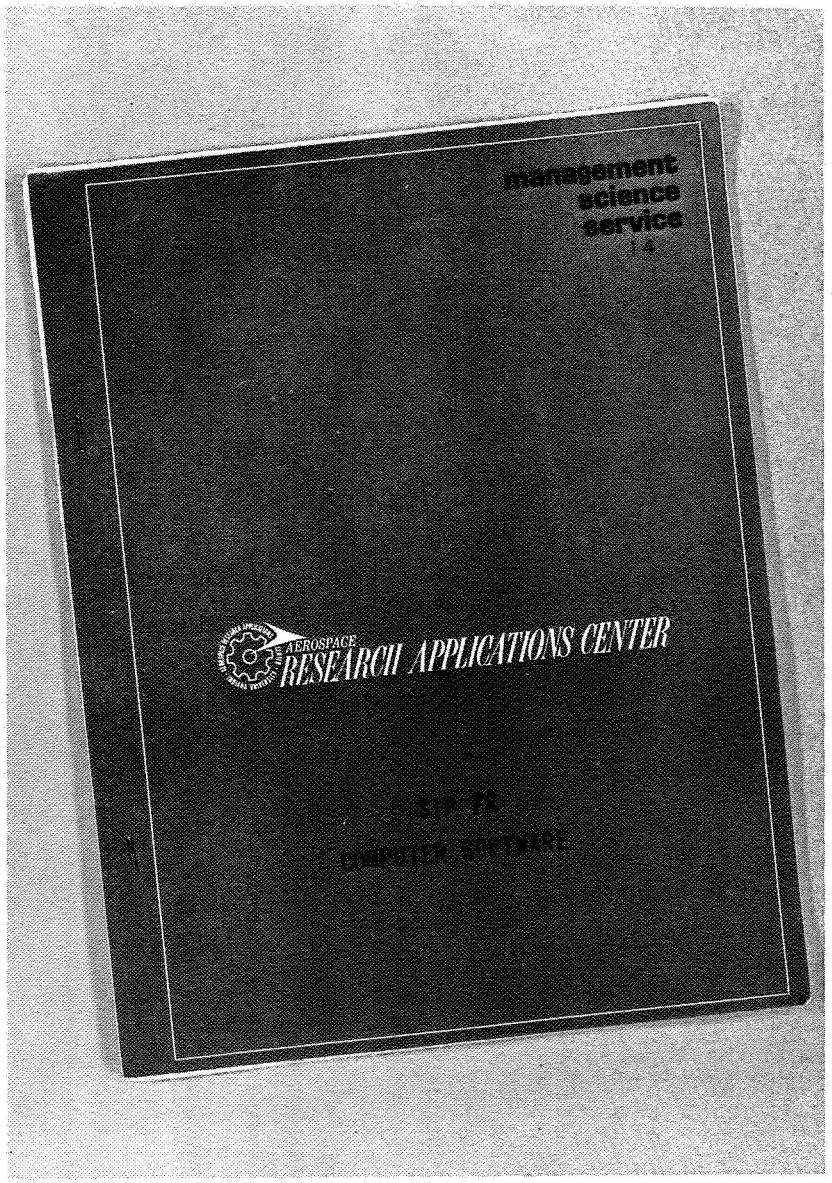
The experience of the ASTRA group also indicates that basic metalworking plants are poor prospects for service. Electronic manufacturing plants, research oriented businesses, machinery manufacturers and consumer goods producers have exhibited the highest interest in the Midwest area. It is doubtful, however, that these rather sparse facts can be projected to all areas of the United States.

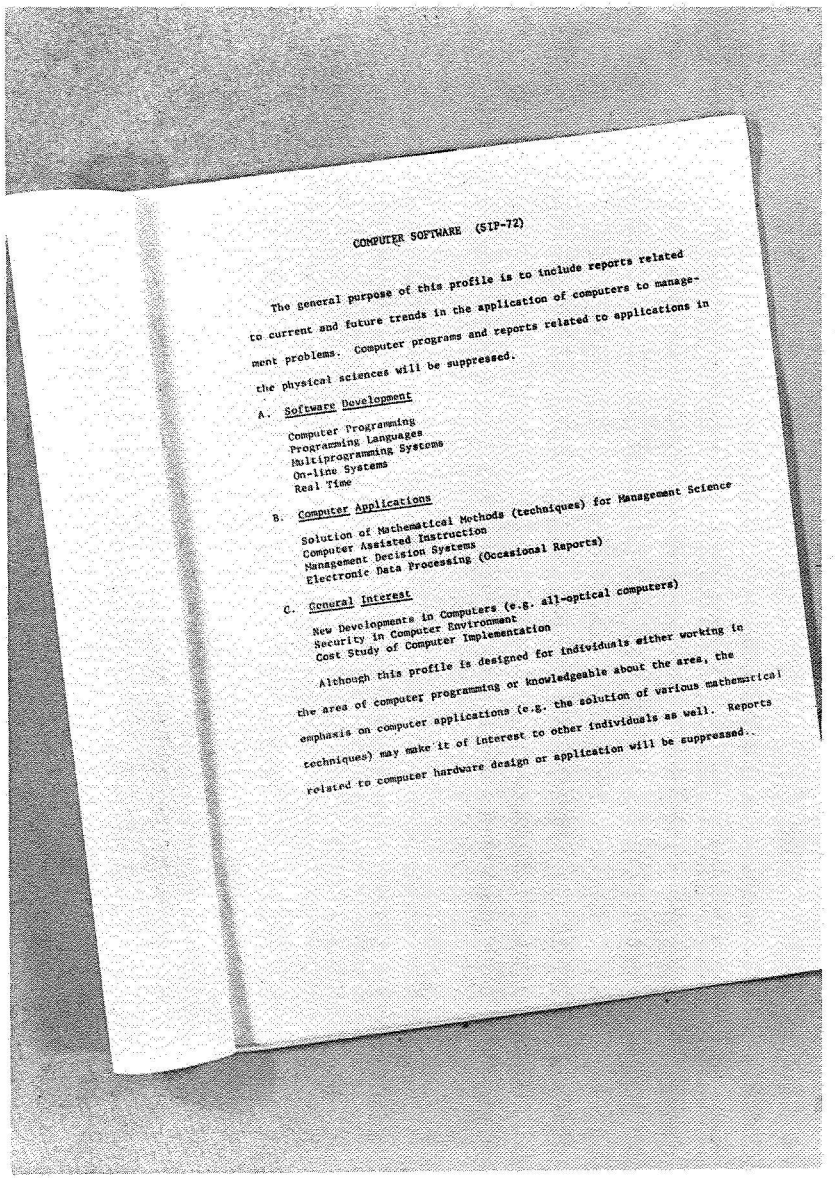
If at all possible, the technologist visiting a business and attempting to sell an RDC service should determine as soon as possible the amount of money spent annually on research and development. If a firm has almost no budget for this endeavor, the chances of interesting the company in technology transfer are usually quite low.

The intraregional distribution of companies often follows a pattern that is useful in analyzing the market. A large aircraft manufacturer may be surrounded by other smaller companies who supply specialized items to the larger plant. We often find that competitors will build new plants close to each other. The reasons for this seem obscure, but an area technologist will frequently be able to tailor a presentation that can be delivered to various companies in the same localized area.

Service to other RDC's: The operational RDC should not overlook the possibility of service to other RDC's. The ARAC RDC at the University of Indiana produces SIPS (Standard Interest Profiles) that are used by other centers. These periodicals cover various areas of research and business and incorporate information abstracted from the NASA technology bank. An example is included as Figure 4.

It is possible that various RDC's could develop expertise in particular areas of technology. The services of these RDC's could then be wholesaled to the other centers. One RDC might develop a capability of producing hard copy documents at a cheaper price, while another RDC could develop a cheaper means of performing computer searches, and yet another could become adept at open literature searches.





COMPUTER SOFTWARE (SIP-72)

The general purpose of this profile is to include reports related to current and future trends in the application of computers to management problems. Computer programs and reports related to applications in the physical sciences will be suppressed.

A. Software Development

Computer Programming
Programming Languages
Multiprogramming Systems
On-line Systems
Real Time

B. Computer Applications

Solution of Mathematical Methods (techniques) for Management Science
Computer Assisted Instruction
Management Decision Systems
Electronic Data Processing (Occasional Reports)

C. General Interest

New Developments in Computers (e.g. all-optical computers)
Security in Computer Environment
Cost Study of Computer Implementation

Although this profile is designed for individuals either working in the area of computer programming or knowledgeable about the area, the emphasis on computer applications (e.g. the solution of various mathematical techniques) may make it of interest to other individuals as well. Reports related to computer hardware design or application will be suppressed.

Figure 4 - ARAC Standard Interest Profile

Service to other RDC's might also be provided in the seminar programs. If an RDC develops a series of seminars in the field of high velocity metal forming, it is conceivable that clients of other RDC's interested in the field could attend the seminars.

Expansion of service: Opportunities for expansion of service of an RDC frequently exist as new technologies develop, or as new industry moves into an area. The BAT teams operating at three of the RDC's are examples of mission oriented programs that could serve as models for increasing services. An RDC located in a region rich in aircraft plants could set up special files in that particular field. This RDC could even develop computer tapes for scanning the open literature in the field.

New RDC's: An institution sponsoring a new RDC is faced with the same problems as the operating centers. In addition, the beginning RDC will have a certain learning or initiation stage which must be reckoned with. The problems in this formative stage can be decreased with assistance from other RDC's. The NASA RDC's have had a continual exchange of information on operational techniques, and personnel from the newer organizations have visited operational groups to learn about the technology of technology transfer. This assistance has been valuable in solving problems encountered in the initial establishment of some centers.

B. Establishing Fee Schedules

Variable Costs

The establishment of a fee structure required a thorough definition of the system needed to perform each type of search. Figure 5 is the flow diagram used when ASTRA's system was first designed and, although a few changes were made as needed, it represents the operation on which the fee structure was based. Each of these elements was then analyzed as being a strictly variable cost. An example of the cost analysis done for each service is as shown on page 19.

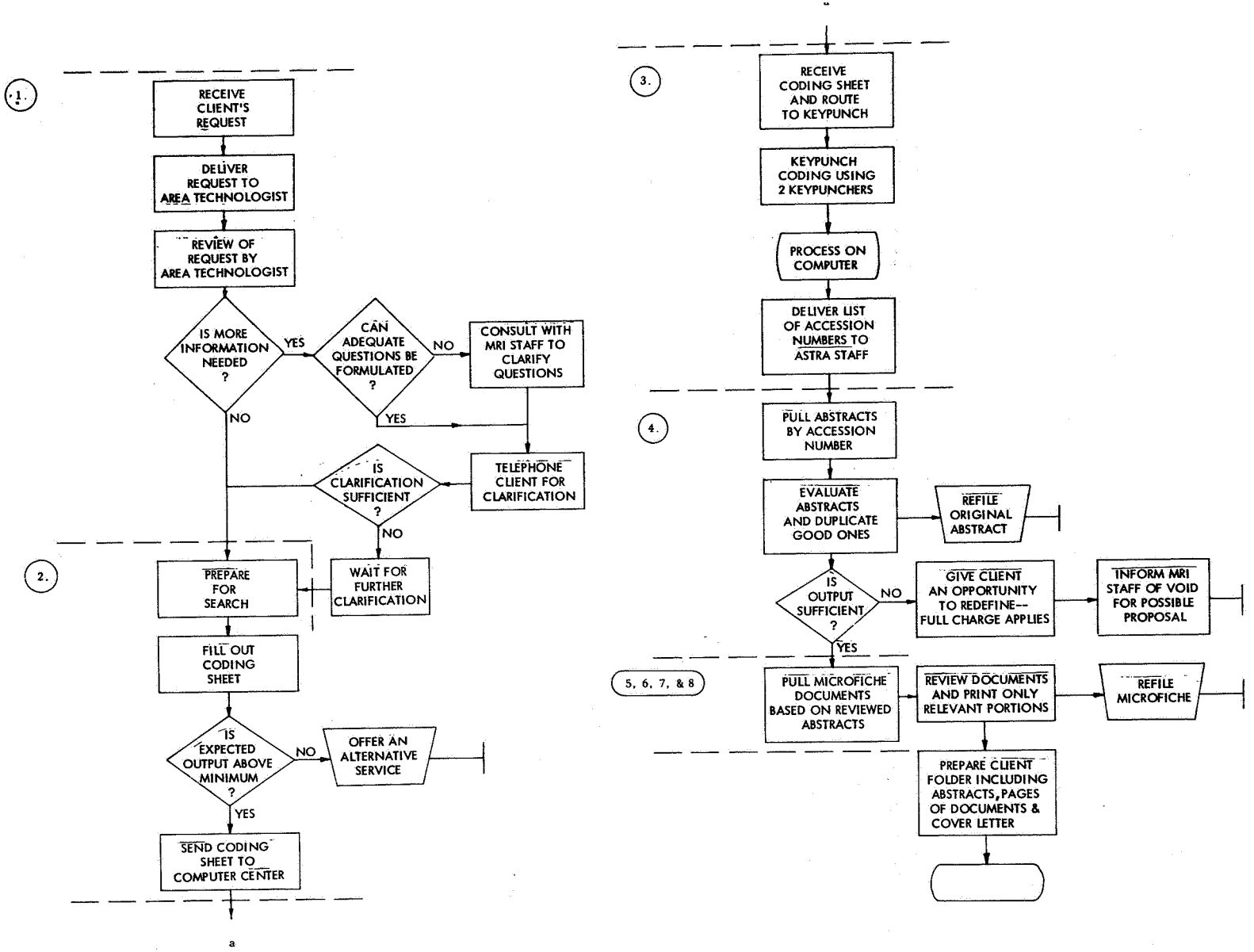


Figure 5 - Flow Diagram of ASTRA Operation

NON-INTERPRETIVE RETROSPECTIVE SEARCH

Task	Person	Time Range/Search
Set up forms and enter in Master Log	Clerk	:05
Evaluate client's statement of the problem	Area technologist	:05
Examine client's file showing interests and needs	Area technologist	:10--:20
Talk to MRI consultants (if needed)	Area technologist	:10--:20
Call client (if needed)	Area technologist	:10--:20
Write strategy	Area technologist	:50--1:20
Computer cost (a check of the most recent update to "debug" strategy) [a]	Computation center	$30 [b]
Check strategy by comparing list of accession numbers to expected volume*	Area technologist	:20--:30
Perform complete search	Computation center	$30 [b]
Pull, duplicate, and refile abstracts	Clerk	1:00--1:20
Review abstracts	Area technologist	1:20--2:00
Write summary letter to client	Area technologist	:20--:30
Write summary for internal use	Area technologist	:10--:20
Typing and mailing	Clerk	:05--:10

Total clerk's time: 1:10--1:35 = $8.--$12.
Total area technologist's time: 3:40--5:15 = $36.--$53.
Total Computation Center cost: $60.
Total reproduction costs: $5.
Total cost range: $109.--$130.

[a] These two steps were subsequently eliminated.
[b] The initial cost is primarily keypunching while the second cost is primarily machine time.

Fixed Costs

Following an analysis of the variable costs, an examination of the fixed costs was made. Fixed costs were limited to staff charges for MRI personnel working full-time on the ASTRA program and the cost incurred by the Computer Center for writing of search routines and for stripping the NASA tapes.

Promotion Costs

Extensive promotional effort is necessary in order to generate the needed volume of searches, and additional promotional endeavor increases the costs of operation correspondingly. The primary consideration in promotional costs are staff time and travel expenses. In addition to the cost of sales calls, staff time and materials are needed to prepare promotional literature and slide presentations.

When establishing the fee schedule, it is important to consider not only the cost of performing the search and the cost of promotion, but also the price the potential user may be expected to pay. The form of the services being offered then becomes important, i.e., will searches be performed on the unit basis, package basis or membership basis. ASTRA's experience during 1966 was that membership basis was not an equitable means of providing services since each company paid the same amount regardless of their usage. The unit basis would be equitable to the companies but does not allow for the contribution to fixed costs which can be covered by the package basis. The package basis was selected by ASTRA.

The initial fee schedule is little more than an estimate of the costs incurred in promotion of the service, maintaining the project staff, and performing the searches. This first approximation requires continued evaluation based on the experience of the RDC. ASTRA attempted to improve its fee schedule through information gleaned on search related costs compiled through the "Search Data Sheet" (see Business Practices, Section VIII, C) and operating expenses through the accounting system by functional category. This information must then be used in the decision-making process of revising the fee schedule to reach the self-supporting status.

RDC Package Plan

The ASTRA service agreements for the $500 and $2,000 package plans may be found in Appendix A of this report. These contracts were modified where necessary to include additional services, changes of the basic package or other alterations. However, it should be noted that $150 of each package

is allocated to fixed costs of operating the RDC. Thus, a client interested in a $500 package plan would first subtract $150 from the $500 base fee. This would leave $350 to be allocated to services shown in the listing on the back of the contract. A client could conceivably call for two retrospective searches for a field of interest ($150 per search) leaving $50 for hard copy reproduction or other services. If desired, the client could add dollars to the basic annual subscription for other services.

The entries on the third page of the contract would total:

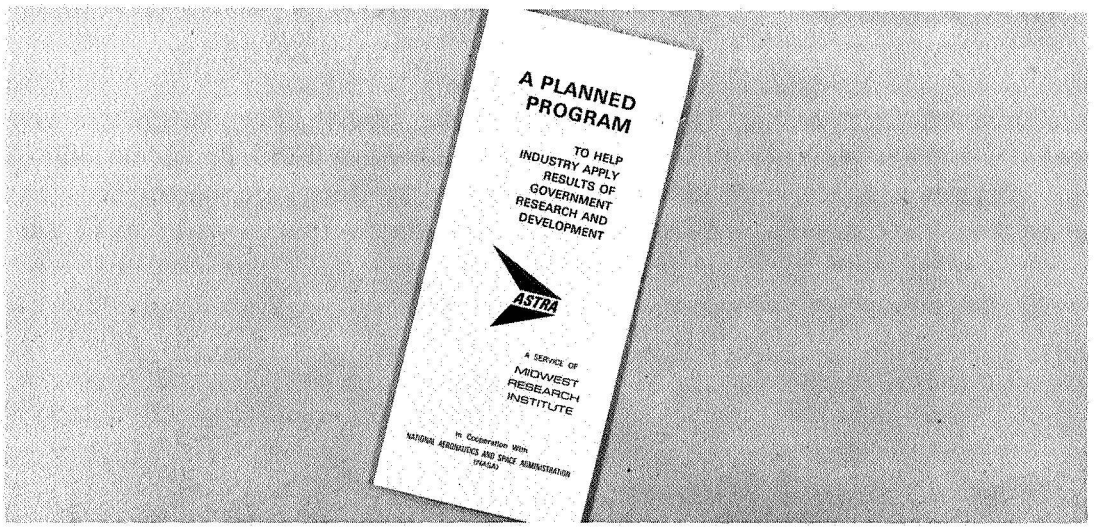
Services Agreed Upon	Cost
Fixed costs	$150
Retrospective search per F.O.I.	150
Retrospective search per F.O.I.	150
Hard copies of documents (or other service)	50
Total	$500

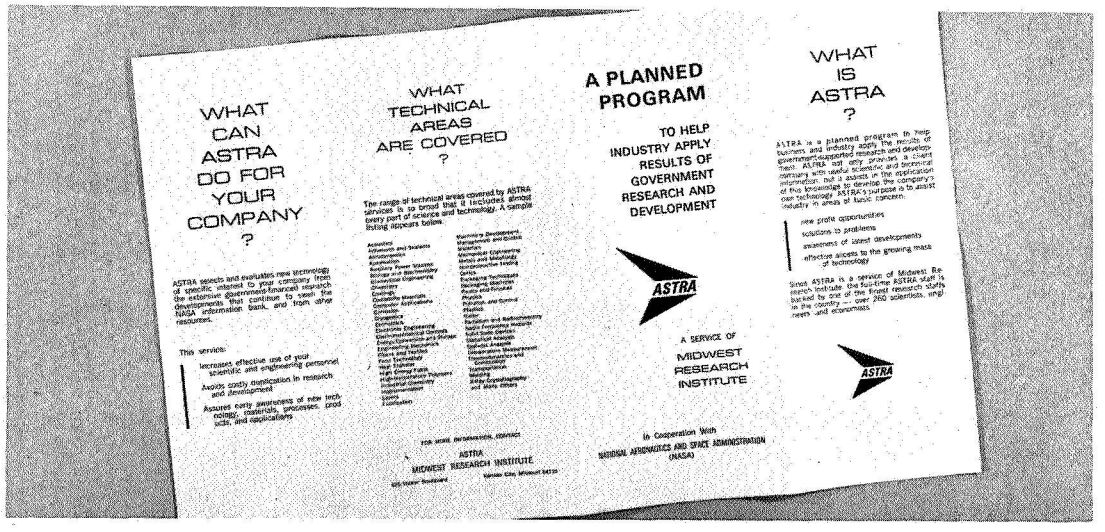
C. Promotional Activities and Public Relations

The impact of the promotional program of an RDC can be the most important aspect of getting a center off the ground and accepted by industry. The problem becomes one of judiciously spending the promotion dollars in the most efficient way. While an RDC may be promoted in various ways, it must be remembered that the potential client audience for an RDC's services can be fairly well defined and isolated. Managers of research and development are prime targets for the services of an RDC, as are executive personnel of most companies.

Brochures

Brochures (see Figure 6) describing the services of an RDC are useful in direct mail campaigns and as a leave-behind piece when making personal calls on prospects. The brochure should briefly outline the program, data sources used, technical areas covered, advantages of using the service, and should give some information on the parent organization. Brochures folded to fit into standard size envelopes are often useful for mailings, and this possibility should be considered during the preparatory stages.





