

AD-A131 990

INFORMATION RETRIEVAL RESEARCH SUPPORT(U) UTICA COLL OF
SYRACUSE UNIV N Y J J ARLOTTO MAY 83 RADC-TR-83-120
F30602-79-C-0195

1/1

UNCLASSIFIED

F/G 9/2

NL

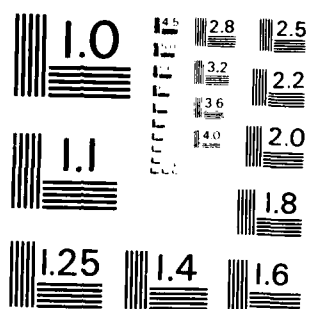
END

DATE

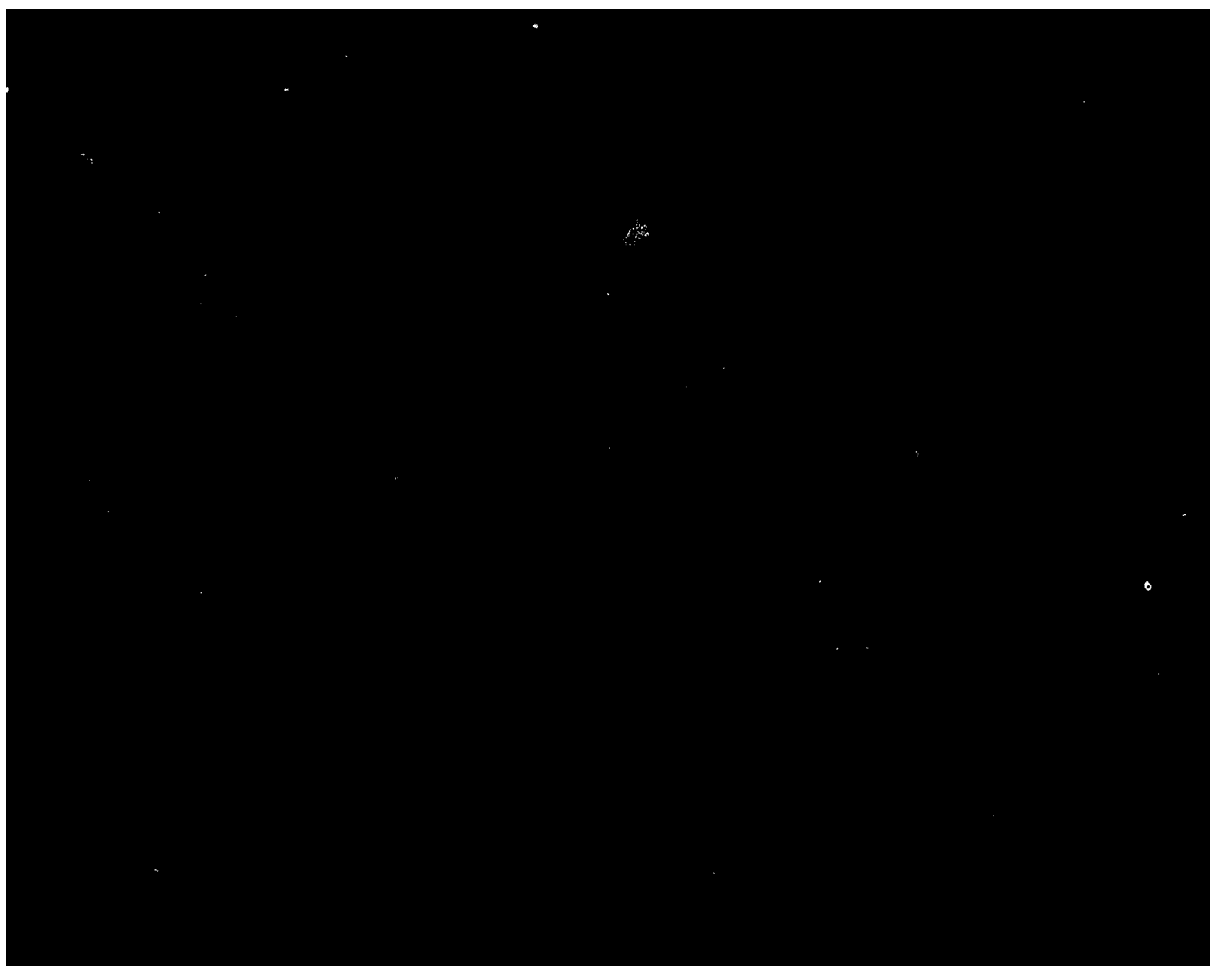
FILED

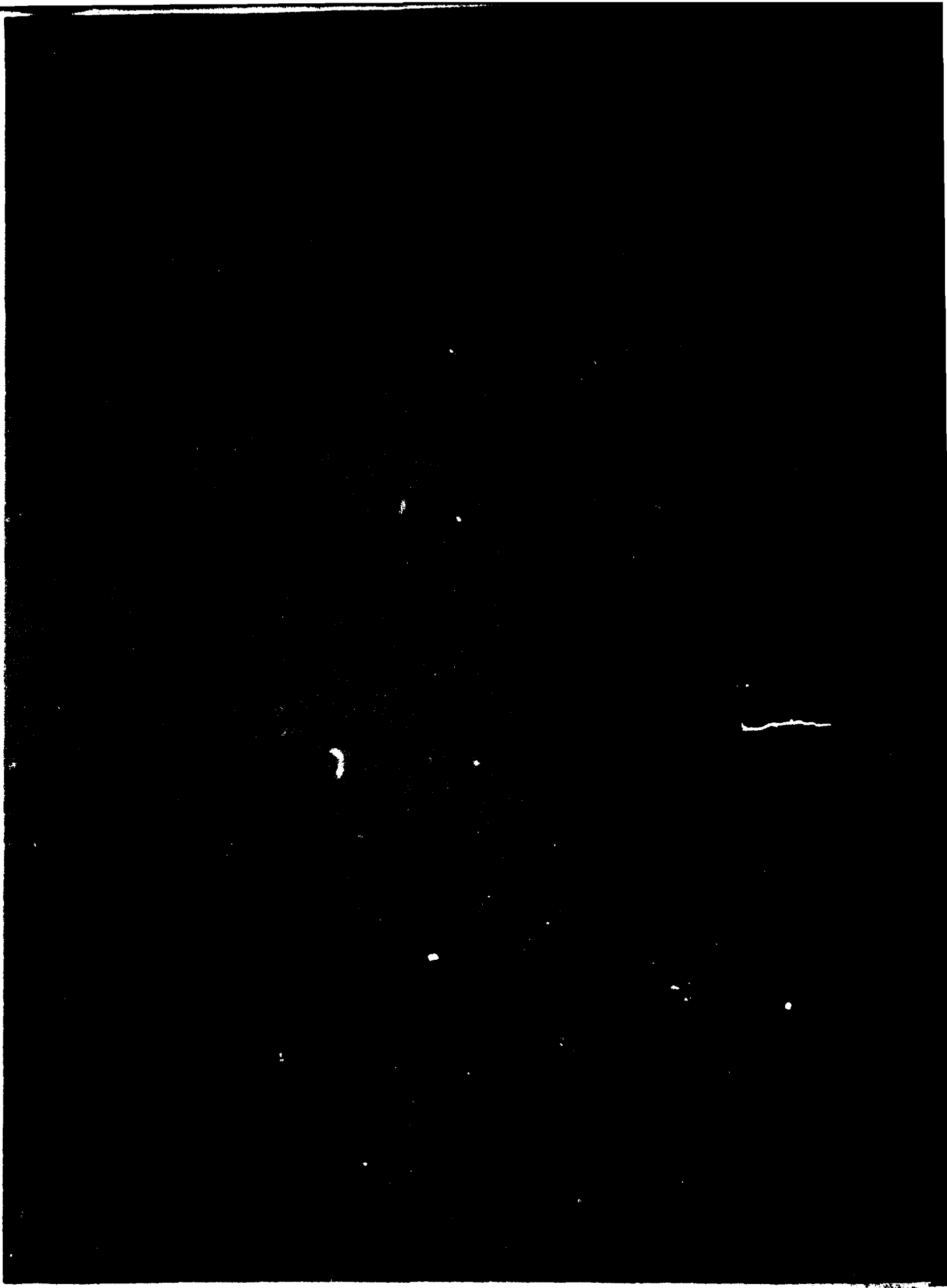
BY H.A.