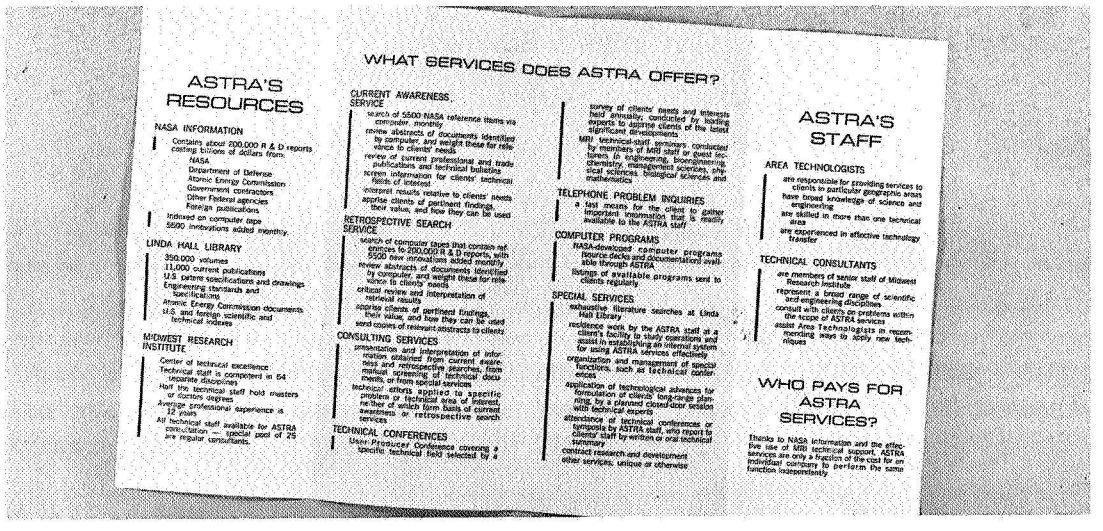


Figure 6 - The ASTRA Brochure

Corporate Brochures

Corporate brochures produced for the RDC's parent institution are desirable items for the sales packages. (See Figure 7.) The ASTRA technologists use a brochure, "Resources for Research." This 32-page booklet describes MRI and is useful in placing the RDC in a context of trust, ability and technical capability.

Special Brochures

Special brochures (Figure 8) for limited direct mailings are also useful. The brochures on the Corrosion Conference sponsored by ASTRA and NASA were overprinted and copies were included in the technologists' promotion kits. These brochures were designed to fit a standard envelope, and copies mailed to prospective attendees included a room reservation card and a conference registration card. Telegrams were used as a followup reminder to selected persons from the special brochure mailing list.

Proceedings of Seminars

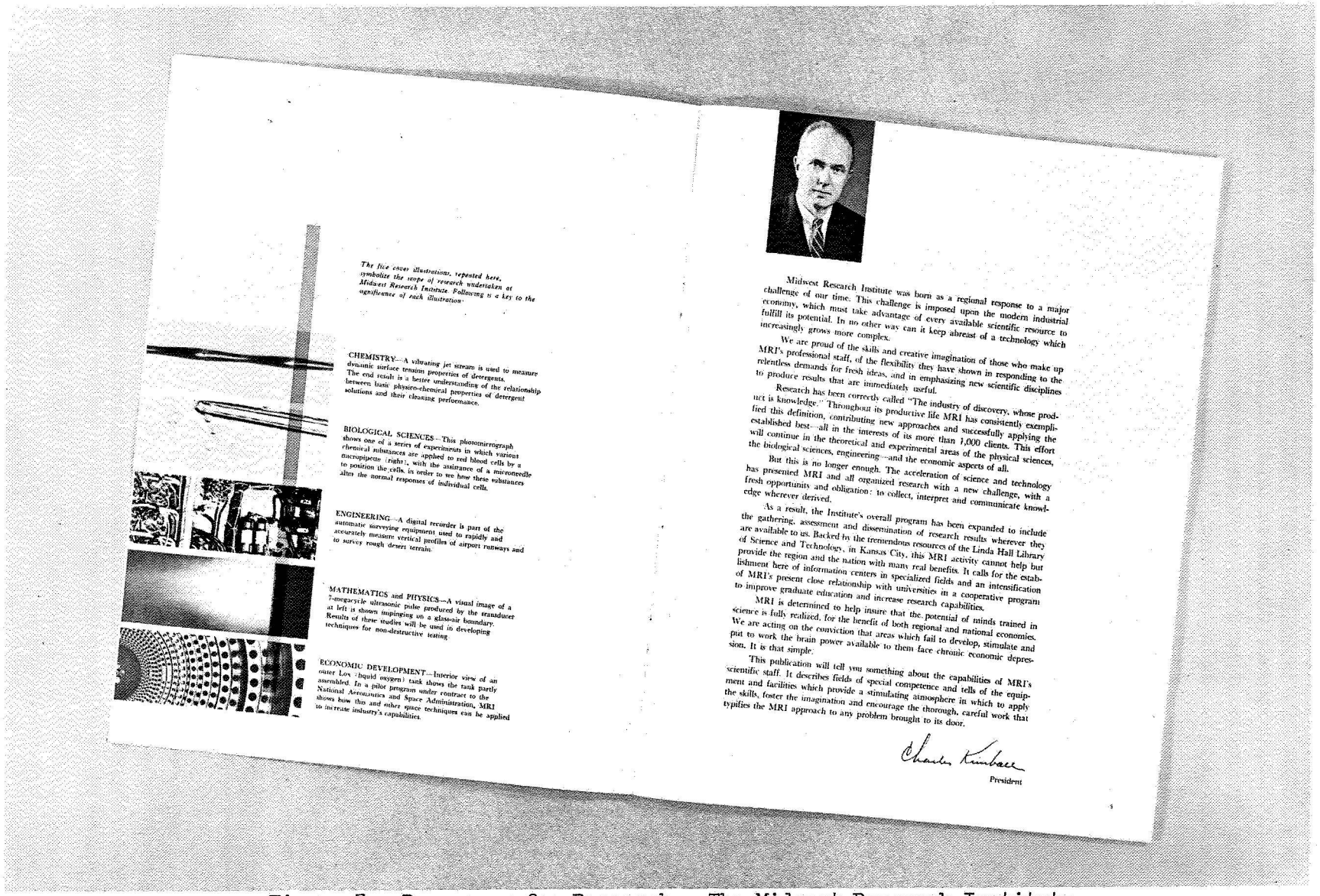
Proceedings of technical seminars sponsored by the RDC are an impressive item to carry in the sales kit. These are especially worthwhile if some of the proceedings are pertinent to the company being visited. ASTRA technologists have used copies of seminar proceedings (Figure 9) to illustrate the capabilities of the center as well as the advantages of attending the seminars.

Sales Handbook

Sales handbooks are a useful adjunct to the area technologists' promotion kit. The sales handbook used by the ASTRA staff is the desk type, flip chart (Figure 10). Photographs of various aspects of the RDC operation enhance a handbook of this type. This particular sales tool has easy insert plastic pages that allow the technologists to add or delete certain sections for a tailored presentation.

Slide Presentations

Slide presentations have proved to be one of the most effective means of describing the services of an RDC to large audiences, and the slide presentation prepared by the ASTRA staff has been used to advantage with very small groups.



The five cover illustrations, repeated here, symbolize the scope of research undertaken at Midwest Research Institute. Following is a key to the significance of each illustration:

CHEMISTRY—A vibrating jet stream is used to measure dynamic surface tension properties of detergents. The end result is a better understanding of the relationship between basic physico-chemical properties of detergent solutions and their cleaning performance.

BIOLOGICAL SCIENCES—This photomicrograph shows one of a series of experiments in which various chemical substances are applied to red blood cells by a micropipette (right), with the assistance of a micronneedle to position the cells, in order to see how these substances alter the normal responses of individual cells.

ENGINEERING—A digital recorder is part of the automatic surveying equipment used to rapidly and accurately measure vertical profiles of airport runways and to survey rough desert terrain.

MATHEMATICS and PHYSICS—A visual image of a 7-megacycle ultrasonic pulse produced by the transducer at left is shown impinging on a glass-air boundary. Results of these studies will be used in developing techniques for non-destructive testing.

ECONOMIC DEVELOPMENT—Interior view of an outer Lox (liquid oxygen) tank shows the tank partly assembled. In a pilot program under contract to the National Aeronautics and Space Administration, MRI shows how this and other space techniques can be applied to increase industry's capabilities.

Midwest Research Institute was born as a regional response to a major challenge of our time. This challenge is imposed upon the modern industrial economy, which must take advantage of every available scientific resource to fulfill its potential. In no other way can it keep abreast of a technology which increasingly grows more complex.

We are proud of the skills and creative imagination of those who make up MRI's professional staff, of the flexibility they have shown in responding to the relentless demands for fresh ideas, and in emphasizing new scientific disciplines to produce results that are immediately useful.

Research has been correctly called "The industry of discovery, whose product is knowledge." Throughout its productive life MRI has consistently exemplified this definition, contributing new approaches and successfully applying the established best—all in the interests of its more than 1,000 clients. This effort will continue in the theoretical and experimental areas of the physical sciences, the biological sciences, engineering—and the economic aspects of all.

But this is no longer enough. The acceleration of science and technology has presented MRI and all organized research with a new challenge, with a fresh opportunity and obligation: to collect, interpret and communicate knowledge wherever derived.

As a result, the Institute's overall program has been expanded to include the gathering, assessment and dissemination of research results wherever they are available to us. Backed by the tremendous resources of the Linda Hall Library of Science and Technology, in Kansas City, this MRI activity cannot help but provide the region and the nation with many real benefits. It calls for the establishment here of information centers in specialized fields and an intensification of MRI's present close relationship with universities in a cooperative program to improve graduate education and increase research capabilities.

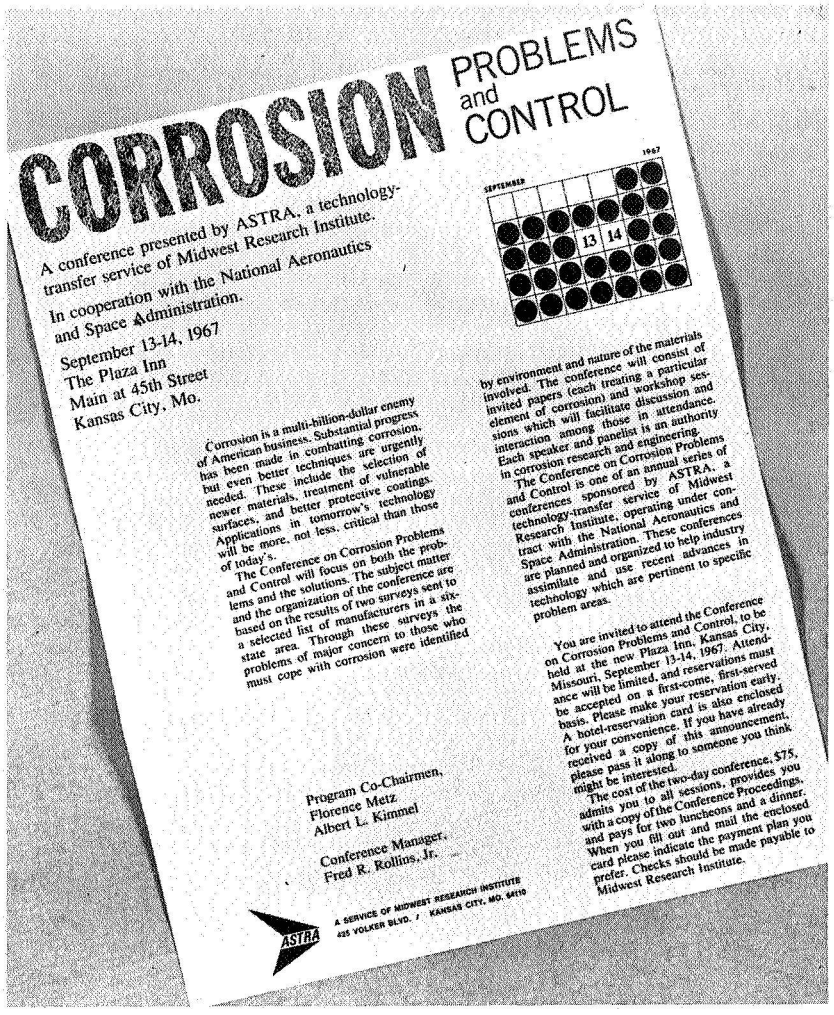
MRI is determined to help insure that the potential of minds trained in science is fully realized, for the benefit of both regional and national economies. We are acting on the conviction that areas which fail to develop, stimulate and put to work the brain power available to them face chronic economic depression. It is that simple.

This publication will tell you something about the capabilities of MRI's scientific staff. It describes fields of special competence and tells of the equipment and facilities which provide a stimulating atmosphere in which to apply the skills, foster the imagination and encourage the thorough, careful work that typifies the MRI approach to any problem brought to its door.

Charles Kimball

President

Figure 7 - Resources for Research - The Midwest Research Institute Corporate Brochure



CORROSION PROBLEMS and CONTROL

A conference presented by ASTRA, a technology-transfer service of Midwest Research Institute.

In cooperation with the National Aeronautics and Space Administration.

September 13-14, 1967
The Plaza Inn
Main at 45th Street
Kansas City, Mo.

1967
SEPTEMBER
13 14

Corrosion is a multi-billion-dollar enemy of American business. Substantial progress has been made in combatting corrosion, but even better techniques are urgently needed. These include the selection of newer materials, treatment of vulnerable surfaces, and better protective coatings. Applications in tomorrow's technology will be more, not less, critical than those of today's.

The Conference on Corrosion Problems and Control will focus on both the problems and the solutions. The subject matter and the organization of the conference are based on the results of two surveys sent to a selected list of manufacturers in a six-state area. Through these surveys the problems of major concern to those who must cope with corrosion were identified by environment and nature of the materials involved. The conference will consist of invited papers (each treating a particular element of corrosion) and workshop sessions which will facilitate discussion and interaction among those in attendance. Each speaker and panelist is an authority in corrosion research and engineering.

The Conference on Corrosion Problems and Control is one of an annual series of conferences sponsored by ASTRA, a technology-transfer service of Midwest Research Institute, operating under contract with the National Aeronautics and Space Administration. These conferences are planned and organized to help industry assimilate and use recent advances in technology which are pertinent to specific problem areas.

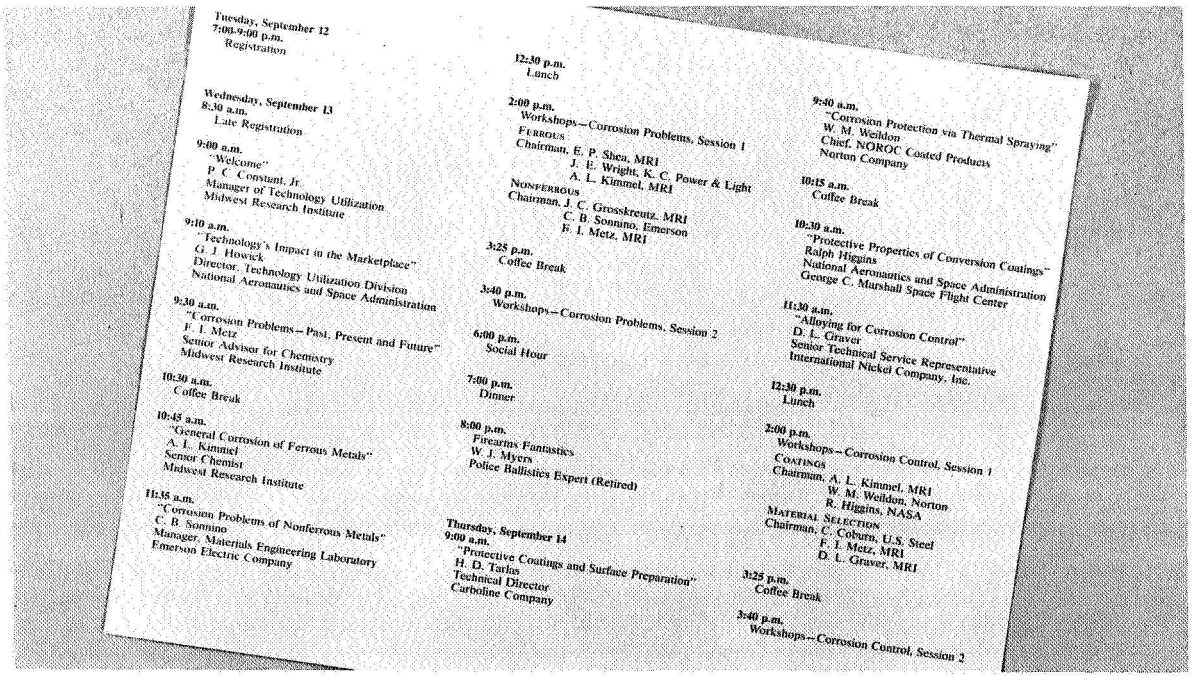
You are invited to attend the Conference on Corrosion Problems and Control, to be held at the new Plaza Inn, Kansas City, Missouri, September 13-14, 1967. Attendance will be limited, and reservations must be accepted on a first-come, first-served basis. Please make your reservation early. A hotel-reservation card is also enclosed for your convenience. If you have already received a copy of this announcement, please pass it along to someone you think might be interested.

The cost of the two-day conference, $75, admits you to all sessions, provides you with a copy of the Conference Proceedings, and pays for two luncheons and a dinner. When you fill out and mail the enclosed card please indicate the payment plan you prefer. Checks should be made payable to Midwest Research Institute.

Program Co-Chairmen,
Florence Metz
Albert L. Kimmel

Conference Manager,
Fred R. Rollins, Jr.

ASTRA
A SERVICE OF MIDWEST RESEARCH INSTITUTE
425 VOLKER BLVD. / KANSAS CITY, MO. 64110



Tuesday, September 12
7:00-9:00 p.m.
Registration

Wednesday, September 13
8:30 a.m.
Late Registration

9:00 a.m.
"Welcome"
P. C. Constant, Jr.
Manager of Technology Utilization
Midwest Research Institute

9:10 a.m.
"Technology's Impact in the Marketplace"
G. J. Howick
Director, Technology Utilization Division
National Aeronautics and Space Administration

9:30 a.m.
"Corrosion Problems—Past, Present and Future"
F. I. Metz
Senior Advisor for Chemistry
Midwest Research Institute

10:30 a.m.
Coffee Break

10:45 a.m.
"General Corrosion of Ferrous Metals"
A. L. Kimmel
Senior Chemist
Midwest Research Institute

11:35 a.m.
"Corrosion Problems of Nonferrous Metals"
C. B. Sonnino
Manager, Materials Engineering Laboratory
Emerson Electric Company

12:30 p.m.
Lunch

2:00 p.m.
Workshops—Corrosion Problems, Session 1
FERROUS
Chairman, E. P. Shea, MRI
J. E. Wright, K. C. Power & Light
A. L. Kimmel, MRI
NONFERROUS
Chairman, J. C. Grosskreutz, MRI
C. B. Sonnino, Emerson
F. I. Metz, MRI

3:25 p.m.
Coffee Break

3:40 p.m.
Workshops—Corrosion Problems, Session 2

6:00 p.m.
Social Hour

7:00 p.m.
Dinner

8:00 p.m.
Firearms Fantastics
W. J. Myers
Police Ballistics Expert (Retired)

Thursday, September 14
9:00 a.m.
"Protective Coatings and Surface Preparation"
H. D. Tarlas
Technical Director
Carboline Company

9:40 a.m.
"Corrosion Protection via Thermal Spraying"
W. M. Weildon
Chief, NOROC Coated Products
Norton Company

10:15 a.m.
Coffee Break

10:30 a.m.
"Protective Properties of Conversion Coatings"
Ralph Higgins
National Aeronautics and Space Administration
George C. Marshall Space Flight Center

11:30 a.m.
"Alloying for Corrosion Control"
D. L. Graver
Senior Technical Service Representative
International Nickel Company, Inc.

12:30 p.m.
Lunch

2:00 p.m.
Workshops—Corrosion Control, Session 1
COATINGS
Chairman, A. L. Kimmel, MRI
W. M. Weildon, Norton
R. Higgins, NASA
MATERIAL SELECTION
Chairman, C. Coburn, U.S. Steel
F. I. Metz, MRI
D. L. Graver, MRI

3:25 p.m.
Coffee Break

3:40 p.m.
Workshops—Corrosion Control, Session 2

Figure 8 - Corrosion Conference Brochure

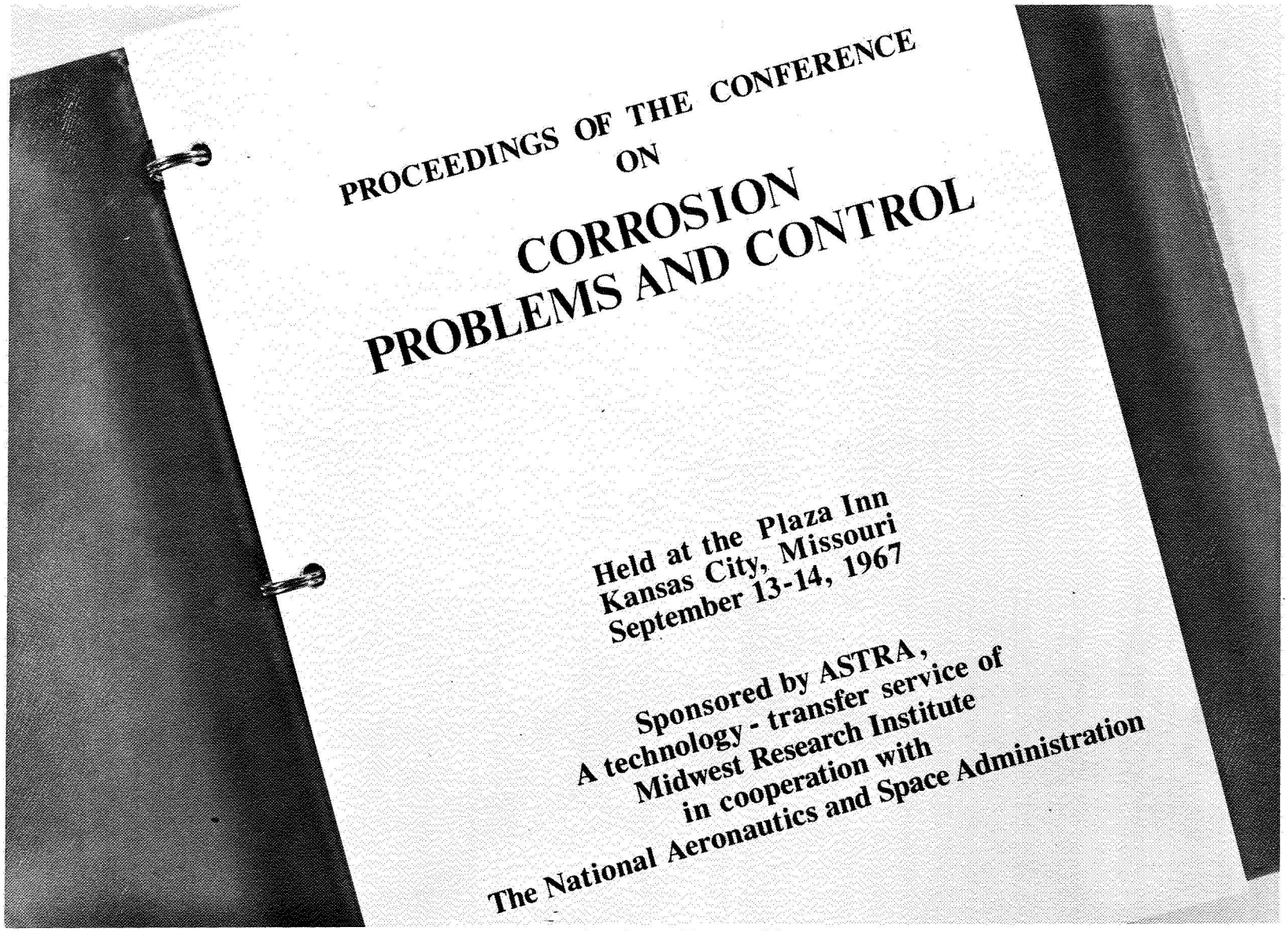


Figure 9 - Seminar Proceedings

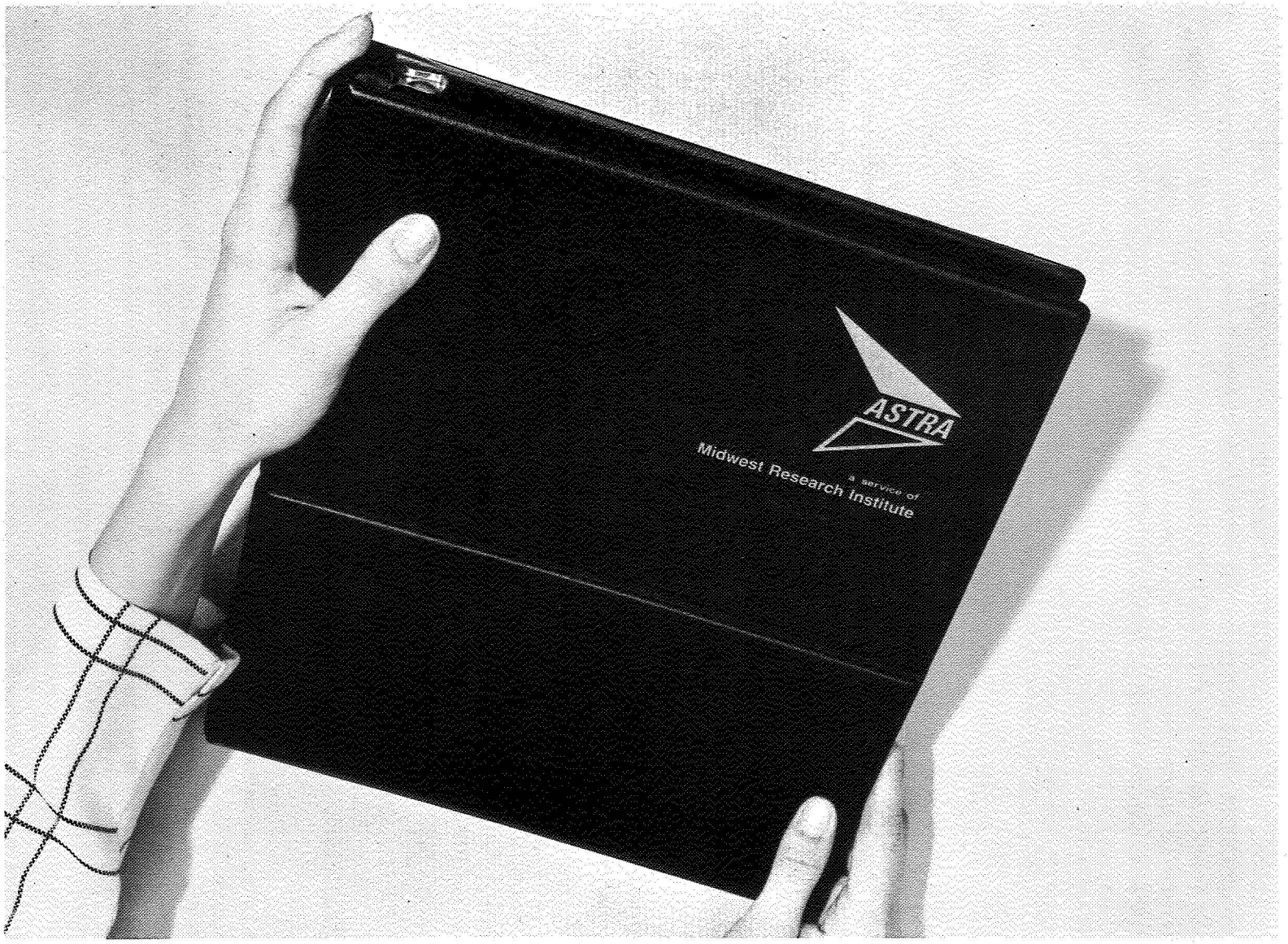


Figure 10 - Promotion Handbook

The slide presentation contains a brief background on Midwest Research Institute, a description of the NASA TU program, the services available through ASTRA, and a number of slides on the technical areas covered. This presentation lasts about 30 min., uses a Kodak Carousel projector, and may be shown on a screen or any light-colored flat surface. This presentation makes up Appendix B of this report.

Motion Pictures

Motion pictures available from the NASA TU office have been used on some occasions to supplement the slide presentations or talks presented by area technologists. The color, synchronized-sound movies have been well accepted at luncheon and dinner meetings where the attention of a large group could be captured. Movies illustrating transfers of NASA technology to industry invariably bring favorable comments from the audience and help to validate the TU concept.

Papers

Published papers or articles in trade and professional publications are impressive items for use by the marketing effort. Examples of these are shown in Figure 11.

The MRI Public Relations Group has been helpful in placing news releases and articles in the local media. While the audience of such media is not restricted to persons able to use the service, these articles are undoubtedly helpful. An example of a news release that resulted in further articles in newspapers and magazines is shown in Figure 12.

Form Letters

Form letters with fill-in salutations were used by the ASTRA staff in an attempt to elicit a post card response from prospective clients (Figure 13). The prospect list was obtained by culling company cards from the Dun and Bradstreet listings mentioned previously. While the returns from this mailing were low, subsequent telephone contacts to the companies indicated that they provided some introduction of the program to the firms involved.

Other form letters have been used effectively by the ASTRA group. Examples of these are shown in Figures 14 and 15.

Space Sciences ⇆ Industrial R&D

April, 1963 Volume 14 Number 4

R/D

The Cover

Artist's conception of NASA Gemini launch, supplied through the courtesy of McDonnell Aircraft Corporation which is developing spacecraft to be used in the program. (Illustration by Horonzak.)

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Contents

Departments

The Authors

KIMBALL

President, Midwest Research Institute

Dr. Kimball has been president of MRI, a not-for-profit independent organization engaging a staff of 300 persons in contract research and development, since June, 1950. A native of Boston, Dr. Kimball received an Electrical Engineering degree from Northeastern University and Master and Doctoral degrees from Harvard. He is the author of more than 100 articles in scientific journals and in business and management publications.

THORNTON

(Deceased) Formerly Vice-President, MRI

Vice-President and technical director of MRI from 1957 until his death in January, 1963, Dr. Thornton was a native of Lockhart, S.C., and received a Bachelor's degree in Chemistry from Clemson College, Master and Doctoral degrees from Purdue University. Before joining MRI, Dr. Thornton was a professor at Purdue. He held a number of patents for the development of improved agricultural and food processing methods; authored publications.

FONG

Director, Industrial Applications, NASA

In his present position, Mr. Fong develops, executes and reviews plans, policies, and programs for translation of technological advances accruing from NASA programs into practical industrial and commercial applications. Born in Boston, he graduated from Massachusetts Institute of Technology in 1935 with a B.S. in Electrical Engineering. He also holds a Master of Engineering Administration degree from George Washington University.

GADBERRY

Assistant Director, Chemistry Division, MRI

A graduate of the University of Kansas with a B.S. degree in Chemical Engineering, Mr. Gadberry has been associated with MRI since 1946; has been assistant director of the Chemistry Division since 1957. He is the co-author of a book on industrial detergency, and contributor to several publications. Before joining MRI, he was chemical engineer, Special Problems Section, Phillips Petroleum Company, where he conducted refinery studies.

SMULL

Director, Office of Grants and Research Contracts

With degrees in aeronautical and mechanical engineering, Dr. Smull is highly qualified for his present post. Previously, he was Assistant Chief, University Programs, NASA; Chief, Research Coordination Division, NACA; Aeronautical Research Scientist, NACA; and Aeronautical Engineer, NACA. Dr. Smull also served on the staff of the President's Air Policy Commission, and was a consultant, Research and Development, Congressional Aviation Policy Board.

Space Sciences ⇆ Industrial R&D

Photos courtesy of NASA and Midwest Research Institute, except where noted otherwise.

Industry and business leaders examine an ASTRA display prior to a program designed to inform them of technical advances.

Universities visited by an MRI team were asked to analyze their strengths and weaknesses as they related to space sciences.

Typical of NASA's contributions to industry is this pressure-sensitive refractory tape using a weld back-up for smooth, uniform welds.

This battery-powered tool examined by MRI scientists Albert Kimmel and John Loser uses same type power source as many space vehicles.

Deeper significance of the space program may lie in its tendency to bring together areas of astronomy, physics, and earth sciences.

Figure 11 - Special Magazine Articles

MRI NEWS

MIDWEST RESEARCH INSTITUTE

425 VOLKER BOULEVARD

KANSAS CITY, MISSOURI 64110

LOGAN 1-0202 (AREA CODE 816)

KANSAS CITY, MO., June 23 -- Midwest Research Institute today announced receipt of a $119,272 contract from the National Aeronautics and Space Administration to provide more specialized technical information dissemination services to industry.

The contract, which covers the period up to Jan. 31, 1967, is another renewal of the original contract let in 1961 to establish the first such information center designed to transfer space-generated technology to industry.

Dr. Charles N. Kimball, MRI president, said that the information center, termed ASTRA, has served more than 900 midwestern companies the last five years.

"MRI is now entering the second phase of its efforts, which will involve several significant changes, all designed for greater selectivity and better 'tailoring' of information for participating companies," Dr. Kimball said.

He said ASTRA was started as a free, experimental service, but that all other NASA dissemination centers organized since then now charge a subscription fee.

The renewal contract specifies that a $500 fee shall be charged for the ASTRA services. These monies go into the government's project fund administered by MRI, Dr. Kimball said.

He pointed out that technological data generated by the government represents a large potential source of new ideas, products, and methods for industry. Government expenditures account for the major portion of all research and development efforts in the United States -- $15.1 billion out of a total of $23 billion anticipated in 1966.

The resulting body of knowledge is in the public domain -- a national resource available to industry. But the very bulk of the new knowledge creates problems of utilization for many firms. NASA alone generated approximately 48,000 innovations annually, and the total for all federally supported programs is about 100,000 a year, Dr. Kimball said.

One way industry has overcome the problem is affiliation with the ASTRA technology dissemination center, which fulfills two basic functions: it assumes the task of collecting, cataloging, and screening the mountain of available technological information; it acts as a catalyst in the transfer process by establishing links between unrelated industries, uses, and methods, Dr. Kimball said.

"One company used a coating developed for NASA which resulted in better product quality and uniformity, and reduced maintenance costs, as well as permitting process experimentation with new chemicals. Direct and indirect benefits amount to several thousand dollars per year," Dr. Kimball Said.

He said another company used information provided by ASTRA to build a modified version of a wire cutter and stripper.

"This company now uses it routinely for preparing coaxial cable for terminal connections. The cutter-stripper does a better job than the previous method, and has reduced the labor cost on this operation by 50 percent," Dr. Kimball said.

Eldon C. Sneegas, who heads the ASTRA staff of specialists-generalists, said the ASTRA services under the renewed contract fall into three major categories: consultation, information services, and seminar participation.

Consultation is designed around a concept of personalized service. ASTRA team members will visit each company twice a year, and the company representatives, in turn, will be invited to visit MRI as often as desired.

Sneegas said information services include announcements and brief descriptions of the latest technical inventions and innovations developed by NASA and its contractors. "These include state-of-the-art reviews and booklets about the latest developments in operating techniques, management systems, materials processes, structures, and analytical and design procedures in numerous technical fields, special publications and bibliographies," Sneegas said.

Several NASA-related technical seminars have already been held at MRI. During the past year, seminars were held on advanced valve technology, solid lubricants, and numerical control. The next seminar, set for Oct. 5-6, will deal with high velocity metalworking.

Additional information about this seminar, and the new ASTRA service, may be obtained from Eldon C. Sneegas at Midwest Research Institute.

Figure 12 - News Release

ASTRA A SERVICE OF MIDWEST RESEARCH INSTITUTE / 425 VOLKER BLVD. / KANSAS CITY, MO. 64110 / 816 • LO 1-0202

YOU CAN CUT YOUR RESEARCH AND DEVELOPMENT COSTS

What is your source of new and improved technology? Have you considered the results of government research and development? Many companies have found these results of great benefit to their operations.

You can, too--through ASTRA.

ASTRA is a program of technology utilization which draws on the tremendous bank of available government research information, as well as other sources. ASTRA concentrates on transferring technology to meet a specific need, to solve a particular problem.

ASTRA experts take the time to get to know your needs; then they find the information that will help you. But most important, they help you apply R and D results to improve your engineering or manufacturing technology without overextending your staff. In fact, they can actually save your staff valuable time through proven, customized services.

ASTRA has served more than 1,000 industrial clients during the past six years, through an organized approach which uses computers as search tools. But the most important part of the ASTRA service is the careful review of pertinent information by technical experts who help the client apply the technology to his particular needs.

Shouldn't your company take advantage of this shortcut to results of R and D?

The enclosed folder outlines briefly how ASTRA can help your company. The postcard will bring more information--without obligation, of course.

Paul C. Constant, Jr.
Manager, Technology Utilization

PCC:jwh
Enclosure

Figure 13 - Form Letter for First Mailing

ASTRA A SERVICE OF MIDWEST RESEARCH INSTITUTE / 425 VOLKER BLVD. / KANSAS CITY, MO. 64110 / 816 • LO 1-0202

August 11, 1967

Dear ASTRA Client:

The enclosed program and reservation forms for the Conference on Corrosion Problems and Control are self-explanatory. As you know, your company's participation in the ASTRA program entitles it to free representation at this conference. We hope all clients will avail themselves of the opportunity to become better informed on corrosion and how to combat this destructive and costly phenomenon. However, we urge you to make your reservation early to insure a place in what will be a limited attendance.

Sincerely,

Fred R. Rollins Jr

Fred R. Rollins, Jr.
Conference Manager

FRR/lw
Encl.

Figure 14 - Form Letter to ASTRA Clients for Corrosion Conference

ASTRA A SERVICE OF MIDWEST RESEARCH INSTITUTE / 425 VOLKER BLVD. / KANSAS CITY, MO. 64110 / 816 • LO 1-0202

August 11, 1967

Dear MRI Trustee:

A Conference on Corrosion Problems and Control will be held September 13-14, 1967, at the Plaza Inn in Kansas City. This conference is being sponsored by MRI's Project ASTRA, the NASA industrial information dissemination program.

The conference will feature authorities in corrosion research and engineering and will include workshop sessions designed to facilitate discussion and interaction among those in attendance. We hope that you or some of your associates will be able to attend this conference and learn more about the latest methods of combating the destructive and costly phenomenon of corrosion. However, if corrosion is not a problem area of direct concern to you, will you please pass the enclosed program announcements along to some of your acquaintances who may be interested.

Very truly yours,

Fred R. Rollins Jr

Fred R. Rollins, Jr.
Conference Manager

FRR/lw
Encl.

Figure 15 - Form Letter to MRI Trustees for Corrosion Conference

Radio and TV

Radio and TV can also be used to promote the TU program and the advantages of using an RDC's services. While these means have not been exploited to a great extent at ASTRA, it would seem that academic institutions could use educational broadcasting facilities to expound the benefits of technology utilization. Where commercial broadcasters carry programs in the public interest, an RDC should have little difficulty in getting time on the station.

Advertising

Advertisements in selected periodicals could provide leads for RDC's selling efforts. While this approach was not used by ASTRA, some commercial information services have been using this technique in the past few years. ASTRA used the MRI quarterly report as a means of advertising the program (see Figure 16). It is possible that a national advertising campaign could be implemented by a group of organized RDC's. If advertising of a Regional Dissemination Center would be placed in a publication with national coverage, much of the audience reached would be too remote to be serviceable by the RDC. Thus, the group advertising concept could provide leads for a network of RDC's and distribute the costs of the ad.

Newsletters

The newsletter is another means of promoting an RDC function. The newsletters could be mailed to existing clients as well as prospects and could contain information on new services offered by the center, seminars, client's problems and solutions, transfers of technology achieved, growth of the program, etc.

Tailored Presentations

Tailored presentations to certain industry groups are deemed advisable in many cases. Ideally, an RDC technologist should speak before various professional organizations to acquaint a number of persons in different firms of the advantages of using technology transfer in their field. By supplementing his talk with transfers specific to their area of interest, the appeal should be high enough to provide an entree into some of the companies represented in the meeting.

Tailored presentations can also be made before engineering and management groups of some larger companies. It would also be wise to

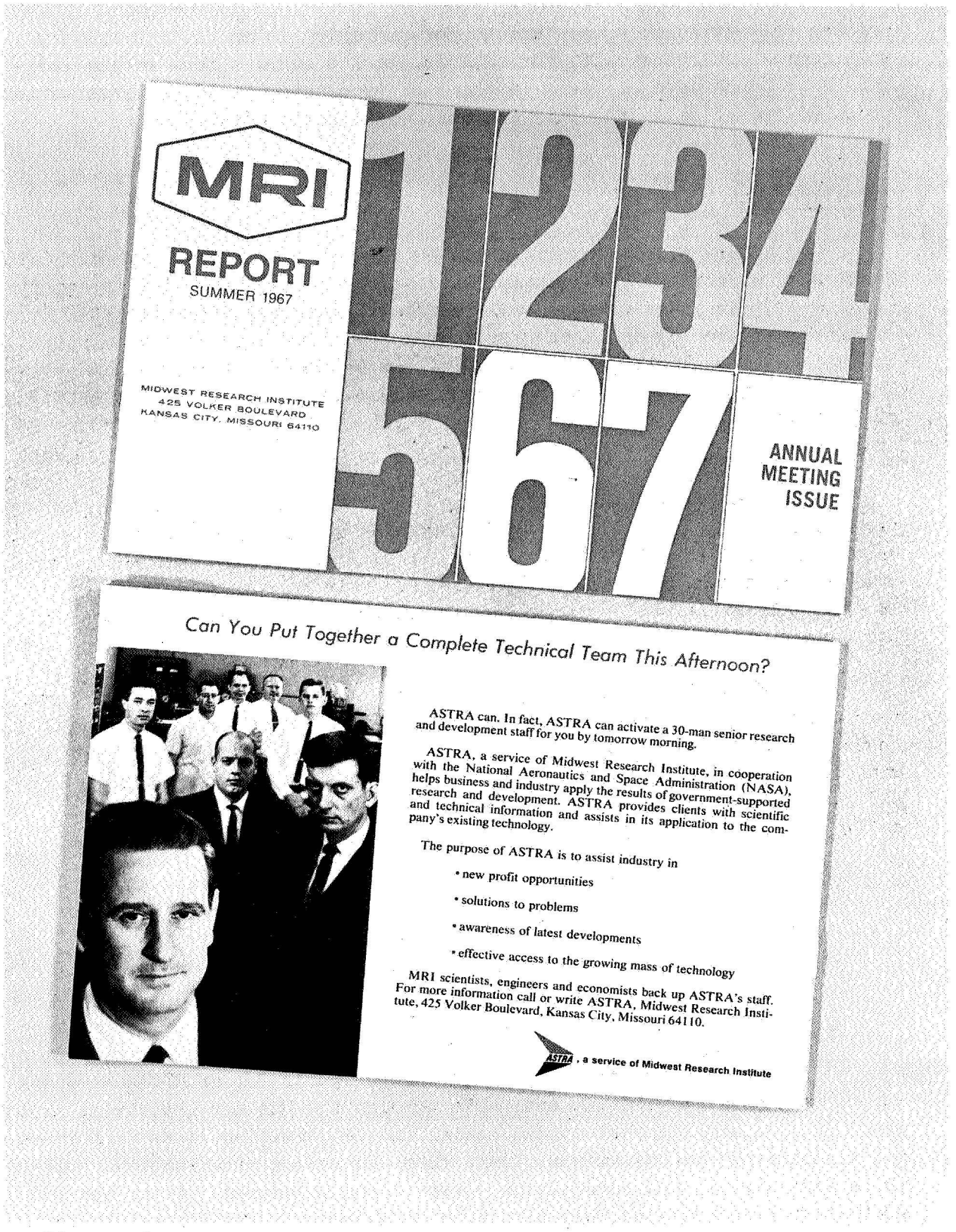


Figure 16 - Midwest Research Institute Quarterly Report Showing ASTRA

prepare some tailored presentations for companies in an RDC's territory with common interests. If, for example, market surveys in a region indicate a preponderance of firms in the food processing field, a presentation prepared specifically for this audience would be in order.

Miscellaneous

Other sales information can be carried by the area technologist. Samples of microfiche cards, samples of abstract cards, service agreements (Figure 17), an index of technical interests patterned after the SCAN listings (Figure 18) and hard copy reproductions of documents are typical items in a technologist's briefcase. A few samples of searches run by the RDC might also be approriate. In some cases, it might be advisable to run a short sample search that would fit into the prospect's field of interests.