DTIC



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A





UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER RADC-TR-83-120	2. GOVT ACCESSION NO. AD A31970	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) INFORMATION RETRIEVAL RESEARCH SUPPORT		5. TYPE OF REPORT & PERIOD COVERED Final Technical Report
		6. PERFORMING ORG. REPORT NUMBER N/A
7. AUTHOR(s) Joseph J. Arlotto		8. CONTRACT OR GRANT NUMBER(s) F30602-79-C-0195
9. PERFORMING ORGANIZATION NAME AND ADDRESS Utica College of Syracuse University Burrstone Campus Utica NY 13502		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 62702F 55811816
11. CONTROLLING OFFICE NAME AND ADDRESS Rome Air Development Center (IRDE) Griffiss AFB NY 13441		12. REPORT DATE May 1983
		13. NUMBER OF PAGES 50
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office) Same		15. SECURITY CLASS. (of this report) UNCLASSIFIED
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE N/A
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report) Same		
18. SUPPLEMENTARY NOTES RADC Project Engineer: Warren M. Emlen (IRDE)		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Computers Information Handling		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report describes work performed by Utica College students of various academic disciplines to undertake study efforts and provide products in the Information Sciences. The report provides a synopsis of the individual investigation study efforts in such areas as information handling information processing, data extraction and data management. When appropriate, individual data gathering efforts were published as separate technical reports under this contract.		

DD FORM 1473 1 JAN 73 EDITION OF 1 NOV 65 IS OBSOLETE

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

Table of Contents

	Page
Introduction.....	1
Task 4.1 Tactical Intelligence Technology Abstracts.....	2
Task 4.2 Message Handling/Processing Analysis.....	4
Task 4.3 Digital Image System Tests.....	6
Task 4.4 Scenarios For Automated Exercising Aids.....	7
Task 4.5 IDH Indexed Bibliography.....	8
Task 4.6 Signal Intelligence Experiments.....	9
Task 4.7 Audio/Analysis Experiments.....	11
Task 4.8 Telemetry Processing/Analysis.....	13
Task 4.9 Software Technology Bibliography Task.....	16
Task 4.10 Software Technology "Call For Papers" Task.....	17
Task 4.11 National Software Works Systems Tests.....	18
Task 4.12 Waveform Processing System Testing.....	19
Task 4.13 Programming Language Document Storage and Retrieval System.....	20
Task 4.14 Software Description Analysis Summaries.....	21
Task 4.15 Data Management Systems Analysis.....	23
Task 4.16 Information Sciences Indexed Bibliography.....	24
Task 4.17 Development of an Automated Microcircuit Test System (AMTS).....	25
Task 4.18 Computerized Semiconductor Analysis Program.....	27
Task 4.19 Software Development For Product Evaluation Report Tracking and Scheduling.....	29
Task 4.21 Management and Scientific Information System.....	31
Task 4.22 Computer Simulation Language/Performance Evaluation Software.....	32
Task 4.23 Data Base Management System Comparative Analysis...	33
Task 4.24 Color Graphics for Intelligence Applications.....	34
Task 4.25 Mini-Computer Programs.....	36
Task 4.26 IBM 6580 Programs.....	37
Task 4.27 Query Language Analysis.....	38
Task 4.28 CUBIC Configuration Management.....	39
Task 4.29 Program Development for Data Base Management on LONEX.....	40

Contract F30602-79-C-0195 is the continuation of a series of contracts between RADC and Utica College of Syracuse University, Utica, New York.

Utica College students have proven to be excellent workers for the performance of contract tasks. The different requirements of the various tasks have made it necessary to seek out students of many different interests and programs of study. Thus, students involved in various academic major programs have been employed to the mutual benefit of student, college and government. Among the academic majors represented are Accounting, Biology, Business, Chemistry, Computer Science, English, Mathematics, Physics and Psychology.

The continuing and increasing development and application of computer techniques have resulted in ever rising employment needs in the computer field. Utica College has responded with the development of a Computer Science degree program which has resulted in considerable student response. The large pool of Computer Science majors has been well utilized in the performance of contract tasks.

Year-round continuity of performance has been possible because the students work essentially full-time in the summer and during school breaks, while working at a reduced pace when classes are in session.

In addition to the immediate benefit of contract performance, the close contact between student personnel and RADC personnel has made possible observation of student work habits and capabilities. This has often resulted in encouragement to graduating students to apply for Civil Service positions. It has been possible, therefore, to hire persons who, upon graduation from college, already have a considerable amount of desirable training and experience. Many former Utica College students, once employed under these contracts, are now civilian employees at RADC.

The present contract (79-C-0195) began in June 1979. The statement of work included tasks to be accomplished for the Intelligence and Reconnaissance Division, the Information Sciences Division and the Reliability and Compatibility Division. Work was done on-site at RADC with a Utica College Faculty member serving as student supervisor.

The following pages contain copies of the contract work statement tasks. Each item is followed by a brief summary of the task performance.

4.1 Tactical Intelligence Technology Abstracts:

a. Using the RADC/IRDE bibliographies (about 100 pages total), research and determine the location of approximately 250 tactical intelligence data processing documents. Prepare requests for such documentation and receive and log receipt of the documents. After receipt and logging, each document shall be reviewed in sufficient detail to prepare an abstract. The abstract shall be written and shall not exceed 1,000 words in length for each document. Approximately 250 abstracts shall be prepared.

b. After completion of the abstracts, they shall be indexed and filed. The documents shall also be indexed and shall be stored in the file cabinets provided in Building 240, Griffiss AFB.

c. A composite of all 250 abstracts shall be made as a single document.

d. In addition to the abstracts and indices, both a topical index and an acronym glossary shall be prepared.

e. Prepare and submit to the Government at the completion of this effort, a task report which documents the work accomplished. In addition to a description of the system and the work accomplished with the system, this report shall provide recommendations for improvements in the system.

The following work was accomplished on Task 4.1 Tactical Intelligence Technology Abstracts in order to fulfill the task requirements:

1. A general overhaul of the data base, containing both classified and unclassified documents, was completed first. By doing this, a definite list from which the bibliography would come was formed. Each document was labeled with a bibliography number (Bib#) to facilitate the workability of the data base. The documents were then listed in each drawer and those lists placed in a binder in front of each drawer.

2. A loan system for the documents in the data base was initiated, allowing both government and contractor personnel to borrow information as set down by the rules of the data base. A binder with these rules was created and placed outside the library.

3. A card catalog was created as a help to those who do not have a copy of the bibliography listing. A card for each document was entered, containing pertinent information and these were stored in a file outside of the data base.

4. Abstracts, or summaries, were taken from each document with other applicable information. This draft was then typed into final form and printed out on special reproduction paper. Necessary forms were filled out and the package was sent to the Reproduction Department. The final product, Bibliography for Tactical Intelligence Technology, is listed as TR-82-112 and is dated May 1982. The finished product has been sent out to Government agencies in the U.S. and Europe.

5. In addition to the data base, an acronym glossary was created. This was done by reading the individual documents in the library, extracting acronyms and abbreviations and then listing them. Each acronym and abbreviation was entered on a separate card, showing the document and page on which it would be found. These cards are kept in a card file along with the library.