Undoubtedly, there are other items that can be included in a promotion program for an RDC. Such things as letterheads, business cards, envelopes, mailing labels, note books, etc., should carry some recognizable name or trademark that denotes the center. This same emblem can be used in slide presentations and promotional literature to create an image for the center.

As the technologists promoting the dissemination center program personally encounter more prospects, they will formulate a list of most needed items for the promotion kit. Some technologists may work better with certain items than others, and this can be somewhat a matter of individual taste. However, sufficient information to leave behind, and sufficient information to explain the program are mandatory.

VII. TECHNIQUES OF SALES

A. Compilations of Prospects

As mentioned, the compilation of prospects for an RDC's services may be made from information available through the Dun and Bradstreet lists. Other sources are the various industrial indices, mailing lists from trade and professional organizations, lists from the parent organization, telephone directories, and advertising clipped from magazines. After the prospects have been compiled they should be rechecked for their possible worth. Often persons in the parent institution can provide leads as to the value of some of the prospects. Other technologists are also helpful in narrowing down the list.

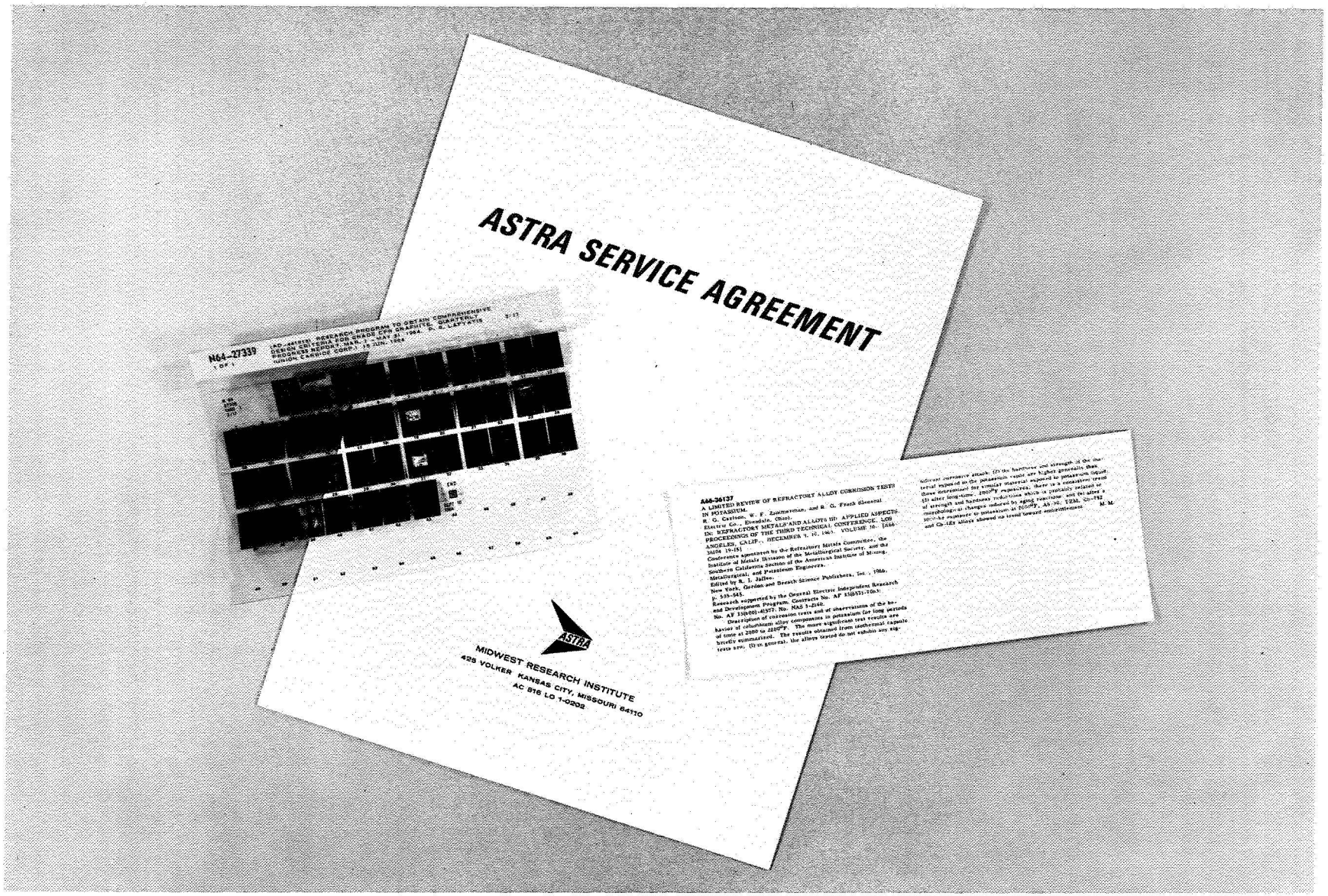
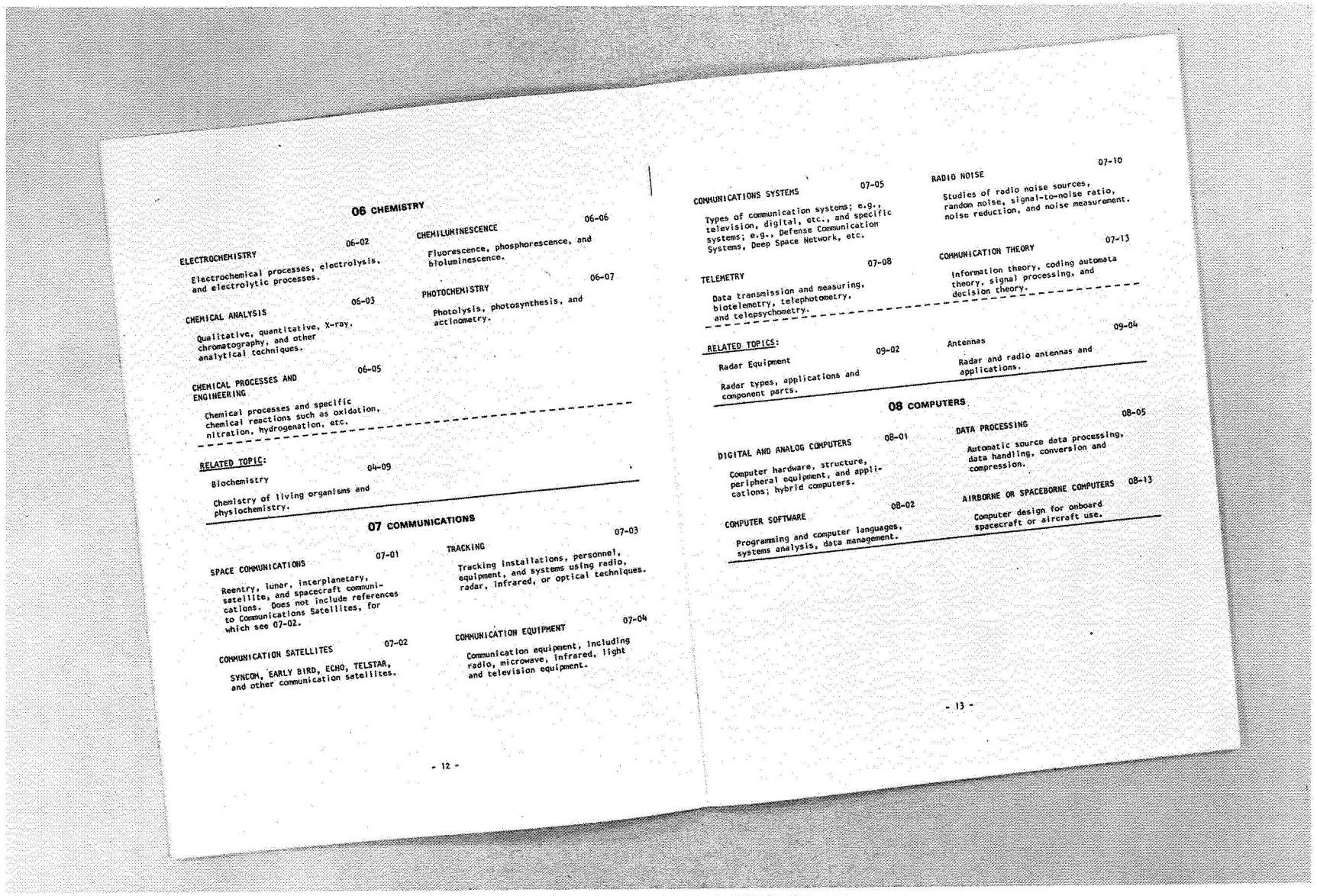


Figure 17 - ASTRA Promotional Items - Microfiche Cards, Abstract Cards, and Service Agreements



06 CHEMISTRY

ELECTROCHEMISTRY 06-02

Electrochemical processes, electrolysis, and electrolytic processes.

CHEMICAL ANALYSIS 06-03

Qualitative, quantitative, X-ray, chromatography, and other analytical techniques.

CHEMICAL PROCESSES AND ENGINEERING 06-05

Chemical processes and specific chemical reactions such as oxidation, nitration, hydrogenation, etc.

CHEMILUMINESCENCE 06-06

Fluorescence, phosphorescence, and bioluminescence.

PHOTOCHEMISTRY 06-07

Photolysis, photosynthesis, and actinometry.

RELATED TOPIC:

Biochemistry 04-09

Chemistry of living organisms and physiochemistry.

07 COMMUNICATIONS

SPACE COMMUNICATIONS 07-01

Reentry, lunar, interplanetary, satellite, and spacecraft communications. Does not include references to Communications Satellites, for which see 07-02.

COMMUNICATION SATELLITES 07-02

SYNCOM, EARLY BIRD, ECHO, TELSTAR, and other communication satellites.

TRACKING 07-03

Tracking installations, personnel, equipment, and systems using radio, radar, infrared, or optical techniques.

COMMUNICATION EQUIPMENT 07-04

Communication equipment, including radio, microwave, infrared, light and television equipment.

- 12 -

COMMUNICATIONS SYSTEMS 07-05

Types of communication systems; e.g., television, digital, etc., and specific systems; e.g., Defense Communication Systems, Deep Space Network, etc.

TELEMETRY 07-08

Data transmission and measuring, biotelemetry, telephotometry, and telepsychometry.

RADIO NOISE 07-10

Studies of radio noise sources, random noise, signal-to-noise ratio, noise reduction, and noise measurement.

COMMUNICATION THEORY 07-13

Information theory, coding automata theory, signal processing, and decision theory.

RELATED TOPICS:

Radar Equipment 09-02

Radar types, applications and component parts.

Antennas 09-04

Radar and radio antennas and applications.

08 COMPUTERS

DIGITAL AND ANALOG COMPUTERS 08-01

Computer hardware, structure, peripheral equipment, and applications; hybrid computers.

COMPUTER SOFTWARE 08-02

Programming and computer languages, systems analysis, data management.

DATA PROCESSING 08-05

Automatic source data processing, data handling, conversion and compression.

AIRBORNE OR SPACEBORNE COMPUTERS 08-13

Computer design for onboard spacecraft or aircraft use.

- 13 -

Figure 18 - Example of SCAN Listing

B. "Home Work"

After the lists have been formed, a technologist would do well to obtain as much information as possible on the products of the companies, the number of personnel working in them, the type of people employed, amount and type of research performed, changing markets in the product line, etc. Company brochures and annual reports are usually easy to obtain by mail, and these often give a sufficient amount of information to familiarize a technologist with the firm.

C. Initial Contacts

The initial contact with the company can take one of several forms. Phone calls seem to be more effective than letters; however, they take more time and can be expensive if the call is outside the immediate area. There is one advantage to a phone call. The technologist is usually placed in contact with the proper person in a very short time. Letters are often sent to the wrong party, are misplaced, or discarded.

Letters are useful as initial contacts where blanket mailings are to be made, but the return is often disappointing. Letters are more useful as follow-ups after the initial telephone contact. They can best be used to remind a prospect of the forthcoming date and time of a personal call.

D. Sales Meetings and Critiques

It is advisable to hold periodic meetings with the area technologists to review new promotion and marketing literature, successful sales techniques. and to discuss problems common to the selling of the programs. Critiques of methods used by the various technologists will serve to improve all members of the group. Persons involved in the promotion and public relations of the RDC should also attend these meetings.

E. Personal Sales Calls

The personal sales call approach has been found to be the most effective method of contacting prospects at the ASTRA RDC. It has also been found that calling on small groups of company employees is preferable

to calling on individuals. In meetings where the prospective company is represented by more than one person, a greater exchange of information results as more questions are asked about the TU concept, retrieval of information, technical areas covered, costs, etc.

Experience has shown that at least four sales calls can be made in one day, provided all prospects are in the same general area. The time taken for calls has ranged from a low of 30 minutes to a maximum of 3 hr. An average is about 1-1/2 hr. spent in talking to the prospects.

While it is impossible to determine in all cases which position in the client firm controls the purchases of technology, the director of research and development, or director of engineering is usually the best prospect. This is, of course, very dependent on the size of the firm. In smaller companies the president or vice president is often available for the technologist's presentation. In very large companies, it will be unlikely that persons in these positions will be available.

F. Follow-ups

It is doubtful that any firm will become an RDC client on the first call. Therefore, it is usually necessary to recontact the company at some later date. If possible, this latter contact should be of the personal type, preferably a visit or a phone call. Letters should also be used to remind the parties involved of the visit, the availability of the service, and to thank them for taking the time to listen to the presentation.

The ASTRA group has found that by extending an invitation to the prospect to visit the facility, and the parent organization, an increased interest in the program is obtained. Invitations to visit Midwest Research Institute have been accepted by prospects in a number of cases. Tours of the facility have been conducted by technologists, and in a few cases, the slide presentation has been given to Institute visitors who expressed interest in the program.

G. Closing the Deal

Technologists must be impressed with the necessity of asking the prospect to return the service agreement with the signature of a suitable company representative affixed. There is very little merit to an excellent presentation when the party is not asked to sign up.

VIII. GENERAL OPERATIONS

A. Management

As mentioned previously, the RDC will function differently in an autonomous operation than it will as a section of a parent institution or as a department in a university. The management of the center will also differ slightly under these various conditions. Irregardless of the environment within which the RDC is operating, there should be some full-time manager responsible for the overall operation. Whether this person is titled supervisor, section head, professor, or "leader" will be of little consequence, as long as he is cognizant of the relationship of the center to the rest of the organization.

The Research Organization

The research organization offers an ideal working environment for an RDC. Most research institutes have a wealth of personnel capable of acting in a consulting capacity, and a sophisticated computer capable of performing searches is usually available on some shared-time basis. The research institute is usually structured with different divisions and departments and the center can be placed within one of these. The research institute also offers a ready made testing ground for the search strategies used by the center.

It is also probable that various groups within the research organization could avail themselves of an RDC's services. Clients of such an institute are seeking technology, and technology is exactly what the RDC offers. Most research groups are also amenable to the concept of technology utilization, as this is essentially the backbone of their business.

The University

The university differs somewhat from the research institute as a parent organization for an RDC. Most universities have a computer facility so in this respect both groups are the same. The university is also departmentalized, but often the departments operate almost as autonomous structures. This factor could make it difficult for an RDC to draft consultants from various fields. However, if the RDC operation within a university is well recognized by other departments, there is a wealth of information and knowledge available to draw upon.

A university also has the advantage of very reasonably priced labor in the body of graduate students, professors, assistants, etc. There is, however, a problem in that the turnover in such a group is usually high, and the RDC would have to learn to live with a staff that is continually in some degree of flux. This latter problem can be turned to the advantage of the total TU effort, as the people leaving a university are usually going into industry. With proper training at the university RDC, they could be expected to become proponents of the usefulness of technology utilization in the business world.

The Autonomous Organization

The autonomous organization has never been tried in the NASA TU program, but there are some commercial information services that have succeeded to a fairly good degree. Most of these are, however, in the field of catalog information, price and delivery data, and manufacturing sources. These organizations are managed in a manner similar to that of ASTRA. They do have an advantage of large sales and advertising budgets necessary in their for-profit structures.

B. Technical

Technology Transfer: Noninterpretive Retrospective

The purpose of the noninterpretive retrospective search is to supply the client with a background of historical information applicable to a certain problem, or area of interest. Hopefully, the information supplied will aid the client in solving his problem, or update his technology in an area.

While the linear process of running a search will be discussed later in this report, there are certain areas that should be given some consideration at this time. Many of the steps discussed under this noninterpretive retrospective search will hold true for the other types of searches.

Definition of the client problem or need: This would appear to be one of the simplest steps of performing the search, but it actually can be one of the most frustrating and difficult. There is a hesitancy on the part of many clients to freely discuss their problems with technologists from the RDC. The reasons are numerous. Stating the problem indicates a weakness or lack of technical ability on the part of the client. The client is afraid to reveal the problem as it could in turn reveal information

of a proprietary nature. The problem has not really been pinpointed. The client may be fishing for a free solution without running a computer search. The client may be technically incapable of discussing the problem, and on and on.

To overcome this multitude of pitfalls to problem definition, the RDC must work closely with the client and above all must obtain the client's trust. Certainly, one way to do this is to have a competent, helpful, and communicative area technologist visit the client's facility, review the problem in detail, and reiterate the problem to the client's technical staff.

The area technologist should work with the customers to formulate the problem in vocabulary terms used in the subject authority list (SAL) and the NASA thesaurus. By allowing the client to review terms in these lists during a joint problem defining meeting, the possibility of the area technologist misinterpreting the area of interest is minimized. Also, at this time the Search Request Form can be filled out. (See Figure 19). With the problem well defined, the technologist is ready to write a computer search strategy.

Search strategy: The strategy used in searching the computer tapes will depend upon the equipment available to the center, the format of the modified NASA tapes, and idiosyncracies of the programmers. Either Boolean or weighted term strategy may be used, or a combination of both strategies can be formulated. Once again we suggest that "Guide to the Processing, Storage, and Retrieval of Bibliographic Information at the NASA Scientific and Technical Information Facility" be reviewed.

The ASTRA center has selected, after considerable study, a Boolean strategy. There are some techniques that may be used to implement this search strategy, however, and the technologist soon learns methods of cutting computer time by properly ordering his terms. Thus, if a search is being run to select all documents concerning silver in solutions of water, the Boolean equation would be written silver and water, or using the Boolean notation silver * water. The silver is placed first as there are, according to SAL list, fewer documents keyed to the word silver than there are keyed to the word water. If the computer must stop on every document containing the key word water, and then scan the rest of the terms in that document for silver, the time taken will be longer than if silver is found first, and then the document is scanned for the word water.

Expertise in writing computer search strategies develops with time. An RDC should have the highest amount of cooperation between computer personnel and area technologists. Cooperation between these areas will eventually lead to idealized searching techniques with the available equipment.

SEARCH REQUEST

☐☐☐☐ Search Number

Company _____ Date of Request ___/___/___

☐ Phone ☐ Letter

_____ Results Needed ___/___/___

Contact _____ ☐ Phone ☐ Letter

Phone ( ) - _____ Ext. _____ Technologist _____

Type of Search- RSS CAS IRS ICAS Search Prepared ___/___/___

Search Title _____

_____

Definition of Problem _____

_____

_____

_____

Do you know of other projects which may be relevant to your problem? _____

☐ Govt. _____

☐ Ind. _____

☐ Univ. _____

Client Also Contacting _____

Other Possible Sources _____

_____

Search Terms and (Number of Computer Entries)

1. _____	( )	11. _____	( )
2. _____	( )	12. _____	( )
3. _____	( )	13. _____	( )
4. _____	( )	14. _____	( )
5. _____	( )	15. _____	( )
6. _____	( )	16. _____	( )
7. _____	( )	17. _____	( )
8. _____	( )	18. _____	( )
9. _____	( )	19. _____	( )
10. _____	( )	20. _____	( )

ASTRA Form 101, 7-67

Figure 19

Manual searches may also be performed if deemed necessary. This searching of available open literature, texts, periodicals, etc., is, however, a tedious and costly operation. Manual searching requires a familiarity with the library, periodicals in the field, and the ability to scan pages of information. The cost of any type of search can mount rapidly if manual scanning is added and this increased cost must be agreeable to the client.

Document retrieval: The documents in the NASA file are initially retrieved in abstract form. The computer types out accession numbers (Figure 20), and these are used to hand retrieve the abstract cards. In a noninterpretive search, the documents are supplied to the client only at his request. The client is initially given only abstracts to review. If he finds an abstract he believes to be pertinent, he may order the complete document.

Other documents are sent to the client at the discretion of the area technologist. If a technologist locates a source that he believes is particularly pertinent to the customer's problem, he will probably do best to notify the client of the availability of the source. The cost of Xeroxing each apparently applicable document can be phenomenal in many searches.

Document review and weighting: This part of the service is performed with NASA documents by scanning the abstract cards for relevance. If an abstract is deemed irrelevant, it is replaced in the storage file. Those deemed worthwhile are Xeroxed. (See Figure 21.) This Xerox copy is sent to the client.

Reporting to the client: Figure 22 is typical of the results of a computerized search. The Xerox copies of the abstracts are stapled together and sent with an explanatory cover letter to the client. If some of the abstracts appear particularly relevant, they may be marked as such.

The area technologist must then keep in contact with the client to determine if complete documents are required. Should the recipient desire copies of complete documents, the RDC may arrange to supply microfiche through Documents, Incorporated; or hard copies may be supplied through the center's own reproduction facility. Copies of documents are billed as a part of the service. Normally, a portion of the fee is allocated to hard copy reproduction. From time to time the client is apprised of the amount he has spent on documents.

The RDC's responsibilities do not end when the client has received documents requested as a result of the search. To fully evaluate the service rendered, the technologist should maintain contact with the recipient of the information. The task now becomes one of ascertaining if the information was used.

SEARCH NO.: COMPANY CODE: BAT AREA TECHNOLOGIST: LLR

SEARCH TITLE: PROTECTIVE CLOTHING

QUESTION:

CLOTHING	325	+
THERMAL ENVIRONMENT	145	+
PROTECTIVE CLOTHING	124	+
COLD ACCLIMATIZATION	65	+
COLD WEATHER	40	+
COLD TOLERANCE /BIOL/	31	+
THERMAL COMFORT		

SEARCH NO.:

ACC. CAT.	ACC. CAT.	ACC. CAT.	ACC. CAT.	ACC. CAT.	ACC. CAT.	ACC. CAT.	ACC. CAT.
66A16062 05	66A16235 05	66A16238 05	66A18584 05		66A22119 04	66A22120 05	66A22121 05
66A23096 20	66A23100 05	66A24958 05	66A26652 03	66A27355 32	66A28412 05	66A28656 05	66A28822 14
66A29458 05	66A31127 05	66A31594 09	66A32142 05	66A32146 05	66A32188 05	66A32193 05	66A34228 28
66A37002 02	66A38162 05	66A38164 05	66A40129 05	66A42959 09	66A80039 04	66A80044 04	66A80152 04
66A80227 04	66A80314 04	66A80359 04	66A80360 04	66A80764 04	66A80772 04	66A80910 04	66A80970 04
66A81022 04	66A81046 04	66A81133 04	66A81174 04	66A81199 04	66A81200 04	66A81298 04	66A81340 04
66A81420 04	66A81446 04	66A81447 04	66A81565 04	66A81589 04	66A81891 04	66A82026 04	66A82047 04
66A82178 04	66A82335 04	66N10052 05	66N10684 29	66N10788 05	66N11077 15	66N11523 04	66N11714 15
66N12250 04	66N12524 13	66N13978 05	66N14830 04	66N14855 04	66N15356 33	66N16743 05	66N16942 05
66N17297 05	66N17386 05	66N19179 05	66N19285 05	66N19599 05	66N19722 14	66N19838 33	66N19878 05
66N19944 04	66N20017 04	66N21642 20	66N21643 20	66N22473 05	66N22474 05	66N22632 05	66N22675 05
66N22762 07	66N22764 04	66N22831 18	66N23433 32	66N27968 04	66N27977 13	66N28270 18	66N28766 30
66N28777 04	66N29170 04	66N29470 31	66N29724 04	66N30197 04	66N30658 04	66N31084 04	66N31824 31
66N32497 13	66N32949 33	66N33042 05	66N33200 04	66N33202 04	66N33260 04	66N33555 31	66N33612 05
66N33641 05	66N33730 05	66N33732 05	66N34018 18	66N34431 33	66N34432 33	66N34433 08	66N34440 33
66N34443 15	66N34775 04	66N34883 04	66N35288 33	66N35590 05	66N36144 05	66N36227 05	66N36517 05
66N37047 30	66N37048 33	66N38359 04	66N38414 33	66N39107 05	66N39792 18	66N39863 05	
67A11944 28	67A12346 05	67A13409 18	67A14582 04	67A15467 20	67A15472 20	67A16284 05	67A17453 09
67A17998 05	67A20271 05	67A22434 11	67A23822 04		67A80003 04	67A80006 04	67A80007 04
67A80008 04	67A80009 04	67A80036 04	67A80101 04	67A80102 04	67A80103 04	67A80208 04	67A80214 04
67A80634 04	67A80725 04	67N10289 04	67N10471 04	67N11383 31	67N11438 04	67N12085 04	67N12442 04
67N12494 05	67N12495 05	67N12500 02	67N12957 04	67N12997 04	67N12998 33	67N13650 05	67N13817 05
67N15178 05	67N17302 31	67N17546 05	67N17929 05	67N17931 05	67N19756 11	67N20295 11	67N20298 33
67N20572 32	67N21712 05	67N21716 05	67N22151 04	67N22339 22	67N22354 13	67N22697 05	

Figure 22 - Computer Printout of Search

N64-30794 Georgia Inst. of Tech., Atlanta Engineering Experiment Station

PHOTOGRAPHIC INSTRUMENTATION FOR TRIANGULATION STUDIES OF LUMINOUS CLOUDS IN THE UPPER ATMOSPHERE

M. M. Cooksey, Z. Frentress, and H. D. Edwards Repr. from Appl. Opt., v. 3, no., Mar. 1964 p 399–403 *Its* Repr. No. 172

Instrumentation has been developed for obtaining triangulation photographs of luminous clouds in the upper atmosphere. These clouds are created by the release of chemicals, such as sodium and cesium, from rockets. The instrumentation has been used on approximately 80 rocket firings. Descriptions and operating characteristics are given of the equipment. A modified version of the K-24 aerial camera with 7 in. (17.8 cm) f/2.5 optics was used and mounted on 60-in. (152-cm) searchlight carriages and Mk 51 gun directors. Camera control system, data chamber, fiducial light system, shutter and filter system field installation, and alignment procedures are described.

Author

97 - 60

N65-10349# Miami U., Coral Gables, Fla. Inst. of Marine Science

OPTICAL RECTIFICATION AND GRIDDING OF SATELLITE PHOTOGRAPHS Semiannual Technical Report

H. V. Senn, P. J. Davies, and H. W. Hiser Jul. 1964 40 p refs (Contract Cwb-10622)

An operational procedure has been developed for the optical rectification and gridding of satellite photographs. The procedure is described, and examples are shown to illustrate both the advantages and disadvantages of the optical rectification system over earlier methods that rectified the geographical grid rather than the TIROS photograph. The problems involved in this rectification system are largely those of achieving dynamic similarity between the film projection system with its spherical section, and the TIROS system that was actually used in obtaining the film (the vidicon camera photographed the true earth and its cloud cover at an angle). Finally, a relatively simple computer program is devised for the determination of the satellite tilt angle and the latitude and longitude of the TPP, when only the TSP coordinates and the satellite altitude are known.

Author

N64-31372 Howell (W E) Associates, Inc , Lexington, Mass.

A STUDY OF MIDDLE CLOUD WAVE PATTERNS Final Report

Manuel E. López and Sigurd N Ronning 31 May 1964 149 p refs

(Contract AF 19(628)-306)

(AFCRL-64-465; AD-605416)

A catalog of stereophotographs of middle-cloud wave patterns has been compiled. A study is made of the relations between the mass velocity and the phase velocity of the waves, the wind shear, and the various angles between these vectors. An almost random distribution of the angles between phase and mass velocities is found. A tendency is found for the phase velocity to be in the same direction as the wind shear; and this tendency is significantly stronger in the case of retrogressive waves (waves moving slower than the component of the average wind along the direction of wave travel). A comparison of wavelengths, computed by assuming that the waves form as short gravitational waves at the interface of two layers, with the actual wavelengths shows good correspondence. The altitude of waves with wavelengths greater than 3 km also correlates well with the lowest altitude at which a minimum of Scorer's parameter occurs, lending support to the notion that many of these gravitational waves originate from lee-wave impulses.

Author

Figure 21 - Page of Xeroxed Abstracts

ASTRA A SERVICE OF MIDWEST RESEARCH INSTITUTE / 425 VOLKER BLVD. / KANSAS CITY, MO. 64110 / 816 • LO 1-0202

C O P Y

PHOTO TECHNIQUES FOR CLOUD STRUCTURE ANALYSIS

A Non-Interpretive Retrospective Search

For: E. Bollay Associates, Inc.

Denver Research Institute

Desert Research Institute

Institute of Atmospheric Research

Meteorology Research, Inc.

Natural Resources Research Institute

North American Weather Consultants

T. G. Owe Berg, Inc.

Utah Water Research Laboratory

By: Lawrence L. Rosine

April 16, 1968

Figure 22 - Cover Sheet for a Typical Search

How was it used? What transfers were achieved? Many questions can be formulated to implement follow-up inquiries to the client. Only by proper evaluation of all responses from the client can the service be improved.

Noninterpretive: Current Awareness Search

This type of technology transfer differs little from the previous search. The first seven steps are the same, but now we have a change in the time span of the search. This is Step 8 in the list.

1. Definition of client problem or need

2. Search strategy

3. Search
   a. Automatic
   b. Manual

4. Document retrieval
   a. NASA
   b. Other

5. Document review and weighting

6. Reporting to the client

7. Follow through

8. Recycling on a monthly basis

In a current awareness search, only the documents received from the information source during the proceding month are searched. This process is repeated on a monthly, or recycling basis. Thus, the current awareness search is similar to a monthly news service except the information supplied to the recipient is technical in nature. Current awareness contracts generally cover the time span of one year. Of course, they can be renewed. Once the search strategy is established for a current awareness search, it is only necessary to alert the computer center to rerun the search over all new tapes received in the last month. From this point, there is no basic difference in the procedure.

Interpretive: Retrospective Search

The interpretive searches include two inserted steps that delineate them from the noninterpretive procedure. The interpretive retrospective search procedure is:

1. Definition of client problem or need
2. Search strategy
3. Search
   a. Automatic
   b. Manual
4. Document retrieval
   a. NASA
   b. Other
5. Document review and weighting
6. Interpretation of the information
7. Adaptation of information
8. Reporting of information
9. Follow through

The first additional step (No. 6) adds an increased cost and time factor to this type of search. It is now the duty of the area technologist, with the assistance of others at the RDC, to attempt to interpret the technology retrieved by the search strategy. This type of search will also entail expanded manual searching of the open literature.

In a search of this type, the portions of the documents deemed vital to the transfer of technology will be copied at the RDC. These copies will be included, along with copies of other library documents, in a file of the search. The technologist is now in a position to utilize the in-house consultants of the RDC organization to diagnose and apply the information.

After diagnosing the available information, the technologist, often with assistance, prepares a report on how the information can be adapted to the solution of the client's problem (Step 7). This report attempts to detail exact measures to be taken, alternatives, suggestions as to research needed, and may possibly outline a development procedure. In

an interpretive search, the technology transfer aspect of TU becomes the most important factor. The RDC is now in a position to serve the idealized function of such a program.

Interpretive: Current Awareness Search

In the interpretive current awareness search, a tenth step is added to the previous procedure. This step (10), recycling on a monthly basis requires a monthly search of new documents added to the tapes as well as a monthly search of journals in the field. This type of search also requires that a monthly report on search activities be prepared for the client. Otherwise, the current awareness search differs little from the previous one.

Consulting

Frequently, the client will require further consulting to assist him with his problems. This service is obtained through the RDC by four means: (a) peripheral to standard search, (b) by the area technologist, (c) by others in the parent organization, and (d) when the RDC serves as an agent to obtain consultants. It is quite natural that some consulting will be obtained by the client from the area technologist as a standard part of any search procedure. However, this peripheral, and often unorganized or subtle consulting will usually be insufficient where there is a pronounced technical problem to be solved.

The area technologist may provide a consulting service to the client on a per day basis, to be funded by extra dollars from the recipient's firm. The cost of such a service will usually be determined by the RDC's own operating costs, or costs incurred as a part of the parent organization. There may be occasions when the technical capability of the area technologists is not suitable for the job at hand. Under these circumstances, it is conceivable that other consultants can be supplied by the parent organization or university. Once again, costs for such services must be figured within the structure of the organization supplying the service.

The RDC can also serve as an agent to obtain consulting for the client. In this case, the RDC will place the client in contact with some private consulting firm or a consultant who is familiar with the problem area of the company. Under these circumstances, the RDC may still be involved in discussing the problem with the outside consultant, and in supplying him with information from the computer searches.

Conferences and Seminars

While some of the promotional aspects of conferences and seminars have been discussed previously, this service should be an important aspect of the TU program at the RDC's. The topics for such conferences or seminars are selected by polling the active clients as well as other technically qualified personnel in the geographical area. If facilities are available at the RDC (or the parent organization) the seminar can be held there. Often, hotels or motels or civic organizations will have facilities for these meetings.

After establishing the topic area for a conference, qualified persons within the RDC's parent organization should be contacted to serve on the panels and committees. These people are often very helpful in locating experts in the field, soliciting papers, formulating the program, and planning other aspects of the meetings.

One word of caution: When planning a seminar or a conference, notify the possible registrants sufficiently ahead of time so they may formulate their own travel and time plans. Also, check carefully to determine if similar seminars are being held at the same time. If at all possible, inform the persons being solicited for attendance of the program a couple of months ahead of time. Repeated announcement of the conference is also desirable. The technical press and direct mail campaigns can be utilized.

The proceedings of the conference or seminar are prepared by the RDC staff with some assistance from other members of the parent organization. These proceedings are quite useful in promoting the capabilities of the center. Proceedings of past seminars should be carried by area technologists on promotion calls.

C. Business Practices

Home Office

Business practices at the home office were designed to coordinate the activities of the area technologists and to support their promotional and searching efforts. A system of controls was established which guaranteed that searches would be performed in the minimum time possible and that all contacts with both clients and potential clients would be followed up immediately.

Promotion: Promotional efforts of the area technologists were supported primarily by the maintenance of records of firms visited, reports of their problems and possible application of NASA information, and an evaluation of their interest in joining the ASTRA program. Follow-up letters were issued from the home office over the signature of the area technologists within three days of their contact with the firm's representatives based on alternative responses shown in Figures 23 and 24.

Searches: A system of internal controls was established for the performance of searches which prescribed the routing of the search through the system and allowed the pinpointing of trouble spots which occur.

Incoming search requests were first entered in the "Master Log," Figure 25, showing the search number, search title, and the client's name. If the request originated by telephone, it would be entered on a "Search Request" form, Figure 19, which accompanies the search throughout the system. If the request were by letter, no "Search Request" would be filled out. In addition to the letter or "Search Request" form, a "Search Data Sheet," Figure 26, and a "Keypunch Sheet," Figure 27, were added to the package. The search number, title, area technologist, and company code were filled in on the "Keypunch Sheet" by the office staff. This form is used by the area technologist for the final writing of the strategy to be used by the computer center for search performance. The "Search Data Sheet" was used to compile data on the staff time used for various functions and the cost of reproduction and computer running time. The office staff listed date in, company name, search number, type of search, area technologist, and under "Technologist's Comments," the title of the search.

The package containing the "Search Request" or letter, "Search Data Sheet," and "Keypunch Sheet" was then given to the area technologist with the client's file. The technologist was required to indicate on the "Search Data Sheet" the length of time spent in the various aspects of the strategy writing.

Following the writing of the strategy, it was returned to the office staff by the technologist and the "Keypunch Sheet" and the "Search Data Sheet" were delivered to the MRI Computation Center. Controls within the Computation Center were strictly up to the personnel in the Center, provided they performed the machine search in a time agreed upon as reasonable and supplied the ASTRA business office with the information required on the "Search Data Sheet."

Upon completion of the machine search, the forms and printout of the results were returned to the office staff. Abstract cards were pulled by part-time ASTRA employees following the procedures outlined in the "Preparation of Searches" form (Figure 28).

CONTACT FOLLOW-UP FORM PHONE CALL

Date Contacted:_____

Name:_____
Company:_____
Address:_____
_____

Dear Mr. XXXXXXXXXX:

It was a pleasure to discuss your firm's interest in our ASTRA program. I believe that ASTRA can provide XXXXXXXXXXXXXXXXXXX with information which will help improve your present products and processes as well as suggest areas for future diversification.

I think our ASTRA services with the special features of

_____

_____

_____

are especially suited to your needs in _____

_____.

I will contact you again in about _____, as you requested. Thank you for your time and interest.

Sincerely yours,

_____
ASTRA Area Technologist

Figure 23 - Contact Follow-Up Form (Phone Call)

CONTACT FOLLOW-UP FORM VISIT

Date Contacted:_____

Name:_____
Company:_____
Address:_____
_____

Dear Mr. XXXXXXXXXX

It was a pleasure to have visited with you
( ) and your colleagues
( ) and tour your facilities
I appreciate this opportunity to describe the ASTRA program as it related to your firm's technical interests and problems. I believe that ASTRA can provide XXXXXXXXXXXXXXXXXXX with information which will help improve your present products and processes as well as suggest areas for future diversification.

I think our ASTRA services, with the special features of

_____

_____

_____,

are especially suited to your needs in_____

_____

_____.

( ) I am looking forward to hearing from you in the near future
( ) I will contact you again in about _____, as you requested, concerning your decision to subscribe to our ASTRA services. ( ) Please convey

my appreciation to _____

_____

_____

for their help in acquainting me with your firm's problems and interests.

Sincerely yours,

_____
ASTRA Area Technologist

Figure 24

EXAMPLE OF MASTER LOG

Retrospective Searches

Search Number			Ck.
RS-1	Timer: UW-8	BAT	ok
RS-2	Muscle or Body Movement: UW-4,7	BAT	ok
RS-3	Telemetry: UW-6, 10, 11, 16	BAT	ok
RS-4	Receiver (Auditory Shock) UW-13, 14, 15	BAT	ok
RS-5	Micro-electrode: UW-18	BAT	ok
RS-6	Infusion of Fluids: UW-12	BAT	ok
RS-7	Exercise Apparatus: UW-19	BAT	ok
RS-8	Apparatus for Learning Research: UW-5	BAT	ok
RS-9	Rotary Joint for Small Tubing: UW-17	BAT	ok
RS-10	Respiration Cycle Detector: UW-9	BAT	ok
RS-11	Effect of Fields on Cells: MU-1	BAT	ok
RS-12	Automatic Recording of Heart Sounds: MU-2	BAT	ok
RS-13	Hemodynamic Impedance of Vascular System	BAT	ok
RS-14	Damping in Cardiac Catheters: MU-5	BAT	ok
RS-15	Charges on Formed Elements of Blood: MU-6	BAT	ok
RS-16	Differential Blood Flow Measurement: MU-7	BAT	ok
RS-17	Silver in Water Solutions	Bur. of Reclamation	ok
RS-18	Wind Study	Bur. of Reclamation	ok
RS-19	Cloud Seeding	Bur. of Reclamation	ok
RS-20	Cloud Physics	Bur. of Reclamation	ok
RS-21	Animal Nutrition	MRI--Meiners	ok
RS-22	Miniature Radio Receiver: UW-13, 14, 15	BAT	ok
RS-23	Thermal Protection	Stimunol	ok
RS-24	Batteries	Stimunol	ok
RS-25	Infrared Detection of Moisture	Bur. of Reclamation	ok
RS-26	Solar Source Equivalents	Bur. of Reclamation	ok
RS-27	Flexible Tether: NU-5	BAT	ok
RS-28	Rotation Damping Devices: UM-15	BAT	ok
RS-29	Floor Cleaners	Tennant, G.H.	ok
RS-30	Monitoring Instrumentation: MU-13	BAT	ok
RS-31	Krypton 85 Detector	Western Electric	ok
RS-32	Storing of EKG Wave Forms: MU-14	BAT	ok
RS-33	X-Ray Computer Enhancement: MU-8	BAT	ok
RS-34	Protective Clothing	BAT	ok
RS-35	Microfilming X-Rays: MU-15	BAT	ok
RS-36	Nitrogen Metabolism in Autotrophic Bact.	BAT	ok
RS-37	Histidine Biosynthesis in Sel. Aminal Sys.	BAT	
RS-38	Positive Temperature Coefficient Conductors	Square D	ok
RS-39	SCR Converters	Woodward Governor	

Figure 25 - Listing of Retrospective Searches From Master Log

SEARCH DATA SHEET Search Number_____

Date In_____ Company_____ Date Out_____

Type of Search_____ Technologist Assigned_____

Technologist's Time:

Review of Request	_____	Review abstracts	_____
Talk with MRI staff	_____	Review documents	_____
Call client	_____	Write client summary	_____
Write strategy	_____	Write internal summary	_____
Other (_____)	_____		

MRI Staff Consulted (Name, Division, Time):

1._____ _____ _____
2._____ _____ _____
3._____ _____ _____

Other sources contacted:

1._____ 4._____
2._____ 5._____
3._____ 6._____

Telephone calls made:

Purpose:_____
_____
Results:_____
_____
Follow-up:_____
_____
_____

Technologist's Comments:

_____
_____
_____
_____
_____

Computer Center:

Keypunching Time:
1._____ 2._____
Approximate machine time for search_____
Comments:_____
_____

Number of abstracts pulled_____ Number of documents pulled_____

Time required:

To pull_____ To pull_____
To refile_____ To refile_____

Total Technologist's Time_____
Total Computer Costs_____
Total Clerical Time_____

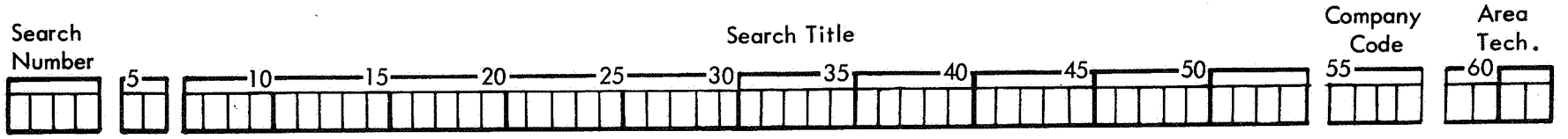
ASTRA form 100, 7-67

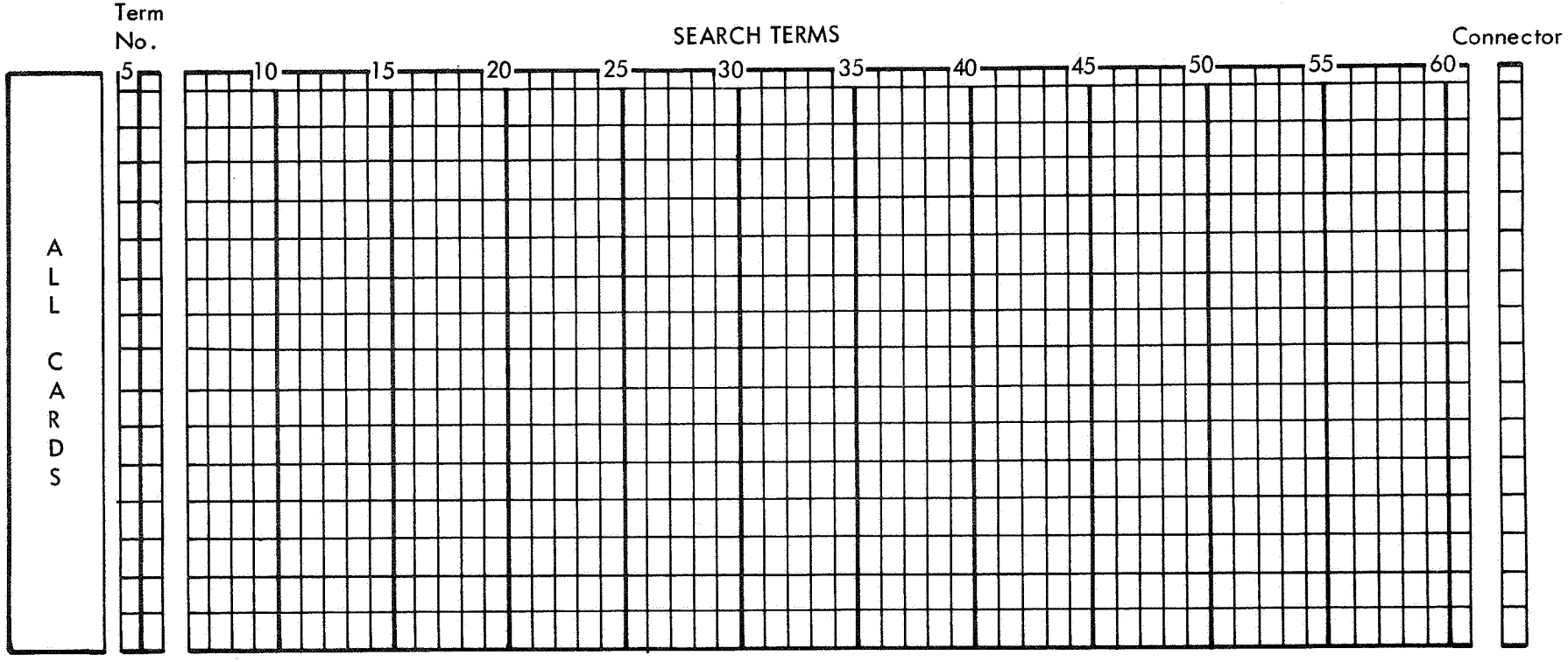
Figure 26

KEYPUNCH SHEET

Page _____ of _____
Prepared / / By _____
Keypunched / / By _____
Computer Run / / By _____

COMPUTER SEARCH FOR _____





ASTRA Form 102, 7/67

Figure 27

PREPARATION OF SEARCHES

_____ 1. Pull abstract cards from the files in 104-N and check them off the print-out as they are pulled.

_____ 2. Each card should be checked to see if it refers the reader to another card for the actual abstract. If such a card is found:
   a. Mark the number of the card just pulled off the list by drawing a line through it.
   b. Check to see if the number referred to is also listed on the print-out.
   c. If it is not, add it to the listing.
   d. Refile the number which has now been crossed off.
   e. Pull the number which was referred to.