6. From the acronym and abbreviation cards, lists were written out and then typed on to storage disks, showing the word and its possible meaning(s). This listing was then printed on special reproduction paper, made into document form and sent to agencies in the U.S. and Europe.

Recommendations for this task are as follows:

1. More effort should be put into gathering documents that could be helpful to tactical intelligence projects or gathering more copies of those particular documents that have proved useful in the past.

2. The availability of the library should be made known to at least the three sections in IRD and possibly to all of IR. As it now stands, few people, all from IRDE, know of the library's existence. It would benefit more people, more documents could be added and the whole project would be more worthwhile in the long run.

3. New people in IR would also benefit by being given copies of the glossary and bibliography. These documents, if updated regularly, could be added to a welcome package for all new IR employees.

4. Finally, the system (both glossary and bibliography) should be updated annually, with changes or shorter up-dates sent out on the six-month interval between major printings.

4.2 Message Handling/Processing Analysis:

a. Perform an analysis of the free-text portions of approximately 250 semi-formatted and unformatted indications and warning tactical intelligence messages (average length of 3 1/2 standard typed pages). This analysis shall have a primary objective of recommending automation methods and means for the dissemination, screening, alerting, storage, indexing, retrieval, terminal-to-terminal transfer, transfer to data base, profile construction, print options, and message production aids. Typical messages and related reference documents will be provided by the Government.

b. Perform an analysis of approximately 600 pages of free-text messages and/or intelligence reports to determine content, standardized data representation, and synthesis of data records. Formal linguistic and logical criteria shall be used. Typical reference and related documents will be provided by the Government.

c. Prepare, and submit to the Government at the completion of this effort, a task report which documents the work accomplished and provide recommendations for further analysis.

The following work was accomplished to fulfill this effort's requirements:

1. A complete accumulation of all Joint Interoperability of Tactical Command And Control Systems (JINTACCS) codes as well as an analysis of the free-text portion of the warning tactical intelligence messages, was completed.

2. A general overview of the Message/Handling (JINTACCS) was developed from the 18 JINTACCS formatted intelligence type messages.

3. A final list was created containing Message numbers, identifiers, and titles. These messages were categorized into specific strategic groups showing capability for JINTACCS and the Government.

Recommendations for JINTACCS within RADC:

1. This report is based mainly on the JINTACCS manuals within Rome Air Development Center (RADC) and in its present state, it is in need of refinement due to the system being time consuming and cumbersome to use. In view of these problems, until these messages are reviewed and refined within another contract, RADC has accomplished all the analysis possible at this time.

4.3 Digital Image System Tests:

a. Prepare materials for test and evaluation of the experimental digital image processing system (see Annex 1 for system description). These materials shall be assembled into approximately 50 test packages, each of which is to be used for an individual test. The Government will provide sample test materials and the previously prepared test plan and procedures.

b. Perform the test, collect test data and analyze the data using the 50 test packages and the test plan and procedures provided by the Government. The basic objective of the test shall be to determine the value (as related to the basic criteria of timeliness, accuracy and completeness) of the digital image processing system (or specific capabilities thereof) to the Air Force photo interpreter for automatic target screening and image feature extraction. The Government will provide the necessary equipment as listed in Annex 1 and computer time for conduct of the test(s).

c. Using the collected and analyzed test data, conclusions shall be drawn, recommendations made and a test report prepared. The test report shall include results of testing, specific recommendations for improvements in capabilities and improvements in test design. This report shall be submitted to the Government at the completion of the effort.

Some work was done in initial preparations for the performance of this task. However, the Government soon decided that completion of the task was no longer desirable. Work was halted. No task report is forthcoming.

4.4 Scenarios for Automated Exercising Aids:

a. Develop the details for four specific scenarios. The scenarios shall be used to evaluate new techniques/software/hardware against the requirements of Air Force intelligence organizations. Subject tests shall involve a comparison of the old system with the new system in the general areas timeliness, accuracy, and completeness. The details for each scenario shall include a representative set of reports/messages that can be used in "playing out" the scenario during a system test. In addition, test packages shall be assembled for each scenario, and each package shall include a test plan.

b. Prepare, and submit to the Government at the completion of this effort, a task report which documents the work accomplished and a description of the packages and how they were prepared.

The following work was accomplished to fulfill this effort's requirements:

1. The details for four scenarios were developed to evaluate new techniques/software/hardware against the requirements of Air Force intelligence organizations. These will be used for testing purposes when the Information Sciences Laboratory (ISL) becomes operational.

2. Each scenario was carefully researched in the areas of timeliness, accuracy, and completeness.

3. The proper messages were written for each scenario and will be used to "play out" the scenario during a system test.

4. A complete package was submitted to the Government for use at a later date.

4.5 IDH Indexed Bibliography:

a. Develop criteria for reviewing and analyzing the Government- provided Defense Documentation Center (DDC) Work Unit Summaries on: (1) data bases, (2) war gaming and exercising, (3) analytic aids and (4) software verification and validation. The following statement shall be used as an input for criteria development: "Implementation of new and improved techniques and systems for such intelligence production problems as automatic storage, retrieval, collation, correlation, analysis and dissemination. Conduct of systems design studies, analyses, system development, system acquisition and system implementation for Unified and Specified Commands and the Defense Intelligence Agency."

b. Review and analyze approximately 500 DDC Work Unit Summaries using the developed criteria. The selected Summaries shall be extracted and an indexed bibliography prepared. This bibliography shall be cross-referenced.

c. Prepare and submit to the Government at the completion of this effort, a final report which describes the work accomplished.

The following work was done to fulfill the task requirements:

1. Criteria were developed for reviewing and analyzing DDC Work Unit Summaries. These criteria were then applied to summaries concerning war gaming and exercising. Other summaries were either late in arrival or unobtainable.

2. Those work Unit Summaries pertaining to Intelligence Data Handling were put into document form, listed by Accession Number. Each summary contains the title, person and agency to contact to receive a copy of a document and some other relevant information. This listing was then cross-referenced alphabetically by title.

4.6 Signal Intelligence Experiments:

a. Analyze, correlate, and individually report the results of twenty completed in-house signal intelligence experiments. The statistics previously gathered during the experiments shall be converted for appropriate graphic and textual presentation in the report. Raw data from the experiments shall be input to a formatted file structure using an interactive ADP terminal located in building 240, Griffiss AFB, NY 13441. (Note: It is estimated that ten pages of free-text-type input to a CRT, which is connected to the RADC HIS-6180 computer system, will be required for each experiment). The ADP shall be used to process, format, and print out the data.

b. Prepare, and submit to the Government at completion of this task, a task report which documents the work accomplished. In addition to a description of the work accomplished, the report shall describe each experiment reported on (short description of the experiment and results), and shall recommend work improvements.

To aid in the analysis of signal intelligence information, a set of cartographic display software was converted to run on the SIGINT Support Facility's PDP 11/70 system. The software was originally written for a VAX/DOS system, driving a Ramtek 9400 graphics display processor. The SSF system also uses a Ramtek 9400.

Prior to converting the software, four major steps were required:

1. Comparison of VAX FORTRAN conventions and PDP 11/70 FORTRAN-IV PLUS. Minor syntax changes were required in the Fortran source code.

2. Comparison of VAX MACRO assembly language with 11/70 MACRO-11 assembly language. Major differences were found between the two languages. Though upwardly compatible (11/70 to VAX), the converse does not hold true. Hence, the possibility of rewriting some of the support software into MACRO-11 was deemed infeasible at the present time.

3. Examination of the currently installed Ramtek driver and Ramtek-written support software, the Fortran Interface Package (FIP). It was determined that FIP subroutines could be used in place of equivalent VAX-MACRO subroutines to operate the Ramtek display processor.

4. Comparison of VAX/DOS file formats and 11/70 formats. Though the file formats were not directly compatible, the RSX-11M operating system includes utility programs which perform the necessary conversions.