_____ 3. All cards which are not in the abstract files must be reproduced from the abstract books in 214-W.

_____ 4. Pull those volumes which contain the referenced abstract, mark the abstract desired by writing the number of the search being pulled in the margin. Also mark a red X in the lower outside corner of the page being reproduced. If the page already has an X mark on it, you have missed the card in the files.

_____ 5. Make a list of the volume, issue, and page numbers of the books to be reproduced.

_____ 6. Take all indexes containing abstracts to be copied to Reproduction.

_____ 7. After receiving the copies of the pages containing the referenced abstracts, cut the abstracts out and paste on extra abstract cards. Make certain that the backs of these cards are crossed out so that there will be no confusion as to which side is good.

_____ 8. All of the cards, i.e., both those which were in the card files and those which had to be cut and pasted, should be arranged in order. All "A" numbers in numerical order and all "N" numbers in numerical order.

_____ 9. Make a final check to guarantee that all of the abstracts listed on the search are included.

_____ 10. Take these cards, which are now in order, to Reproduction. They should be copied in ascending order from the top of the page to the bottom, three on a page.

Initial each step in the process as you complete it. When working on more than one search at a time, it is <u>imperative</u> that the searches be kept separate. Label each portion of the search, i.e., the stack of cards, reproduced pages, etc., with the search number.

Figure 28

It was necessary to go to such a form since the entire process was time-consuming and the short hours worked by part-time employees often required that more than one person work on the same search; i.e., it was necessary for anyone to be able to begin working on each search, in any stage of completion, without the need to talk with the preceeding person.

The area technologist then received the completed search along with the complete file and control forms. A letter to the client was then written discussing the results of the search and future recommendations. The folder was then returned to the office and clerical staff where the files and search records were updated.

Accounting: Information gathered from the "Search Data Sheet" was used to study the cost of performing various types of searches rather than locating deviations in the system. Control of staff charges and materials and equipment costs was maintained by using an accounting system as shown in Figure 29. By this method, all charges made to the ASTRA project were kept separate by function even though all accounting was performed by the MRI Accounting Section. The ASTRA business staff prepared a monthly summary of all project charges by each category for review and action by the director.

Regional Areas

Call cards: In keeping with good sales practices, the ASTRA program provided each area technologist with trip call cards (Figure 30). These cards were filled out by the technologists and updated as subsequent contacts were made with each prospect. The call cards were reviewed periodically with the ASTRA director in sales critique meetings.

Trip reports: When scheduling permitted, pre-trip plans were filed with the home office so that the program efforts could be better coordinated and organized. Where complete scheduling could not be made in advance of the travel period, tentative schedules were filed to indicate a relative effort of contact with regional firms by the area technologists.

During and after each trip, the area technologist completed records of the firms he contacted, the firms in which key personnel could not be reached, and the pertinent results of each contact. These records were used to assure that the area technologist had properly contacted the firms in his area and presented them with an opportunity to become familiar with and join the ASTRA program.

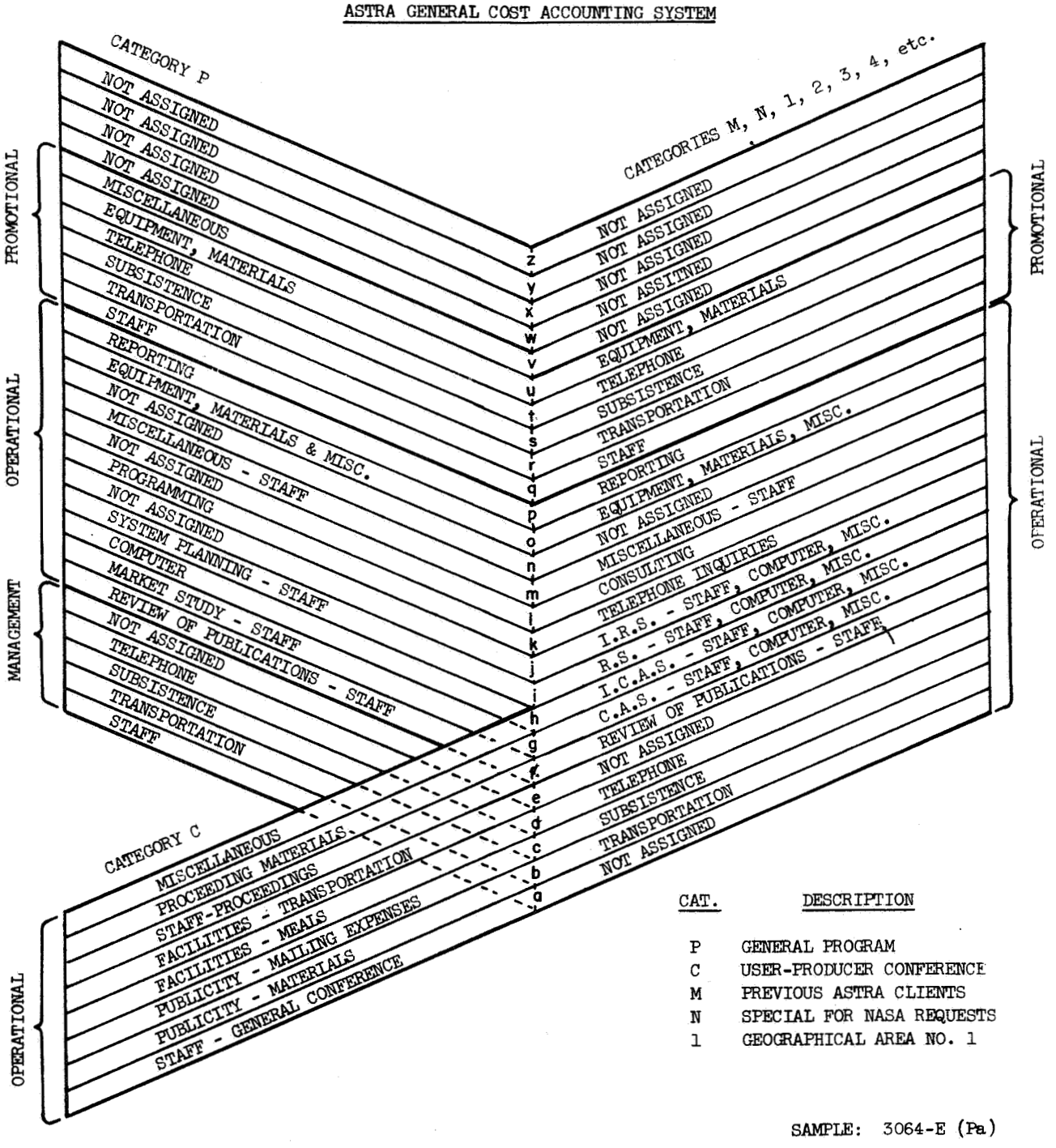


Figure 29 - ASTRA Cost Accounting Code Sheet

Company : THE ANSUL COMPANY

Division:

Address :

City : MARINETTE

State : WISCONSIN Zip: 54143

Phone : (715) 735-7411 Ext:

Computer:

Contacts: CHARLES F. ABENDSCHEIN (VP)
DAVID L. SCHMITTLER
R.E. ENNIS

Remarks : INTERESTED

(over)

Technologist: ROSINE

Contact Methods	Dates
1. Visit MRC:	Nov / 15 / 67
2. :	/ /
3. :	/ /
4. :	/ /
5. :	/ /
6. :	/ /
7. :	/ /

Information Sent	Dates
1. Letter :	Nov/17 /1967
2. :	/ /
3. :	/ /
4. :	/ /
5. :	/ /
6. :	/ /
7. :	/ /

Figure 30 - ASTRA Call Card

Telephone reporting to home office: A procedure was established whereby the area technologist reported in to the home office at least once a week. This procedure provides a closer coordination between the field operations and the developments at the home office. Thus, the home office could be alerted to program developments in each region and the area technologists could be apprised of the progress in other areas as well as new developments in the home office.

Miscellaneous: Operations of the "office" in each area was left mainly to the responsible technologist. In Minneapolis, the technologist made arrangements for his hotel to store his office supplies during the period in which he returned to the home office, to arrange an extra large room for him, and to set up a table in his room which could serve as a convenient desk. These arrangements made it possible to keep available a variety of NASA back-up documents and adequate office supplies to operate effectively in the field.

For the St. Louis area, the technologist followed a different plan. He was close enough to the home office so that he could use his personal automobile for business travel. Thus, he could transport adequate office supplies and back-up technology as his area developed.

The use of a variety of back-up technology was a key factor in the area operations. The technologist, through substantial home work on the companies contacted, selected material from the technology bank which was relevant to that firm's interest. In this way, he presented ASTRA in its best light. This was not at all an effort to deceive the firm into thinking all ASTRA and NASA technology was tailored to meet all his firm's technology needs. By selecting the display literature carefully, the area technologist made an effort to create a maximum interest in the ASTRA services so that he could obtain an audience which was alert to his description of the ASTRA program and its goals.

IX. BASIS FOR PREDICTING FUTURE NEEDS

A. Primary Measures of Effectiveness

Transfer of Technology

One of the principal rules by which the effectiveness of the ASTRA program was judged has been the type, number, and form of technology transfers achieved. However, under the increased fee structure of the present ASTRA program, the number of clients decreased considerably.

Consequently, there have been no definite transfers recorded during the new program.

Dollars Saved

A second factor by which the effectiveness of the program was judged was the dollars saved by firms using the ASTRA technology to solve their industrial problems or supplement their own R&D efforts. As yet, there are insufficient data available on the new program to determine the dollar savings incurred by the firms using the services.

Profit

A third significant factor in judging the effectiveness of the ASTRA services has been the profits gained by a firm through the use of the ASTRA program. This has been found to be a very sensitive subject to discuss with most firms. They simply do not want competitors to ascertain their financial gains, their technology breakthroughs, or their sources of problem solution. To date, ASTRA has not been able to establish levels of profit for any of the firms utilizing the ASTRA services.

Self-Supporting Operations

From limited acceptance of the present program by industry, it would appear that it is not possible to develop a self-supporting program of the type which ASTRA has tried. This is not to say that the ASTRA services are not desired by Midwest firms familiar with the program. It simply means that the value of the service does not appear to match their investments; yet, there is no question about their requirements for solutions to their industrial problems.

Industry tends to take a characteristic attitude toward the ASTRA services. It appears that they tend to consider that: (a) their range of past problems is representative of their future problems, (b) their range of technological needs for past problems is representative of their future technological needs, (c) the ASTRA information output is marginal since their problems are down-to-earth and the ASTRA returns often stress exotic materials and far-out techniques, (d) even "closely related" material from ASTRA must be interpreted to solve their particular problems, (e) they have neither the staff nor the experience to effectively complete this interpretation, (f) the cost of solving their problems through normal (and familiar) channels was less than, or comparable to, those incurred by the modernized (and less familiar) processes of ASTRA,

and (g) their confidence was considerably higher for solutions being developed from their normal channels of R&D than from ASTRA's program.

Under these conditions it is most difficult to predict what the future needs of the RDC's will be if it is required that they become self-supporting operations.

Number of Customers Served

A primary factor in determining the value and effectiveness of the RDC service is the number of customers it serves in its operations. Since the beginning of the new program, March 1967, ASTRA has served organizations with 42 searches. These include three searches for three firms under contract from the previous program and 39 searches under new contract. Only one search has been of the current awareness type; the remainder have been of the retrospective type.

Influence in Locale of RDC

The locale of an RDC certainly must influence its structure, operation, and services. A region which is high in aerospace industries would appear to more readily accept the benefits of an RDC operation than a region having no industries or having essentially nonspace oriented industries.

B. Secondary Factors

Government Programs

The inquiries to ASTRA from Midwestern industries have covered a very broad range of technological fields. Predominantly, these inquiries could be satisfied through computerized literature searches of NASA's tapes. However, there remained many inquiries which could be solved only through searches of other sources--such as AEC, DDC, and the open literature (including books). Thus, it was recognized that technology from other government sources was essential to answering some of the problems encountered by industry.

A highly successful and active RDC program should involve: (1) searches of all the (Unclassified) government reports, the open literature,

(nonproprietary) industrial literature, and text/reference books, and (2) close coordination with existing agencies throughout the U. S. and abroad for searches of their specialized files, (3) a flexibility to serve both the industry and government agencies, (4) a service structure such that an inquirer could obtain exactly those services required to satisfy his particular needs, and (5) a fee structure commensurate with the services rendered.

Attitudes Toward TU

The attitudes toward the TU program cover the spectrum of human responses and are not essentially different from those toward any other important issue of today. Listed below are a few observations organized by selected (and by no means complete) categories.

The man-on-the-street: He doesn't know what it is, but he has heard about NASA and has some very definite opinions about our expenditures there. From this opinion alone, his response to TU can range from ignorance to bliss, from vehement dislike to emotional commitment.

The industrial executive: He's not very different from the man-on-the-street. However, by now he has probably heard of RDC's and TU from national publicity in the press and in trade journals. However, his reactions are usually tempered by professional courtesy and his opinions are usually strongly influenced by whether or not his firm is benefiting from their financial contributions to the space effort.

The RDC's: The concerns here include all those of the technical community mentioned above plus those involving the problems of cooperating with the sponsor (NASA) on the TU effort. This latter group of problems encompasses the mechanics of operating a functional RDC and maintaining close cooperation with a dynamic, growing TU program.

In spite of the problems associated with RDC operations, this group remains ardent proponents of exploring avenues for technology disseminating and utilization. The ASTRA program has explored one procedure different from the other RDC's: interpretation of the data to directly answer the inquirer's question or problem area. This requires close cooperation with the inquirer and often a detailed knowledge of the firm making the inquiry.

Response of Business Community

The business community responded in varied ways to the ASTRA program and its services. The portion of this community which felt it could not use aerospace technology in their businesses did not hesitate to indicate such. Those businesses which were familiar with and used aerospace technology in their businesses were willing to take advantage of the ASTRA services but very few were willing to pay for an intangible product. This applies also to current NASA contractors who have no-cost access to the NASA information bank. (NASA contractors are the only firms which have a no-cost access to the NASA information bank; and this access is limited to areas related to the subject of the contract.)

The local Chambers of Commerce were found to be very interested in helping promote the development of ASTRA in their areas. They provide ASTRA with information on local conditions, locations of industrial parks, potential ASTRA clients, and listings on local and state firms. These were valuable information sources for ASTRA in its promotional work.

The most significant factor by which to judge the response of the business community to the new ASTRA program has been the number of clients obtained. The number of firms served dropped from 47 on the previous program to 6 on the new program (not including MRI).

APPENDIX A

ASTRA CLIENT CONTRACT FORMS

ASTRA SERVICE AGREEMENT

MIDWEST RESEARCH INSTITUTE
425 VOLKER KANSAS CITY, MISSOURI 64110
AC 816 LO 1-0202

ASTRA SERVICE AGREEMENT

Midwest Research Institute (MRI) shall provide technological information service, known as the ASTRA Program to

_____

_____, the

client, for a 12-month period (ASTRA Service Period) commencing with the first day of the month following the date of this agreement. The specific services to be furnished are shown on page 3.

The service fee(s) are payable upon receipt of a statement which MRI shall send to the client during the first month of this ASTRA Service Period.

During the ASTRA Service Period, the client may purchase additional ASTRA services on a unit basis at the prices shown in the Fee Schedule, page 4. Services added after the date of this agreement shall be authorized by the client in writing and confirmed by MRI. The service fee(s) shall be payable upon receipt of statement which MRI shall send to the client during the first month following the authorization.

The agreement shall become binding upon the parties hereto by the affixing below of the signatures of the client by its authorized representative and the signature of the ASTRA representative on behalf of Midwest Research Institute, subject to the approval of Midwest Research Institute at its home office in Kansas City, Missouri, of which client shall be sent written notice within ten (10) days after Midwest Research Institute receives this agreement signed by the client.

CLIENT	MIDWEST RESEARCH INSTITUTE
BY_____	BY_____
TITLE_____	TITLE ASTRA Representative
DATE_____	DATE_____

SERVICES AGREED UPON	COST
Total	$

FEE SCHEDULE

Basic Annual Subscription: $2,000

This covers interpretive current awareness surveillance for one field of interest (F.O.I.), a retrospective search for one field of interest, one full day of in-plant consultation, telephone inquiries, and ASTRA program publications.

Up to $500 of the basic annual subscription fee may be used by the client company to purchase additional services listed below.

Additional Services:

Interpretive current awareness surveillance per F.O.I.	$1,000
Interpretive retrospective search per F.O.I.	500
Current awareness surveillance per F.O.I.	250
Retrospective search per F.O.I.	150
Consultation per day	200
User-Producer Conference per registrant	75

These rates are also applicable for any additional services over and above those services included in the basic annual subscription which the client may desire during the ASTRA service period.

MRI

MIDWEST RESEARCH INSTITUTE
425 VOLKER KANSAS CITY, MISSOURI 64110
AC 816 LO 1-0202

ASTRA SERVICE AGREEMENT

MIDWEST RESEARCH INSTITUTE
425 VOLKER KANSAS CITY, MISSOURI 64110
AC 816 LO 1-0202

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The service fee(s) are payable upon receipt of a statement which MRI shall send to the client during the first month of this ASTRA Service Period.

During the ASTRA Service Period, the client may purchase additional ASTRA services on a unit basis at the prices shown in the Fee Schedule, page 4. Services added after the date of this agreement shall be authorized by the client in writing and confirmed by MRI. The service fee(s) shall be payable upon receipt of statement which MRI shall send to the client during the first month following the authorization.

The agreement shall become binding upon the parties hereto by the affixing below of the signatures of the client by its authorized representative and the signature of the ASTRA representative on behalf of Midwest Research Institute, subject to the approval of Midwest Research Institute at its home office in Kansas City, Missouri, of which client shall be sent written notice within ten (10) days after Midwest Research Institute receives this agreement signed by the client.

CLIENT	MIDWEST RESEARCH INSTITUTE
BY _____	BY _____
TITLE _____	TITLE ASTRA Representative
DATE _____	DATE _____

SERVICES AGREED UPON	COST
Total	$

FEE SCHEDULE

Basic Annual Subscription:	$ 500

This covers a retrospective search for one field of interest (F.O.I.), one full day of in-plant consulting, telephone inquiries, and ASTRA program publications.

The client company may purchase additional services as listed below.

Additional Services:

Interpretive current awareness surveillance per F.O.I.	$1,000
Interpretive retrospective search per F.O.I.	500
Current awareness surveillance per F.O.I.	250
Retrospective search per F.O.I.	150
Consultation per day	200
User-Producer Conference per registrant	75

MRI

MIDWEST RESEARCH INSTITUTE

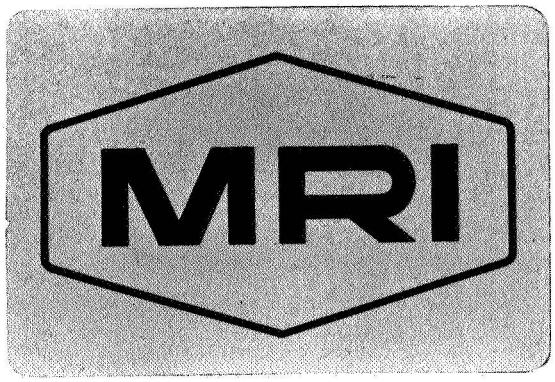
425 VOLKER KANSAS CITY, MISSOURI 64110

AC 816 LO 1-0202

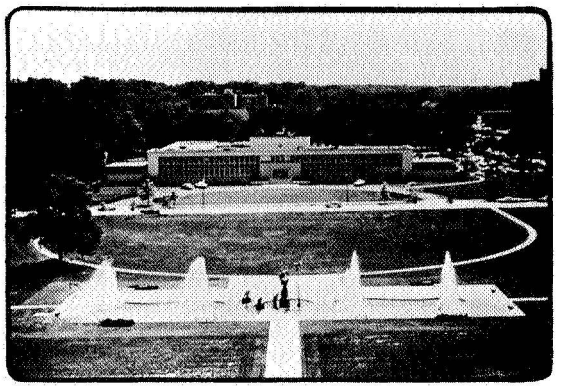
APPENDIX B

SLIDE PRESENTATION

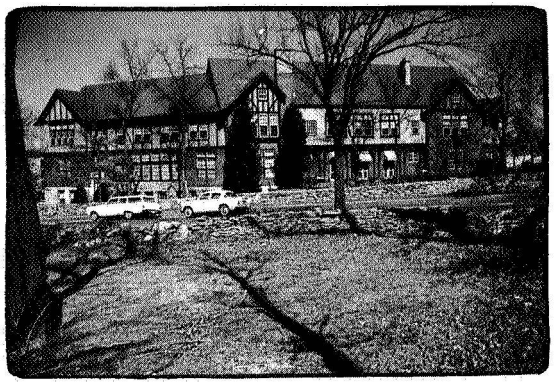
I would like to take a few minutes of your time to tell you about a service that Midwest Research Institute has offered for the past six years. MRI has supported this service in cooperation with NASA. This service, called ASTRA, is available to clients in various facets of the industrial, business and scientific complex and is a means whereby the results of existing technology may be efficiently distributed to client firms and applied to solution of their problems. But, before I delve into the ASTRA Service, let me briefly tell you about Midwest Research Institute.



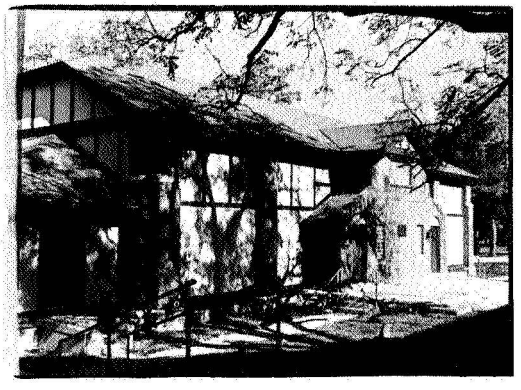
Midwest Research Institute is an independent, not-for-profit center devoted to research for industry, government and the general welfare. It takes as its purview the whole spectrum of modern science, including engineering, chemistry, physics, mathematics, biology, economics, and the social sciences. The Institute was established in 1944 by nine men with a practical purpose. These civic, industrial, and technical leaders were convinced that the application of scientific research to industry was bound to become a key factor in the economic and social growth of the middle-west. Kansas City businessmen contributed funds to launch MRI and develop a competent staff. The Institute soon outgrew its original meager facilities in six assorted buildings at Fortieth and Pennsylvania in Kansas City, and in 1955 moved into this...



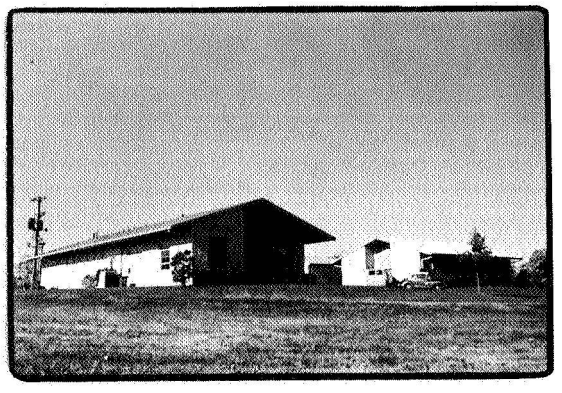
...structure at 425 Volker Boulevard. This places MRI in the center of Kansas City's cultural community. We are adjacent to the William Rockhill Nelson Art Gallery, The University of Missouri at Kansas City, Rockhurst College, and the Linda Hall Library of Science and Technology. The building contains 128,000 square feet of office space and lies on a 13-acre tract.



The growth of the Economic Development Division of the Institute necessitated the purchase of this nearby building containing 14,000 feet of floor space.

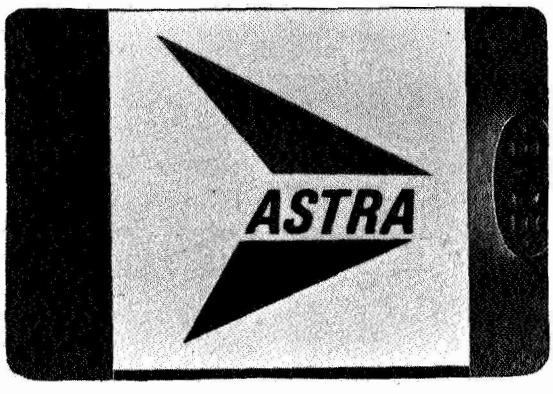


The Institute also has an auditorium for seminar attendees and special meetings.



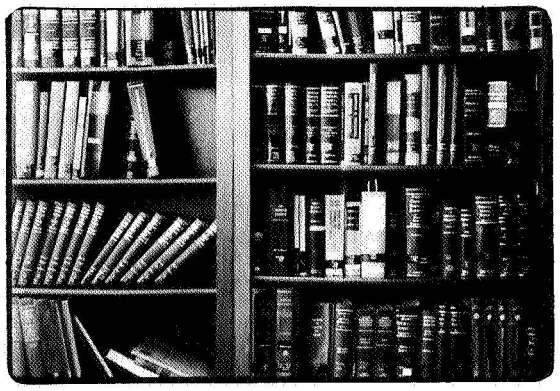
Special research in the health sciences requires that the Institute keep a number of Rhesus monkeys for laboratory subjects. The proximity of the Institute to the Country Club Plaza district could present a problem if one of these animals escaped. Therefore, 18 miles from Kansas City we have another facility: Deramus Field Station, a 75-acre site with 5,000 square feet

of laboratory space. The Institute also maintains an office in Washington, D. C., and operates periodically from various field sites around the country.



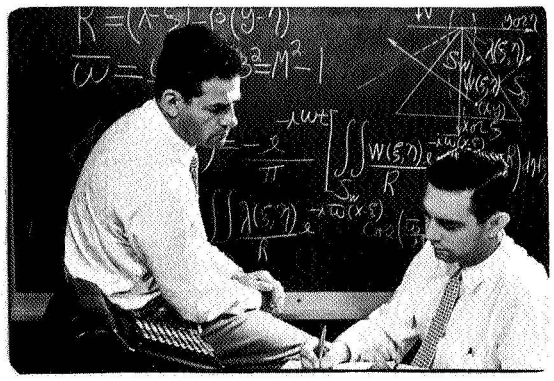
But let's return to ASTRA. One of the greatest difficulties existing in business and industry today is the retrieval of information pertinent to an existing problem. Information retrieval and transfer must be performed in an economical manner, with the shortest possible lapse in time between interrogation and retrieval. How do people seek out information? Well, there are various ways.

They <u>can</u> go to the trade, technical or business journals. It is virtually impossible for an individual to pursue every periodical in his field of interest. Even if he could read every journal in his field, he will undoubtedly forget where he saw a particular article dealing with his problem, even assuming he can remember the article. Readers of periodicals are also easily sidetracked by advertising, editorials, industry or society news, and nonproductive articles in the magazine. Journals become a time-wasting drudge for the person seeking a specific problem solution.



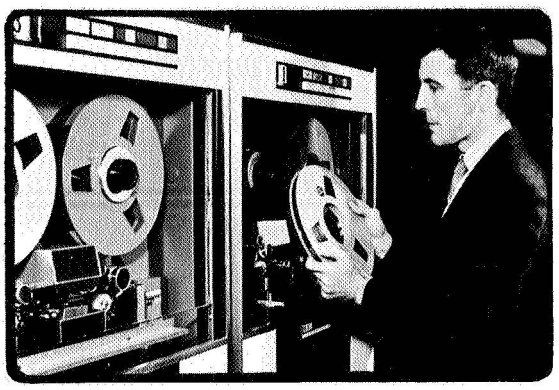
He can go to his own private collection of handbooks and texts. But, this is usually incomplete, outdated, or suffers from the closed-mindedness of the person who collected the books.

He can go to a good scientific repository -- if he is physically near one. Unfortunately, the cost of establishing a library, such as Linda Hall, in each community is prohibitive, and more often than not, an individual performs a library search so infrequently that his methods are inefficient.



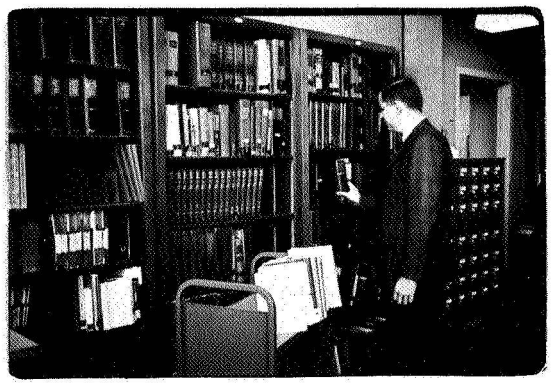
He can go to an experienced fellow employee (competitors are out here as they simply won't put forth the effort to help him beat them). Even the experienced compatriot will be biased, lack complete information, or lack the time to help. Attempts by fellow workers to help also require other man-hours and decrease the overall output-to-cost ratio of a company.

There is, however, an efficient, and effective alternative. The person can turn to a service that offers...



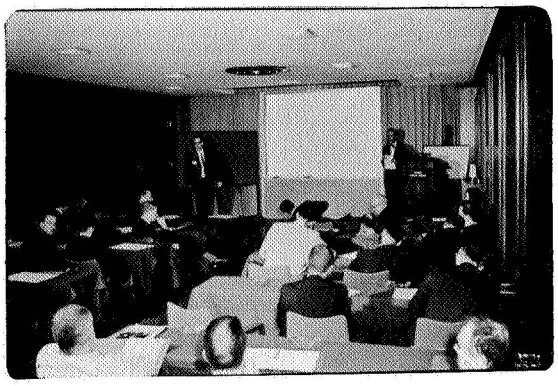
...computerized search of pertinent documents, both current and past.

...a continuous review of journals by a specialist seeking material in specific areas of interest.

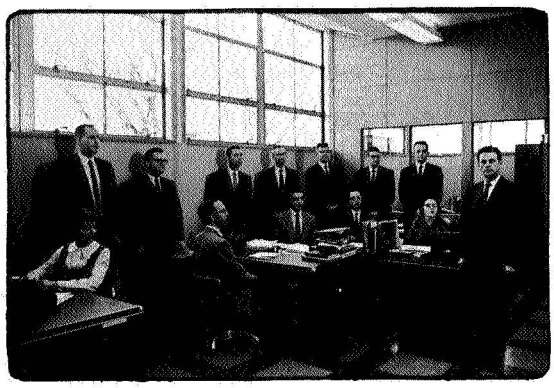


A service that offers library searches by persons familiar with the problem and the library.

A service that offers to send representatives to specific technical meetings or conferences, and subsequently apply the information gleaned from these meetings to the existing problem.



A service that conducts small conferences dealing with specific problem areas, i.e., "High Velocity Metal Forming," "Corrosion," and so on.

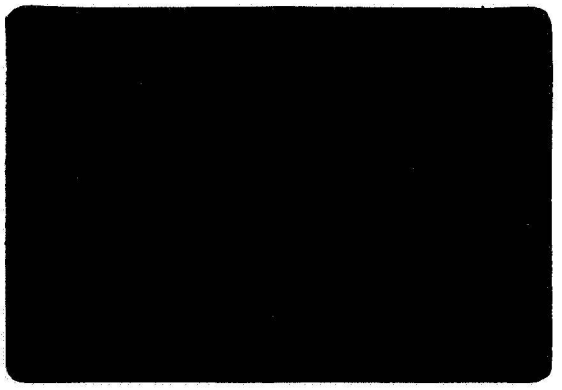


Or a group of consultants can be assembled to work on the problem.

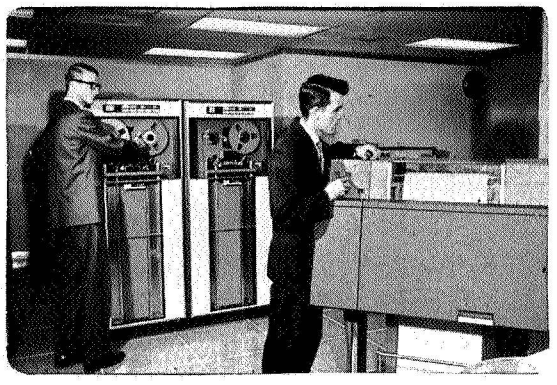
Or a service that can assemble information from various sources into a concise document. This document would be written by a qualified person who has used all the prior sources, and who makes recommendations as to their application to solving the existing problem.

ASTRA

ASTRA can offer all these means to a problem solution usually at a cost far less than an individual company would have to pay.

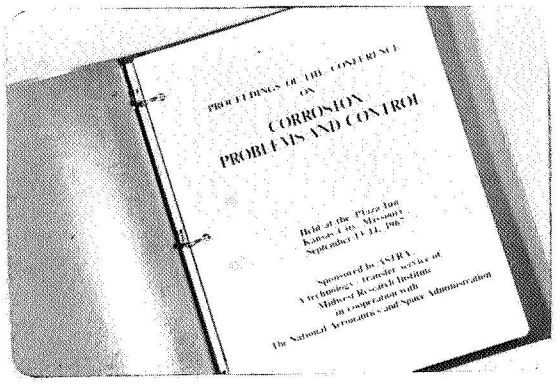


Here are some of the resources of ASTRA. We have...

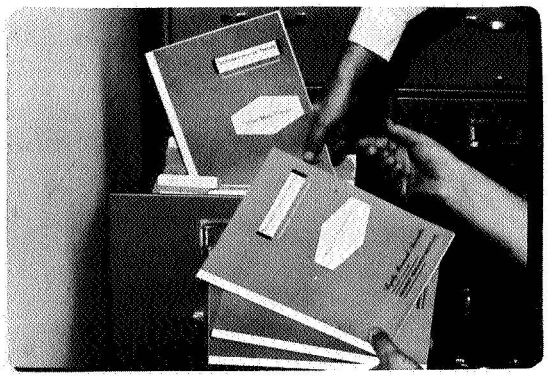


...an IBM 360 that is programmed to rapidly search through 300,000 documents compiled by NASA. These documents cover government-supported research and development from NASA, Department of Defense, Atomic Energy Commission, Government Contracts, other Federal Agencies, and Foreign Publications. About 6,000 new documents are added to this file each month.

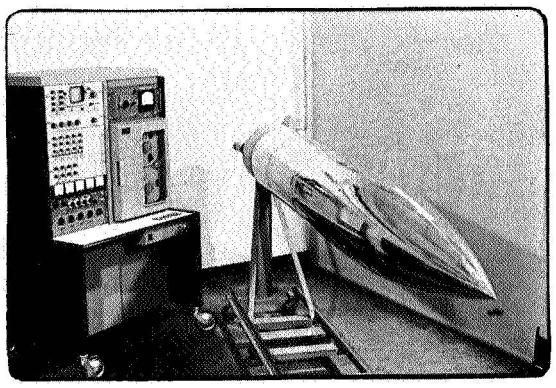
We have immediate access to Linda Hall Library and its 350,000 volumes of technical material. Linda Hall receives 11,000 current publications, U.S. patent specifications and drawings, engineering standards and specifications, AEC documents, and U.S. and foreign scientific and technical indices.



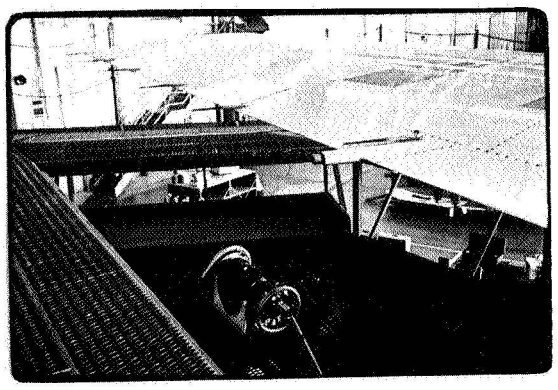
We conduct user-producer conferences dealing with specific problems of interest to business. A typical conference, on Corrosion, brings together experts in the field to discuss the problem and its solution. Conference topics are selected by a careful polling of ASTRA and MRI clients. Other conferences have included "High Velocity Metal Forming," "Valve Technology," to name a few.



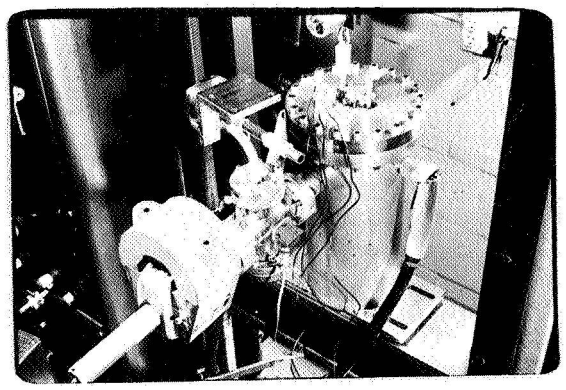
The ASTRA technologists prepare specific recommendations as to how the client may solve his problems using existing technology. These in-depth reports, treated as proprietary client information, are written as an aid to the client, and represent the results of thorough searching, combining all assets of ASTRA information. Sample areas covered by these techniques include...



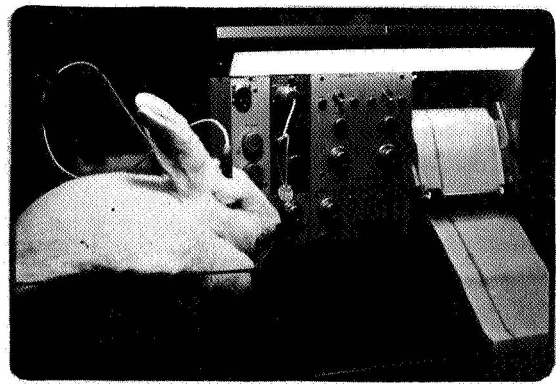
...aerodynamics...



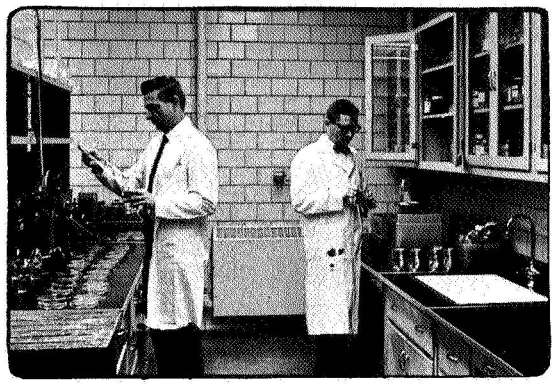
...aircraft...



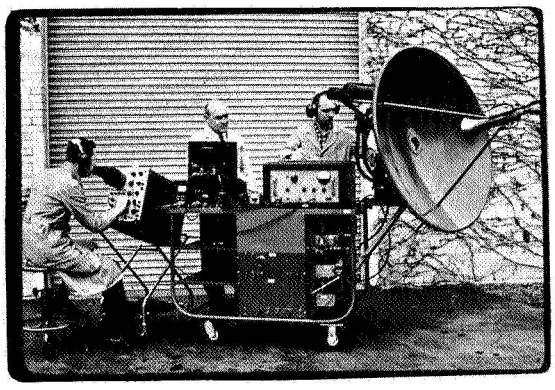
...auxiliary systems, fuel cells, solar power, hydraulic and pneumatic systems, auxiliary electrical systems...



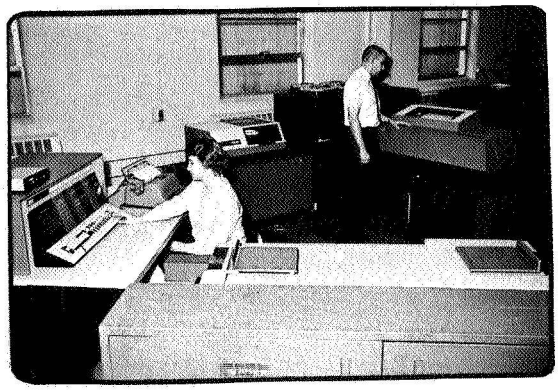
...biosciences, and biotechnology...



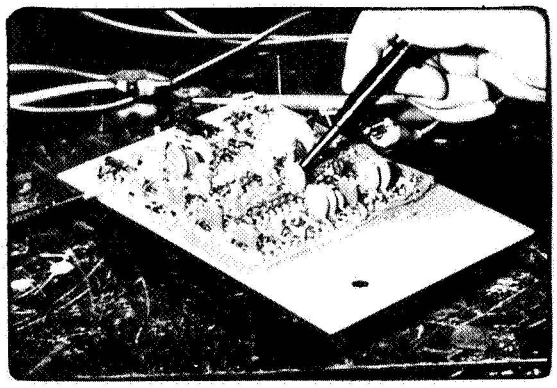
...chemistry...



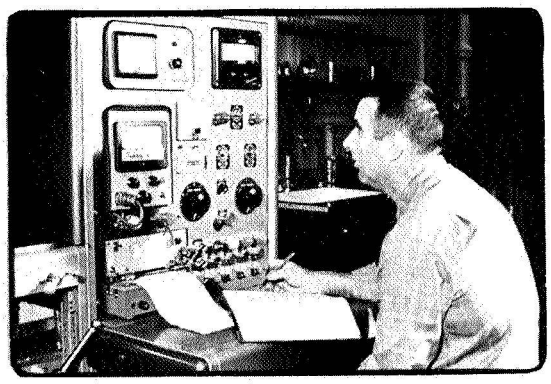
...communications...



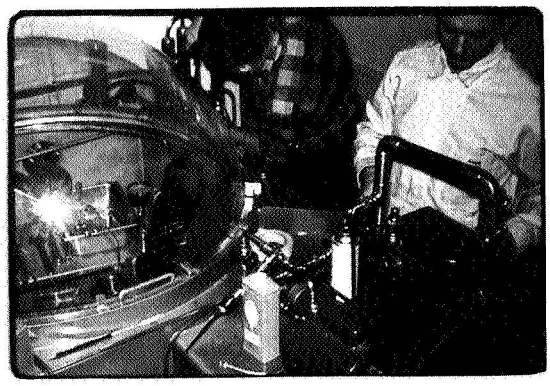
...computers, both analog and digital, computer software, and data processing...