Conversion of the software was performed by substituting equivalent FIP subroutine calls for VAX-MACRO calls in the original source code.

The converted program was successfully tested on the 11/70 system using two separate cartographic data files.

4.7 Audio/Analysis Experiments:

a. Analyze, correlate, and individually report the results of twenty completed in-house audio analysis experiments. The statistics previously gathered during the experiments shall be converted for appropriate graphic and textual presentation in the report. Raw data from the experiments shall be input to a formatted file structure using an interactive ADP terminal located in building 240, Griffiss AFB, NY 13441. (Note: It is estimated that ten pages of free-text-type input to a CRT, which is connected to the RADC HIS-6180 computer system, will be required for each experiment). The ADP shall be used to process, format, and print out the data.

b. Prepare, and submit to the Government at completion of this task, a task report which documents the work accomplished. In addition to a description of the work accomplished, the report shall describe each experiment reported on (short description of the experiment and results), and shall recommend work improvements.

Work was done on the following projects to satisfy task requirements:

A. Navy air/air, air/gna, and gna/air tactical voice communications were recorded during training exercises at NAS Mirimar, San Diego, California. The following analysis was done:

1. A word-for-word transcription of the conversations on each tape was recorded on paper. Included in this was the origin and destination of each transmission.
2. Each of the transmissions was timed. Where appropriate, the time between transmissions was recorded.
3. The number of words in each transmission was determined and recorded. If any words were unrecognizable a blank was left, but the utterance was recorded in the number of words.

4. The data was analyzed in two ways:

a. The statistics of the timing information were studied. The mean and standard deviation of the transmission times, and the times between transmissions were used so that from the results histograms could be drawn.

b. The linguistic content of the transmissions was then analyzed in the following manner:

1. the emotional state of the speaker
2. extraneous conversation
3. number of requests for information
4. the number of replies
5. the number of statements
6. the number of words in each message
7. what word occurred most often

These statistics were to be used for other experimentation to be performed later.

B. A "Voice Recognition Experiment" was planned. With the aid of an engineering supervisor, the following series was devised:

1. After an initial discussion of events, it was decided that the test plan would be as follows:

a. 2 systems would be tested against each other

b. testing would consist of live versus taped input, system versus system, and microphone versus microphone, to determine the system and style of input with the smallest error rate.

2. The test plan was further refined and outlined.

3. A diagrammatic representation of the system was created.

4. The necessary algorithms were designed and written.

5. A group of 20 subjects was enlisted.

6. In-house experimentation had not yet begun when this report was written

4.8 Telemetry Processing/Analysis:

a. Establish and update a file of approximately 25 signal-types. The file shall consist of an index and a catalog of signal types. The catalog shall include, but not be limited to, data rates, signal formats, and modulation types, with a synopsis for each signal type.

b. Establish and update a telemetry intelligence technology information file. This file shall consist of approximately 100 telemetry intelligence technology documents. The file shall be indexed, and abstracts of each filed document shall be prepared and assembled into a separate file.

c. Perform a statistical analysis of approximately 250 pages of data to be used in support of the on-line FTD/RADC ADP processing capability. The results of this analysis shall be assembled in text/chart and/or graphic form, as appropriate. This data, along with other appropriate data, shall be prepared (assembled and formatted) for entry to the on-line system.

d. Prepare, and submit to the Government at the completion of this task, a task report which documents the work accomplished. The report shall also include recommended improvements in the files and data packages, as well as recommendations.

The following work was accomplished to fulfill the task requirements:

1. A data base was created to hold the EWIR signal types. This data was formatted and loaded onto the REL*STOR Relational Data Base Management System. The purpose was to test REL*STOR for possible use as the final EWIR data base management system.

Under this part of the task the following documents were written: an abbreviated user's guide to aid users in the mechanics of Rel*Stor, a two part Test Plan (Part II with a SECRET classification) stating the purpose of the testing and the methods to be employed, and a Test Evaluation (also with a SECRET classification) that documented the results of the testing. The necessary tests to complete this test plan were conducted over a period of three months after the mechanics of the system were learned and simulated data was practiced on to gain proficiency. During this time demonstrations on the use and mechanics of REL*STOR were given.

2. A telemetry intelligence technology information file was created using the Telemetry Beaconry Analysis Guide (TEBAG). The data stored consisted of approximately 300 signal types. The modulation and RF frequencies corresponding to these signals were compiled. The data was compiled on index cards and is kept in the RADC/IRAE section office.

3. A statistical analysis was performed using documents from the RADC Technical Library and the Data and Analysis Center for Software (DACS). This data was to be used for the development of a standard query language to be used on-line at FTD. The analysis entailed a detailed literature search and survey of applicable documents. After the documents were retrieved and read, an abstract was written detailing the contents and relative importance of each document read. After all abstracts were written a complete bibliography was compiled.

In support of this on-line processing of a standard query language, two surveys were conducted. The first survey entailed querying current on-line users of any system within RADC. People surveyed worked on four existing systems. The questionnaire asked questions concerning the likes and dislikes of various parts of the system they used. The purpose of the survey was to discover what current, non-programming users looked for in a system. The second survey expanded on this and asked the user to rank 62 criteria, on a percentage basis, in terms of importance in a system.

The first survey required manual evaluation and a brief, unofficial report was written. Because the second survey used numerical data, a PASCAL program was written that evaluated the data among all surveyed and output a consensus for each of the 62 criteria. In addition statistical calculations were made and a detailed report of the findings and of the results of these calculations was written.

Also under the RADC on-line processing the following were output:

Twice a month a Late-in-Step Report was produced that was submitted to the branch. This data is retrieved from the JANUS data base management system under Multics. It was necessary to first learn the mechanics of the Multics system and then learn the JANUS system. A Status of New Starts report was produced for the branch. This report was produced on a non-regular basis as formatted by the division.

A JANUS data base called TRACK-83 was updated approximately twice a week for a period of 3 months. This data is needed once a year for a period of time and will be updated each year. A new report based on project number was produced. These reports are used by the individual project engineers and the branch office.

4. A task report documenting the work accomplished and a list of recommendations on each part of the above task has been written and submitted.

4.9 Software Technology Bibliography Task:

a. The contractor shall provide the Government a hardcopy of the Bibliography of approximately 30 RADC/IS Software Technology Reports. This task shall include the following:

(1) Review quarterly the RADC Technical Report Summaries and extract all IS produced Technical Reports and Technical Memorandums.

(2) Correct any discrepancies that may exist on the previous report provided, against (1) above.

(3) Update the Bibliography to include accession document numbers of all previous and newly listed reports.

Throughout the life of the contract, a hardcopy of the bibliography was prepared quarterly and delivered to the Government.

The RADC Technical Report Summaries were reviewed periodically to obtain information concerning reports produced by IS.

The bibliography was continuously updated to include accession document numbers of all previous and newly listed reports.

4.10 Software Technology "Call for Papers" Task:

The contractor shall provide a "Call for Papers" report, to include all conferences, symposia and meetings pertinent to the Information Sciences area. This task shall include the following:

a. Review approximately 60 journals, transactions, magazines, etc., with the objective of extracting all events related to the Information Science area, in particular those relating to technical interest in which RADC/IS has technical expertise.

b. Prepare and submit a task report (Call for Papers) to include a list of recommended events.

Throughout the life of the contract the information media were searched for notices of events of interest to RADC/IS.

A "Call for Papers" report was prepared monthly. The report contained a list of recommended events and, in some cases, appended brochures which provided additional details.

4.11 National Software Works System Tests:

The contractor shall develop and submit to the Government for approval a test plan using test procedures outlined in the National Software Works Test Manuals. The test plan shall be oriented toward test procedures and test criteria necessary to execute pre-defined performance tests. The contractor shall perform tests, in accordance with the plan, using interactive computer terminals and basic data processing knowledge to validate user documentation for the National Software Works System. Upon completion of the tests, the contractor shall prepare a report outlining the analyzed test results.