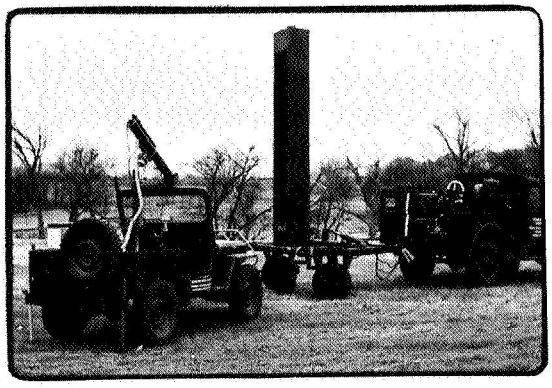
...all facets of electronics...



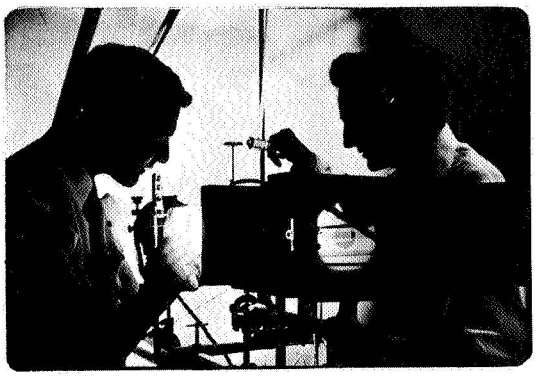
...facilities, research and support...



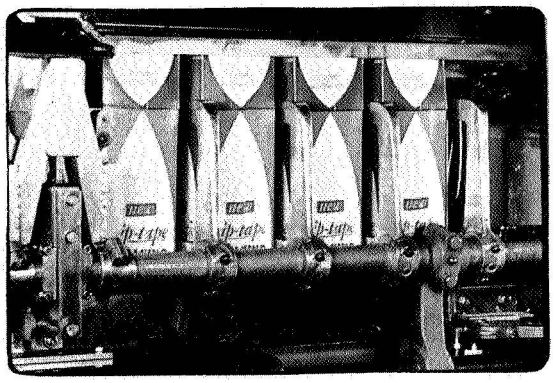
...fluid mechanics...



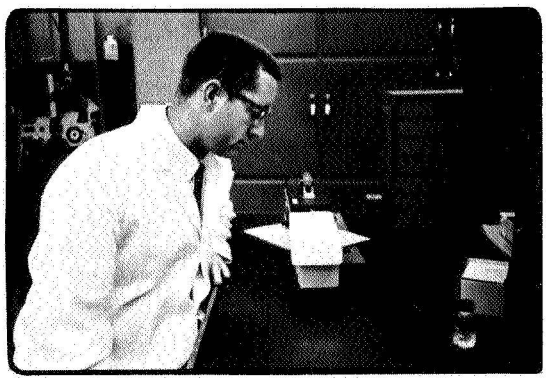
...geophysics...



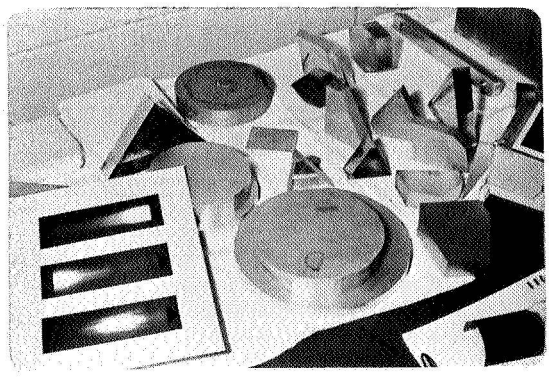
...instrumentation and photography...



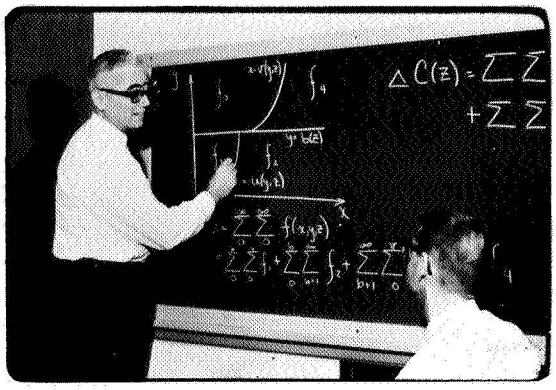
...machines and processes...



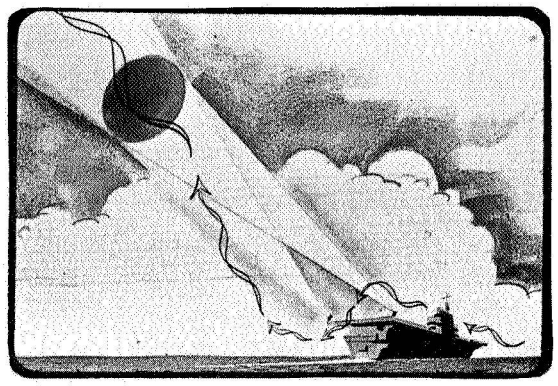
...masers and lasers...



...materials, metallic and nonmetallic...



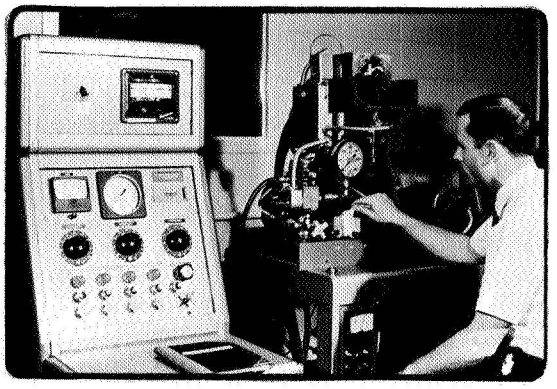
...mathematics and statistics...



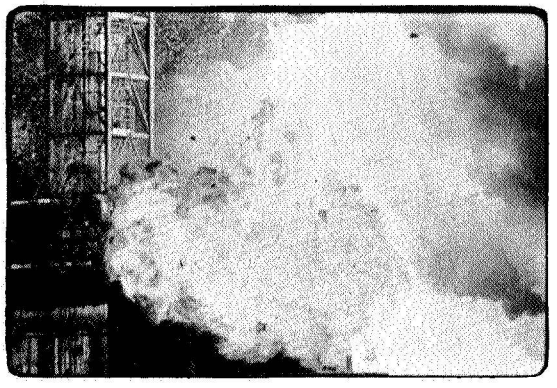
...meteorology...

...navigation...

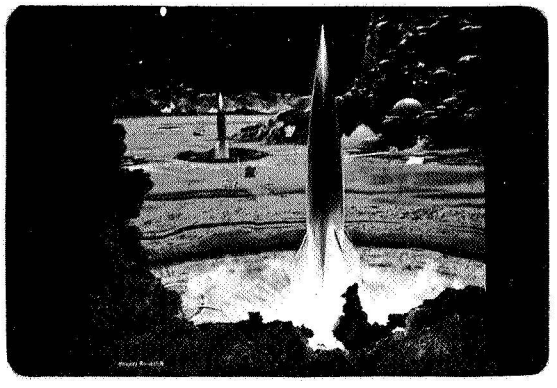
...nuclear engineering...



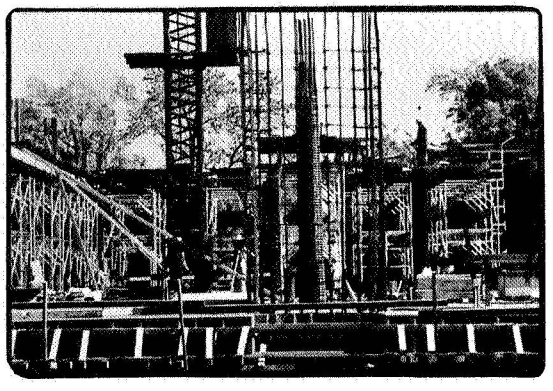
...all phases of physics, atomic, molecular, nuclear, plasma, solid state...



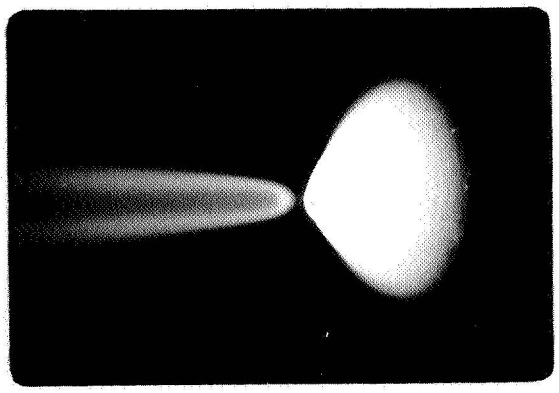
...propellants and propulsion systems...



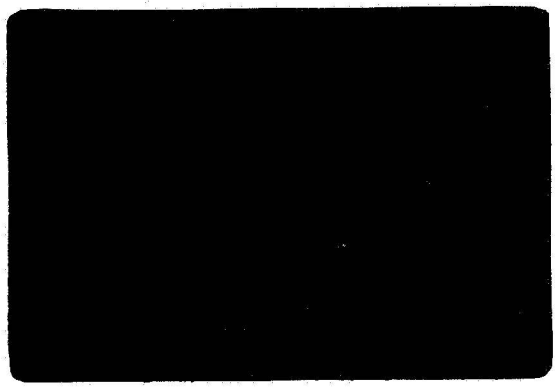
...space sciences, including radiation and vehicles...



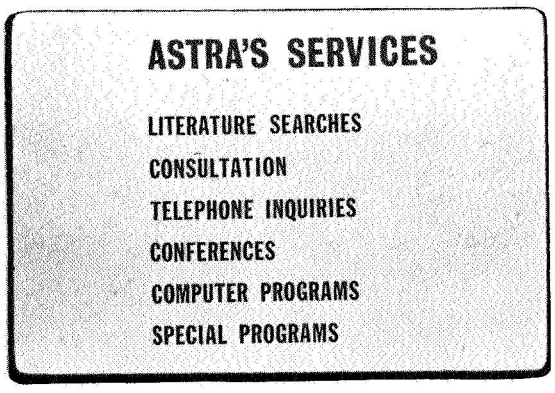
...structural mechanics...



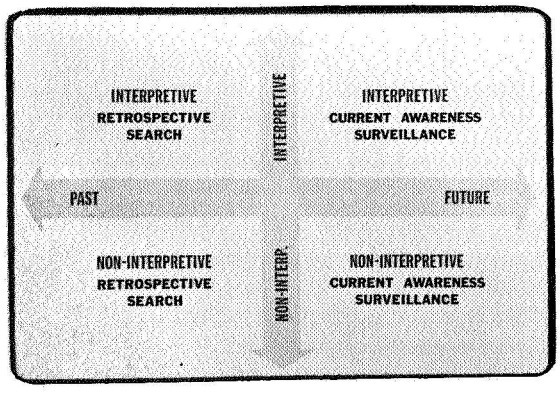
...thermodynamics and combustion.



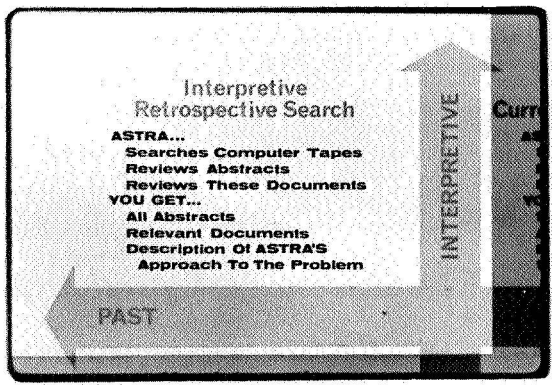
Now let us take a look at how you can utilize the services offered by the ASTRA program. Essentially, we offer a problem solution service for industry. Our organization can assist your technical personnel in their work by supplying them with information, and we can save them valuable time. Consequently, this saved time can be used in more productive efforts.



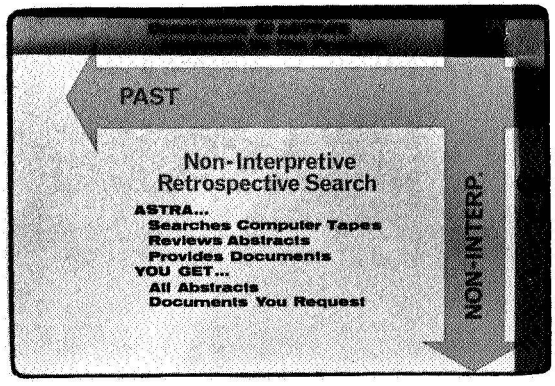
Here is what ASTRA offers.
Literature searches...
Consultation...
Telephone inquiries...
Conferences...
Computer programs...
Special programs...



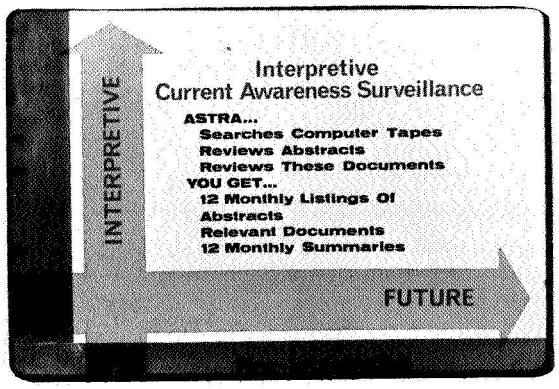
The backbone of the program is information or literature searching. There are four basic types of searches, the interpretive retrospective search, the interpretive current awareness search, and the non-interpretive retrospective and current awareness searches. (This portion is changed to suit the situation.)



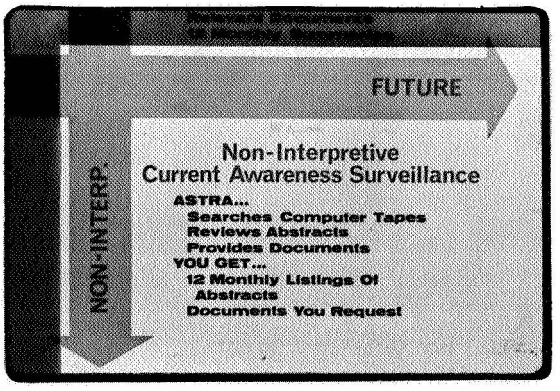
The interpretive search is used when a specific question can be asked. This type of search brings in the full spectrum of the ASTRA program. We define the problem in terms of key words contained in the NASA computer file. This of course is based upon detailed discussions with the client's technical staff. A technically qualified member of the ASTRA staff then reviews abstracts of documents selected by the computer, selects relevant documents, and prepares a report designed to aid in the solving of the problem. We provide the client abstracts, relevant portions of the documents, and a report. The retrospective search is over all historical material available in our information bank, and other references selected by the technologist.



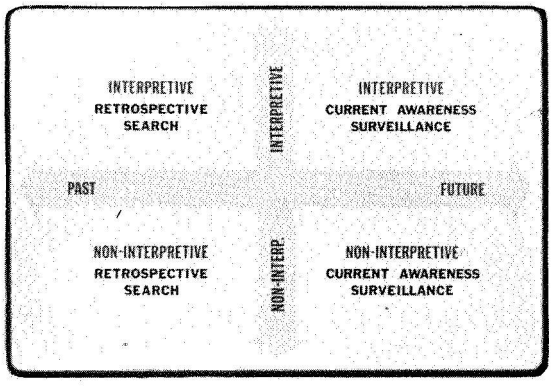
The non-interpretive retrospective search differs from the interpretive search only in that the retrieved information is sent to the client without comment by the ASTRA technologist. It is assumed that the client's technical personnel will read and adapt the information as he sees fit.



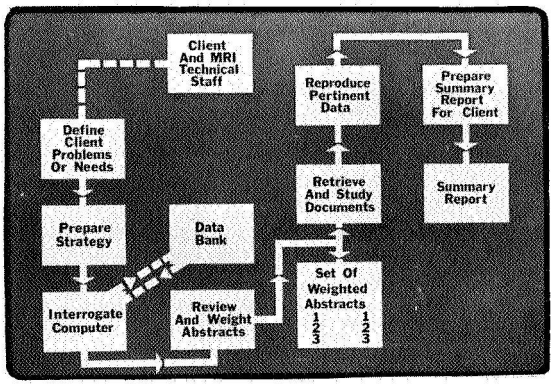
The current awareness searches provide monthly reviews of new literature in the problem area. The client receives, in the case of the interpretive current awareness search, a monthly updating of all new information entering the literature bank. This updating is in the form of abstracts, pertinent portions of documents, and reports.



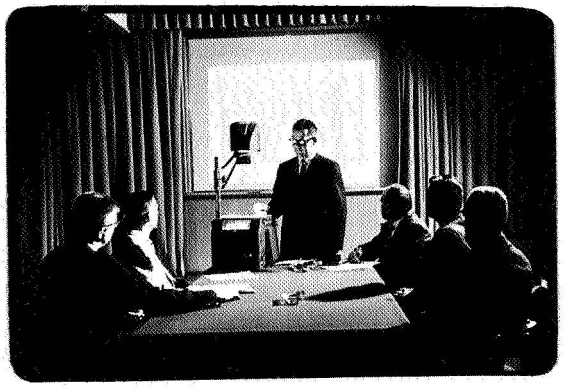
If the client subscribes to a non-interpretive current awareness service, he receives abstracts of current documents in his problem area. He may also receive titles of articles appearing in the open literature during the past month.



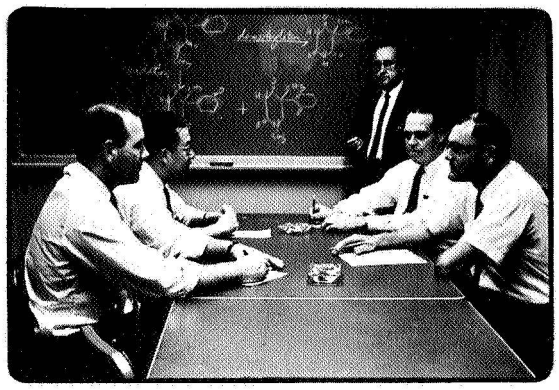
Once again, here are the four types of search services offered by ASTRA. (Here a review of the search services helps to clarify the differences. Also, this is a good time for questions from prospective clients.)



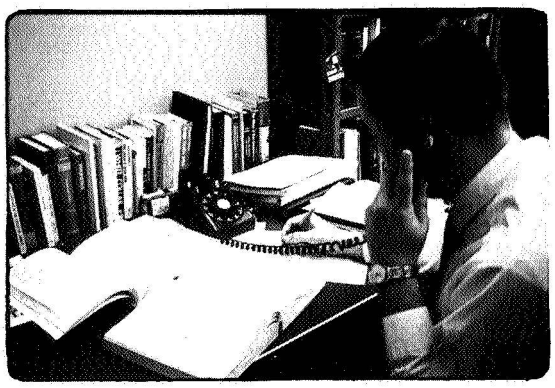
Here is the step-by-step procedure used to implement a search of the ASTRA files. You will note that summary reports are produced only in cases where the search is interpretive. (A step-by-step review of the center's procedure is given in the prospect.)



ASTRA also provides consultation by MRI staff members who have a working knowledge of the problem areas encountered by the client. The consultant works directly with the client's staff. All information is considered proprietary and all benefits and developments resulting from the consultation belong to the client. This consultation is available at a standard cost to all clients.

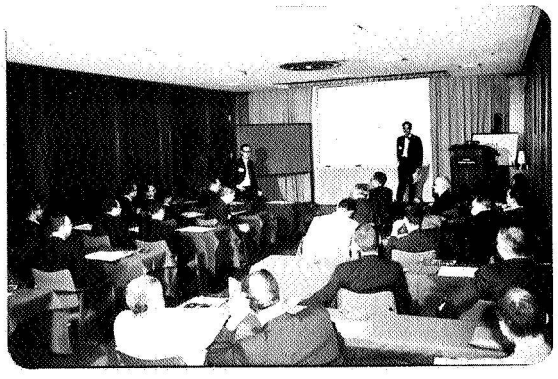


The ASTRA technologist working on a problem for a client makes extensive use of the MRI staff to better understand and answer the client's questions. This consultation is available as a part of the standard search procedure, and there is no additional cost for this assistance.



Answers to telephone inquiries are provided without charge if the information is readily accessible in the ASTRA technologist's own files or from other MRI staff members.

ASTRA sponsors and organizes user-producer conferences or seminars which provide the needed personal interaction between the originators and the ultimate appliers of technology. A few of the seminars held have resulted in extensive reprints of the proceedings.



Formal presentations are made by recognized leaders in the selected topic area to provide direction to the seminar. Informal question-and-answer periods allow the participants to interact with the experts.

ASTRA can also provide computer programs for special applications. Often these can be obtained in formats suitable for use with the client's hardware. Abstract of computer programs available often result from literature searches. In such cases the cost of the program is provided to assist the client in deciding whether or not to purchase it.

SPECIAL ASTRA SERVICES

- Extensive literature searches
- Resident work by an ASTRA Technical Consultant at client's facilities
- Organization and management of special functions
- Formulation of client's long-range planning
- Conference attendance by ASTRA personnel
- Contract R & D services by ASTRA consultants
- Special R & D services as required by client

ASTRA also has these special services which the client may purchase. (Here, each of the services are described in as much or as little detail as is needed.)

ASTRA's SERVICE

- Literature Searches
  - Interpretive Retrospective
  - Interpretive Current Awareness Surveillance
  - Non-interpretive Retrospective
  - Non-interpretive Current Awareness Surveillance
- Consultation
- Telephone Inquiries
- Conferences
- Computer Programs
- Special Services

Once again, the backbone of the ASTRA service is the searching of the NASA information for problem solving via the use of existing technology.

(At this time the presentation can be thrown open for questions, literature can be passed out, or an appropriate movie on NASA technology transfer can be shown.)