Work on this task included gathering and reviewing documentation for the National Software Works (NSW) System. A documentation library was then established for NSW system users within RADC.

The library was available for use by both experienced and inexperienced users. It consisted of "help files", manuals, and other NSW documentation sources.

With the aid of the NSW documentation library, system tests were performed. The tests consisted of accessing NSW tools via interactive computer terminals; tools such as FORTRAN and BASIC compilers, TECO and XED editors, and GIM and GIMII database management systems.

Recommendations:

This task is still continuing. The task is very useful for a person with programming interest, and also with editing capabilities.

In summary, the contractor's time is used wisely since a number of operations can be performed using a variety of computer systems, and computer failure is rare. This task is highly recommended for future use.

4.12 Waveform Processing System Testing:

The contractor shall conduct performance tests on the Waveform Processing System (located in Building 3, Griffiss AFB), using 25 pre-prepared data sets and test objectives and criteria provided by the Government. The contractor shall use FORTRAN, PL-1 and MULTICS Programming Manuals to prepare a test plan. The contractor shall implement the approved test plan to analyze and validate data to test documented Signal Processing Algorithms. Upon completion of the tests, the contractor shall provide a report documenting the analyzed test results.

Work was done on the Long Waveform Analysis (WAVES) which was installed on MULTICS. Among the specific activities were the following:

1. Data tapes mailed from England were read into WAVES. Feedback from this process enabled the British group to improve their tape format.
2. Assistance was given in the testing of a Spectral Estimation program.
3. A program was prepared which arranged ASCII data into a format which was acceptable to WAVES. It was capable of building waves, nodes and trees.
4. Due to documentation problems, IMSL subroutines were not working. The problem was solved when routines were found to establish proper procedures.
5. Two I/O programs were tested in order to locate an error. In each case it was found that an entry point to a subroutine was missing.
6. DICEF had some Modem data needed by WAVES users. Work was done to complete a path for transfer of the data to MULTICS. Elements of the path included - 7 to 9 track tape change, segmentation of trees in an 11/45, tape output from an 11/45, and entry into MULTICS/WAVES.

4.13 Programming Language Document Storage and Retrieval System:

Incorporate approximately 350 documents, consisting of 75-100 pages each of technical documentation, to the RADC MULTICS Commands and Parameters search system. This task shall include the following actions:

- a. Abstract the technical documents and assemble a compendium of the abstracts.
- b. Create and update a keyword index to the abstracts.
- c. Prepare and submit an operations guide. This guide shall include a description of the system, the operating procedures and guides for the continued improvement of the keyword index.

The goal of Task 4.13 Programming Language Document Storage and Retrieval System, was to create, document and update files within the General Comprehensive Operating Supervisor (GCOS) Explain subsystem.

The subsystem exists to provide any user, on the system, with a condensed description of, and utilization of, commands, other subsystems, subroutine libraries, languages, and utilities available on GCOS.

The initial step was to research a topic frequently requiring assistance. Before creating a file the topic was fully researched and experimented with on-line (on the terminal interacting with the computer). All information gathered was then combined to create a simplified explanation of what the topic was, and how it was to be used. Often the explanation included on-line examples exemplifying the way the feature worked. Because of a constant upgrading of the computer system, files already written were often reconstructed to show the new capabilities the command, subsystem, or language had to offer.

For a detailed index of the topics presently documented in the GCOS Explain subsystem, refer to the task report for this task.

4.14 Software Description Analysis Summaries:

a. Perform an analysis of the narrative portions of the Federal Software Exchange software system descriptions. This analysis shall include the comparison of these software descriptions with the RADC mission statement, as described in the RADC O&F book, to enable a recommendation for (or rejection of) abstracts for inclusion in the Commands and Parameters search system. Abstracts will be those provided by the Federal Software Exchange publication.

b. Perform an analysis of the narrative portions of the commercially available software system descriptions. This analysis shall include the comparison of these software descriptions with the RADC data processing mission statement, as described in the RADC O&F book, to enable a recommendation for (or rejection of) abstracts for inclusion in the Commands and Parameters search system. Abstracts shall be those provided via the ACM, IEEE, and Computer Trade journals. Upon completion of this task, the contractor shall submit a summary consisting of the list of recommended abstracts derived from the Federal Software exchange and commercially available sources.

The goal of task 4.14a was to perform an analysis of the Federal Software Exchange Catalog, looking for software that could benefit the RADC R&D Computer Facility Operations Section. After repeated inspection of the quarterly and annual Federal Software Exchange Catalogs, it was decided that they did not contain enough software to benefit the Computer Facility, and task 4.14a was concluded.

The goal of task 4.14b was to analyze and compare commercially available software system descriptions, and provide a recommendation for (or rejection of) them for inclusion on the Computer System or Explain Subsystem (see task 4.13).

The Biomedical Statistical Programs (BMD) software was researched, and was not recommended for the online system of software descriptions and explanations (Called the Explain Subsystem - see Task 4.13). Even though it is available on tape for use, BMD was not included because the number of users with BMD applications was not large enough to justify inclusion.

The Time Sharing Applications Library was another software package examined. This software was found to be well documented, relatively easy to use, and covered a wide range of applications. It was included in the Explain Subsystem.

Pursuing this task further, the Statistical Package for the Social Sciences (SPSS) software was compared with the International Mathematical and Statistical Library (IMSL) software. It was concluded that most of the capabilities of SPSS were available in IMSL. IMSL also had features not found in SPSS. The user's manual for SPSS, however, is very explanatory, and was kept as a statistical tutorial. Although IMSL was the recommended software system, its documentation is lacking in user education. Because of this, various texts and other materials were evaluated to supplement the IMSL documentation. Those materials judged most suitable were included in a list which was submitted to the Government.

4.15 Data Management System Analysis:

a. Perform a comparative evaluation analysis of approximately six (6) Data Base Management Systems (DBMS) for the purpose of aiding users in selecting a DBMS. Systems to be evaluated include MRDS (Multics Rational Data System) and MDQS (Management Data Query System) which are available on A-6100, DEC-20 and PDP-11 in the R&D Computer Facility. The criteria for comparison shall be data throughput, storage requirements, run time, and utilization of peripherals.

b. Prepare a task report which will include introductory examples exemplifying data base management systems and more features considered pertinent in the comparative analysis.

In performance of this task, assistance was provided in the creation and loading of many of the RADC corporate datasets. Various macros were written to help the user retrieve information from these databases. These macros, which can be executed by a single command, were defined to generate reports which are used frequently by RADC employees. These macros contain the basic display commands along with many of its complex arguments.

Also written were on-line help files which are designed to help the new user learn the basic ways to manipulate the system. Using EMACS (full screen text editor) and TED (line editor), help files for many of the available systems on Multics were written, and out-of-date help files and on-line manuals were revised (consolidation of on-line information provided the material for some new manuals which were created).

Execcom programs were written to check any text for spelling errors and to familiarize the new user with the RADC public databases. A directory of program examples was created as a reference for the help files for certain programming languages (i.e. Pascal, APL). This was part of a user accessible directory structure that attempted to allow proper access for people of various disciplines to an extremely complex computer facility.

4.16 Information Sciences Indexed Bibliography:

a. Develop criteria for the review and analysis of Government provided DDC Work Unit Summaries on data bases and analytic aids through the use and evaluation of on-line interactive computer systems such as the ARPA network, GCOS, and MULTICS Operating Systems. The following statement shall be used as input criteria development: Develop and implement new and revised techniques for such Information Sciences problems as automatic storage, retrieval, collation, analysis, and dissemination of data. This effort shall result in the generation of routine reports, editing and revising final outputs and a resultant listing which will be used for referencing to prevent duplicative efforts.

b. Review and analyze approximately 300 DDC Work Unit Summaries using the developed criteria. Selected summaries shall be extracted and an indexed listing prepared.

c. A task report describing the work accomplished with the recommended actions for future work improvements relating to this task will be submitted upon completion.

In performance of this task, work included reviewing Government provided Work Unit Summaries on a quarterly basis.

Review, update, and analysis were accomplished through the use of on-line computer systems such as the ARPA network and MULTICS. As a result, routine reports were generated using editing, storage, and retrieval techniques.

A final report was submitted along with computer data to verify accomplished output.

Recommendations for this task:

1. Summaries are performed on a quarterly basis and work between quarters must be related to this task. Monthly updates of summaries were accomplished using various editing techniques. Information was obtained from MASIS Job Order Listings.

2. Familiarity with the MULTICS system must also be related to this task; especially used for the accessing of summaries by other users.

In summary, this task is recommended since it uses the contractors time wisely and gives the contractor enough time to prepare the summaries.

4.17 Development of an Automated Microcircuit Test System (AMTS):

a. The contractor shall develop a computer controlled test system to automate the electrical testing of microcircuit devices. The system shall include a software program to track devices through the Government provided S-3260 test generator and conduct verification testing of the AMTS.

b. In developing the AMTS the contractor shall:

(1) Utilize fifty (50) Government furnished device types as test verification samples.

(2) Execute the system diagnostic program (VERDICT) on the S-3260 test generator to verify test generator integrity.

(3) Conduct a final validation of AMTS utilizing ten (10) Government furnished microcircuit devices of each type.

c. The end product shall include a final report which shall include test results, references used, analysis done, resources used, and overall system operation for each device type; and the software program shall include the job order number, responsible individual, part number, equipment used and specified types of tests.

The following work was done on Task 4.17 Development of an Automated Microcircuit Test System (AMTS) in order to fulfill the task requirements:

1. A program library now exists (stored on disk) for microcircuit verification. The programs were developed to run on the Tektronix S-3260 AMTS. Some have been updated to run on the newer AMTS, the Tektronix S-3270.

2. On a daily basis the AMTS diagnostic program (VERDICT) was run on both the S-3260 and the S-3270 to verify the integrity of the systems. A summary of the test results was printed out and kept on file in the AMTS facility.

3. The task report contains a list of the identifying numbers of the device types available for use on the S-3260 and/or the S-3270. (The programs are stored in short form, a boiler plate control program must be added before they can run on either system). NOTE: Disk name is "RADCPSTDPGMS".

4. Test results, with automated analysis, on sample parts are stored on disk in the AMTS facility (RADC/RBRP). Test results are in the form of a log file. This log file must be run with various analysis routines on either system to extract the needed test information. Manuals and computer help files are available in the facility to assist operator in using log files and the analysis system. A file is also kept on each program with complete hardware set-up on the S-3260 and/or the S-3270.

4.18 Computerized Semiconductor Analysis Program:

a. The contractor shall develop a software program to evaluate the reliability risk associated with utilizing semiconductor devices in Air Force systems such as A1/TRC-17C, F-16, DSCS III, SACDIN, etc. The program shall be software compatible in format and operation to the Computerized Microcircuit Analysis Program (CMAP). This program shall include a discrete semiconductor data base and procedures for searching and upgrading the data file to maintain it with current state-of-the-art technology. Verification tests to demonstrate compatibility with CMAP shall be conducted. The program output shall be a computerized listing of devices requiring additional documentation or replacement with a military standard. The end product of this task shall be computer program test results included in the final report that documents the operational procedures.

The data base has been entered onto MULTICS and software has been written to access and update the information. The Semiconductor Reliability Assessment Program, as it is now called, is compatible with the Microcircuit Reliability Assessment Program. The data from both of these programs is regularly published as MRAP/SRAP.

This document tracks Mil-M-38510 and Mil-S-19500 activity and can also be used as a preferred parts list for new system designs.

Because all of the files that MRAP/SRAP require are structured and based, a text editor cannot be used to modify the information. Several programs have been written which may be used to update these files. They are as follows:

1. update - used to control information related to microcircuits covered by Mil-M-38510 slash sheets.

2. update_qpl - used to keep track of the devices, and their vendors, on the current Qualified Parts List published by DESC.

3. update_srap - functionally similar to the update program. It is used to maintain information on semiconductors covered by Mil-S-19500.

4. mrap - tracking system that individual device numbers may be checked against to determine their status.

Instructions for using these programs are available to the users of the MRAP/SRAP system. These instructions have also been entered onto MULTICS as help files.

SRAP is being modified. Future issues will contain sections in addition to the preferred parts list. Devices not approved for new designs, and sections listing substitute and/or replacement parts may be included.

4.19 Software Development for Product Evaluation Report Tracking and Scheduling (PERTS):

a. The contractor shall develop a software program to track and schedule the flow of microelectronic devices through the RADC Product Evaluation Facility.

b. The software program shall be in PL/1 or Fortran and shall be compatible with the existing (PERTS) which consists of notebooks containing background information on the devices, manufacturer, tests to be performed, time and date received, engineer responsible for tests, status of editing, and whether final approval has been accomplished, and the distribution listing.

c. Verification testing of the software program utilizing Government furnished product evaluation data shall be conducted on the H-6180 MULTICS System.

d. The end product shall be a software program and a users manual.

The software program has been written and is called PENTER. PENTER is a program that keeps a record of all the Product Evaluation Reports of RBRE. It is written in PL/1. PENTER is stored in a directory called peval on MULTICS. Also stored in this directory are: 2 data files, 7 programs used by PENTER and 2 other programs that define "&" and "1". The two data files are data_1 and data_2. Presently data_2 is being used to store data. The 7 programs used by PENTER are:

1. Instructions - this gives instructions on how to use the PENTER program.
2. use 22
3. look - this searches through the program.
4. stat_file - this gives a listing of the questions asked by the PENTER program.
5. list 2
6. entries - defines space for answers to questions.

7. ptrack

The other two programs in the directory are the same program. These are called Test and TT. Their purpose is to define the, and, and or conditions as "&" and "|". They also call two subroutines which are: lookh, which prints header information and looks, which prints information requested. To obtain a list of this directory type: peval (space) ls. To enter a report type PENTER to start the program. The program will ask the user questions and the user may obtain the information from the reports and type in to the computer. The answer to the question: "What is the name of the output file?" is data_.2.

4.21 Management and Scientific Information System:

a. The contractor shall provide current information for MASIS input as extracted from the RADC/IR status report collection. This task shall include the following:

1. Review monthly the RADC Technical Status Reports; extract all IR progress to date.

2. Correct any discrepancies that may exist on the previous MASIS report provided, against (1) above.

3. Update the Masis report to include narrative and accession document numbers of all previous and newly listed reports.

b. The contractor shall provide MASIS a continuous updated flow of pertinent incoming information concerning the status of each contract in RADC/IR.

The work performed required monthly reviewing of RADC Technical Status Reports. This involved a "checking" system to ensure that contracts in the IRD branch were still active, complete or retired. If any reports were delinquent, updates were submitted to the MASIS office stating a extension or a completion to the contract.

Update information for these reports was derived from various RADC forms and/or from talking directly with the engineers in charge of the specific contract.

For all new contracts, progress narratives were submitted which included the objective, approach and progress sections of the Technical Status Reports. Also, for all completed or retired contracts, a final progress report was submitted stating the end product of the specified contract.

4.22 Computer Simulation/Performance Evaluation Software:

a. Perform a survey of approximately 10 available state-of-the-art computer simulation languages/compilers and computer system performance evaluation modeling/simulation software. The objective shall be to identify a set of potentially applicable software tools to be used in the planned RADC Intelligence System Laboratory (ISL). Reference and related documents will be provided by the government and will be available in Building 240, Room 241.

b. Prepare and submit to the Government at the completion of this effort, a task report which documents the work accomplished and provides recommendations for further analysis.

To fulfill this task's requirements:

1. The process of familiarization in regards to the Intelligence Systems Laboratory (ISL) project had been initiated. This process involved the study of various technical plans, reports and manuals, which led to a general understanding of the ISL's description, purpose, relationships to other facilities and implementation.

2. A survey which involved the research of models, simulations, and simulation languages, was then conducted. This involved obtaining a list of bibliographies of Department of Defense models, simulations, and simulation languages. From this list reports were chosen which presented several models, simulations, and simulation languages, used for Department of Defense purposes.

3. After examination, it was determined which models, simulations, and simulation languages could be applied to and utilized by the ISL. Categorization of the models and simulations by type was then performed.

4. A specific format was developed in order to outline the information presented by the reports regarding the models and simulations. This information included the model or simulation title, purpose, general description, users, and point of contact.

5. The compiled lists of information were typed in and revised on a computer terminal which displayed the information via Cathode Ray Tube and led to the production and printout of a hard-copy listing which was submitted for future use by the ISL.

4.23 Data Base Management System Comparative Analysis:

a. Perform a comparative analysis of approximately 10 data base management systems for medium to large scale computers, for the purpose of aiding system developers having a knowledge of their data base structure, size, anticipated distribution of retrievals and updates, etc., in selecting reasonable candidate data base management system(s) for further evaluation. Systems to be analyzed shall include ADABAS, IDMS, M204, S2000, ORACLE, and SARP. The criteria shall include the logical data structure supported, maximum parameters (such as maximum record size, maximum number of hierarchy levels, maximum number of fields per record), availability of features such as cross-file coupling, query language/report generator, and other characteristics which serve to constrain or bias DBMS utility. The analysis may be depicted in matrix form. Reference and related documents will be provided by the Government and will be available in Building 240, Room 241.

b. Prepare and submit to the Government at the completion of this effort a task report which documents the work accomplished and provides recommendations for further analysis.

The following work was done on this task in order to fulfill the task requirements:

1. An analysis of 10 data base management systems for medium to large scale computers was performed using the following criteria: logical data structure supported, maximum parameters, query language/report generator, documentation, performance, security, integrity, vendor, coexistence with other systems, portability, and cost. Information on these systems was obtained by existing technical reports, unclassified documented comparisons, and responses from vendors themselves. Data acquired for this task was based on available Government-furnished products during the period of contract performance.

2. A twenty-page task report was completed. The report includes recommendations for additional analysis and documents work completed.

4.24 Color Graphics for Intelligence Applications:

a. Analysis of color graphic hardware. An analysis of a minimum of 10 color graphics terminals shall be conducted. This analysis shall include, but not necessarily be limited to, the following data: size, weight, CRT resolution, number of colors, cost, contractor support (spare parts, maintenance), TEMPEST qualifications, power requirements, built-in capabilities, (eg., test) and delivery time after order. A set of criteria shall be first developed, against which the terminal characteristics shall be compared.

b. Analysis of color graphics software. An analysis of characteristics of commercially-available graphics support software packages shall be conducted. This literature analysis shall include, but not necessarily be limited to, the following data: computer capabilities required (type computer, memory size, etc.); relative proportions of work done in the computer and the terminal; response times; capabilities with respect to types of graphics displayed, ease of change, number of standard symbols, etc.; cost; delivery time after order; and amount of contractor support provided (training, maintenance). A set of criteria shall be first developed, against which the software characteristics shall be compared.

c. Prepare, and submit to the Government at the completion of this effort, a task report which documents the work done. This report shall explain the criteria selected, the rationale for their selection and the methodology used in accomplishing the study. It shall provide the results obtained and the recommendations for use of specific terminals and graphic packages. (NOTE: The individual recommendations made for hardware and software must be compatible. That is, the software selected must be able to operate with the hardware selected).

In order to fulfill the Task requirements, it was necessary to go through the following procedures:

1. Since the use of color graphics has just begun to be developed in recent years and new machines or printers are still being developed, it was useless to research the old materials on printers. Therefore, a search for the addresses of companies who manufacture color graphics had to be made by reading recent magazines, such as Computer Digest. Every advertisement concerning color graphics was carefully noted.

2. A list of the addresses of the companies which carried the terminals was compiled. Phone calls were then placed to various companies to find out if they stocked the printer.

3. The companies provided the names of sales representatives in the area and where they could be contacted.

4. Phone calls to various representatives were placed and information was sought concerning color graphic printers which would be compatible with a CGC 7900 terminal. If a representative carried such a printer, he was requested to send any information concerning it.

5. When all the material was gathered, a matrix was assembled with all the common characteristics.

6. After this was done, criteria on the software packages had to be obtained. Since the software packages had to be compatible with the CGC 7900 and their printers, calls were placed to the companies which stocked the color graphic printers. If software packages were necessary, the information had to be sent.

7. The final step involved developing a matrix of the software packages with all of the common characteristics.

4.25 Mini-Computer Programs:

a. Design, develop, test, and implement mini-computer applications programs for in-house RADC/IRDE mini-computer systems. These applications programs will include automated support tools for formatted data generation, file and index creation, file and index maintenance, work unit control and reporting, and related activities.

b. The end product will include program and user documentation and training of RADC personnel for daily use of the delivered programs and procedures.

This task was performed in combination with Task 4.26. See the description of work done under 4.26.

4.26 IBM 6580 Programs:

a. Perform analysis of the forms software of the IBM Textpack III currently used on the IBM 6580s located in RADC/IRD, Bldg 240. Based on the analysis, the contractor shall develop software programs to be used on the 6580s in conjunction with Textpack III for the purpose of structuring and composing forms. This will involve the development of approximately 10 different forms formats with corresponding instruction sets.

b. The end product shall be a software program, a user description and instruction set including a pictorial representation of the finished form with appropriate comments. Additionally, the contractor shall prepare a training course and schedule employing these products for the purpose of instructing the RADC operators of the IBM 6580s.

1. In order to learn the IBM 6580, it is necessary to read the operators manuals. In order to learn how to operate the processor, it is necessary to go through the Operators Training Book in Basic Topics on the processor. This manual gives step by step instructions for all the various keys and functions and lets you practice them on specific exercises. Learning how to operate the 6580s is self taught.

2. After going through the Operator Training Book, it would be a good idea to experiment with the various keys and functions of the word processor on your own.

3. The task involves formatting the forms assigned (form 1610, form 77, form 1820, form 74, form 126, form 133). The forms on the processor are roughly on the same scale as the originals, except where the words wouldn't fit in the space provided, therefore it was necessary to extend the section a few lines.

4. The formats of the forms on the 6580 allows the secretaries to move automatically to the next location and type in the information required by use of stop codes.

5. Machine time was shared with the secretaries so it was available for use when they were out of the office.

6. The forms assigned are completed. There is an instruction set included with them. A copy of all the formatted forms from the processor is attached to the instructions.

4.27 Query Language Analysis:

a. Conduct a literature search to determine the attributes and capabilities of approximately 5 query languages with potential for use for access to intelligence data bases. The RADC Technical Library and the RADC Data Analysis Center for Software (DACS) will be used for this search. An annotated bibliography shall be prepared, covering each document/paper reviewed. This bibliography shall include an index, a glossary, and key words for each entry.

b. Using the annotated bibliography and other referenced material, the query language attributes shall be portrayed in matrix form.

c. The bibliography and the matrix shall be provided as a data item in the form of an informal technical report.

The following work was accomplished on this task in order to fulfill the task requirements:

1. Abstracts of various computer related reports were reviewed in search of specific reports on query languages and data base management systems. These reports were obtained from the RADC Technical Library.

2. A DACS bibliography was reviewed in search of documents and reports on query languages. These reports/documents were obtained.

3. In order to find more information on query languages it was requested that a computer search be done at the RADC Technical Library. The output of this search was a list of report abstracts. These abstracts were reviewed and the relevant reports were obtained.

4. Each report and document was read and notes were taken that could be used to write a report on the query languages that are used by intelligence analysts.

5. A report was written that discusses the attributes of the various query languages that are used to access intelligence DBMS. A bibliography of references used was prepared.

4.28 CUBIC Configuration Management:

a. Establish and maintain the CUBIC Configuration Management problem report recording and tracking system. This task will include, but not be limited to the following records: (1) a log which provides the problem report identification, the date received, dates that specific actions are taken, and the current status; (2) copies of all problem reports; and (3) related correspondence.

b. At the completion of the contract, the contractor shall deliver the records that were developed and maintained. No technical report is required.

The following work was accomplished on this task in order to fulfill the task requirements:

1. A file system was created containing the three systems included in CUBIC Configuration Management. These files contain the problem reports which are filed separately by the month.

2. Each problem report which came in from certain organizations was recorded on Problem Report LOGS which were then attached to the actual problem report. The two were then filed.

3. Configuration Management Monthly Report Status Reports which come each month were used in order to verify the status of each problem report which came in that month.

4. A file which explains the whole Configuration Management Program was created on the LONEX computer and placed in the LONEX Library as a help to those who do not have a copy of the information contained in the Configuration Management Program.

4.29 Program Development for Data Base Management on LONEX:

a. The contractor shall develop a file for entry, storage, and retrieval of current TDY related information. The file will include information which can be used to project cost estimates for air travel, car rental, and overnight lodging. It will also include appropriate 800 telephone numbers and addresses for each listing. A users guide shall also be developed so that an untrained individual can access the files.

The following objectives were accomplished in compliance with this task:

1. A system of files containing air travel, car rental, and overnight lodging information was established in the LONEX Central Library System.

2. Addresses, 800 telephone numbers, and Autovon numbers are included for each listing where available.

3. A users guide that should enable a user/nonuser of LONEX to manipulate (delete/update) data within the file system is included within the file system.

4. A table of contents, identifying and summarizing each file within the file system is included in the file system.

5. The following sequence of commands (following successful "Login") will access the TDY file system's table of contents:

```
(computer)  COMMAND:
(user)      library (carraige return (acpt))
(computer)  Library action?
(user)      copy (acpt)
(computer)  Item type?
(user)      document
(computer)  Item name?
(user)      Travel
```

(computer) copy of document was successful
Library action?
(user) done
(computer) COMMAND:
(user) show Travel

The user is now in the TDY table of contents; upon selection of the desired file, depress the control key (CTRL) and the D key simultaneously. This will bring the user back to the COMMAND: prompt and the desired file may be accessed by repeating the above sequence of commands, replacing the new file name everywhere the word Travel appears.

4.29 Program Development for Data Base Management on LONEX:

b. The contractor shall establish a LONEX data base listing approximately 100 chemicals and solvents stored in the in-house laboratory. The data base shall include nomenclature, stock number, purchase price, quantity, and storage location. The data base shall be set up so that it can be easily modified as chemicals are purchased or turned in. A users guide shall also be developed so that a non-LONEX trained individual can access the file.

The data base has been established. A representative copy is included in the task report for TASK 4.29. The users guide is reproduced here:

This data base stores a list of chemicals and other materials that are in the RBRE laboratories. It is run on the Janus system on MULTICS. The instructions to enter this data base are:

```
(user)      . (space)csGina
(computer)  R
(user)      j (space) inventory
(computer)  J
```

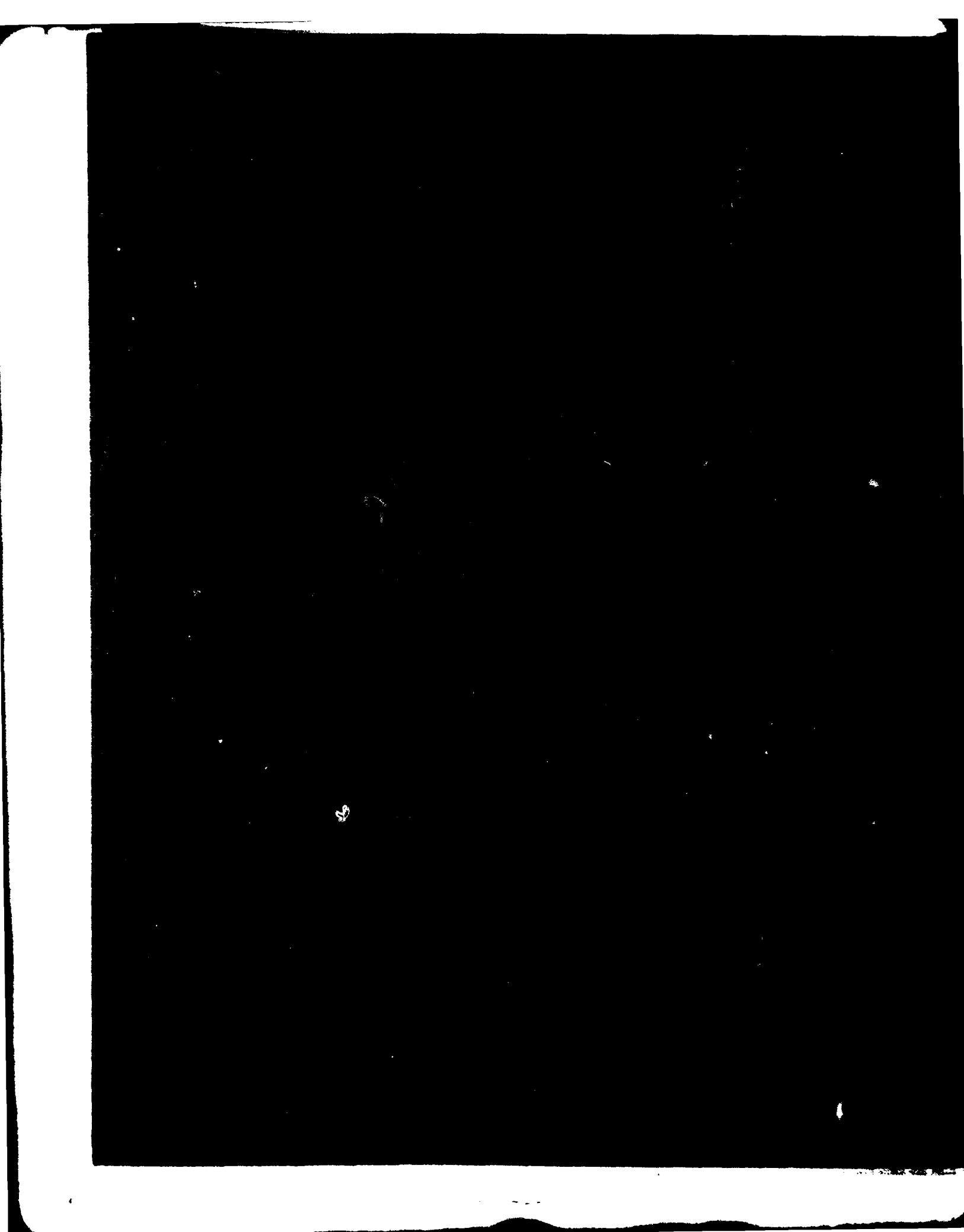
At this point you are in the Janus system. To obtain a list of the chemicals type: ds all in chemicals. To obtain a list of the other materials type: ds all in other. If you are in the chemicals file and wish to be in the other file type: chdd other.

To add on to either list type: ade. The computer will automatically respond with the next number. The operator then will type in the name of the chemical, the quantity of the chemical and the room where the chemical is stored.

To delete any chemical listings start with the last number to be deleted; command to delete any chemical (or other material) type: dle and the number of the entry.

```
To leave the Janus system type:  leave (operator)
                                   R      (computer)
                                   exit  (operator)
```

This will bring you back to MULTICS.



END

DATE
FILMED

9 — 83

DTIC