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Separations System Data Base: A Users' Manual

Revision I

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W. J. McDowell

MASTER

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SEPARATIONS SYSTEMS DATA BASE: A USERS' MANUAL. REVISION 1

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OAK RIDGE NATIONAL LABORATORY
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CONTENTS

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HIGHLIGHTS

A separations systems data base (SEPSYS), designed specifically for the retrieval of information needed in chemical separations problems (i.e., how to perform a given separation under given conditions), is described. Included are descriptions of the basic methods of searching and retrieving information from the data base, the procedure for entering records into the data base, a listing of additional references concerning the computer information process, and an example of a typical record. The initial entries are concerned primarily with liquid-liquid extraction and liquid-solid ion exchange methods for metal ions and salts; however, the data base is constructed so that almost any separation process can be accommodated.

Each record is indexed with information provided under the following fields: author; title; publication source; date of publication; organization sponsoring the work; brief abstract of the work; abstract number if the work has been so referenced, and/or abstractors initials; type of separation system used (e.g., flotation); specific or generic name of the separation agent used (e.g., acetylacetone); list of substances separated (e.g., gold, copper); qualitative description of the supporting medium or matrix containing the substances before separation (e.g., nitrate); type of literature where the record was printed (e.g., book); and type of information that the article contains. Each of these fields may be searched independently of the others (or in combination), and the last six fields contain specific key words that are listed in the report. Definitions are provided for the 36 information terms.

1. INTRODUCTION

In the processes relating to nuclear fuel reprocessing, fossil fuel utilization, resource recovery, and environmental protection connected with these, one of the questions most often asked is "How can I separate substance A from substance B out of matrix M?" Sometimes an additional constraint necessitates the use of a specific separation agent. The standard computer-searchable data bases are not indexed so that answers to such questions can be obtained directly. Because of the continuing importance of separations methods in energy production and utilization, we have undertaken to assemble the appropriate references and index them in such a way that the aforementioned questions are readily answered by a computer search of the data base. The information is stored on the Oak Ridge National Laboratory (ORNL) IBM-3033 computer system via the ORCHIS/ADSEP System.[1-3] The data base is public and can be searched through an interactive retrieval program called ORLOOK by anyone having a charge number for the ORNL system (see Sec. 2.1).

The initial entries in this data base are concerned primarily with liquid-liquid extraction and liquid-solid ion exchange methods for metal ions and salts. However, the data base is constructed so

that almost any separation process can be accommodated; for example, isotope separation, filtration, flotation, or centrifugation.

The purpose of this document is to describe the basic methods of searching and retrieving information from the data base, the process of entering records into the data base, and the listing of additional references concerning the computer information handling process.

1.1 References for Section 1

1. A. A. Brooks, private communication, May 1970.

2. A. A. Brooks, *ORCHIS Interim Technical Report - Collected Memos and Cumulative Bibliography*, ORNL/TM-3727 (August 1972).

3. A. A. Brooks, *Oak Ridge Computerized Hierarchical Information System (ORCHIS) Status Report*, ORNL-4929 (July 1973).

2. RETRIEVAL OF INFORMATION FROM THE DATA BASE

This section describes the use of a remote terminal to retrieve information directly from the SEPSYS data base. These instructions are given in a step-by-step manner, with the assumption that the user has no background in computer programming or operation. Whenever possible, specialized computer terminology has been avoided. Extensive reference has been made to a report by V. A. Singletary,[1] which is a comprehensive user's guide to the computer program ORLOOK, a program that implements the search of computer files. The novice or beginning user should have no trepidation in using the computer for searching the data base, because it is impossible to destroy or damage any of the records in the system.

In order to use the SEPSYS data base a means of communicating with the ORNL IBM-3033 computer system is needed. The hardware required is a keyboard typewriter terminal with a printing or cathode ray tube (CRT) display. The terminal must be acoustically coupled to a standard voice-grade telephone. The acoustic coupler is a small device that is wired to the terminal and connects it to a telephone via sound waves rather than wires. The telephone is a standard model and is used to connect to ("to call") the computer. In addition, the user must make arrangements with Computer Operations personnel concerning cost accounting for the computer usage and to obtain a timesharing option (TSO) user identification code and password. These arrangements can be made with ORNL Computer Systems support personnel by calling 4-5315 (for a computer services account number and a three-letter identification code) and 4-5400 (for a LOGON procedure password and allocation of on-line storage space; see COPY, Sect. 2.4.1); FTS numbers are 624-5315 and 624-5400, and the commercial numbers are (615) 574-5315 and 574-5400.

2.1 Computer Connection

To begin a search utilizing the ORLOOK program, the user dials the appropriate telephone number (below) and connects the computer via the telephone line to the terminal through the

acoustic coupler. When the hardware connections are established, the user enters the required information. (A sample search, including the starting procedure, has been included as an example in Appendix A.) The steps for access follow.

1. Turn on the terminal, set it to the on-line mode, and turn on the acoustic coupler. Set the appropriate terminal and acoustic coupler switches to "full duplex" mode. Some terminals may require "half duplex" mode. The parity setting can be either even- or no-parity modes. The odd parity mode is not supported.

2. Dial one of the following in-plant numbers: (1) 4-7600 for IBM 2741 or NOVAR compatible terminals (15 CPS); or (2) 4-7610, 4-7620, 4-7630, or 4-7640 for teletype compatible terminals receiving at a speed of 110 BAUD (10 CPS) or 300 BAUD (30 CPS). For corresponding FTS numbers add the prefix 62 (e.g., for an IBM 2741 terminal use 624-7600) to the in-plant numbers. The computer answers with a high-pitched steady tone. If the phone rings more than a few times without switching to the tone signal, the system is probably not in operation; a busy signal indicates that all the lines may be in use. In this case, the handset either can be returned to its cradle and the call can be made later or the user can try repeatedly without waiting.

3. When the steady tone is heard, place the handset properly into the acoustic coupler cradle, making sure there is a carrier wave (usually there is an indicator light labeled CARRIER). Immediately type a capital A and the return key. The purpose of the A is to initiate an automatic speed-sensing device that makes the IBM transmitting rate system compatible with the user's terminal. *All lines of terminal input must be ended with the return key for recognition.* (In the examples, the symbol ↓ has been used to show where the user is to press the return key.) The computer responds with a request that asks the user to select a system, either TSO, RECON, OR IS HELP NEEDED? After the choice is made, the computer responds with two additional requests that are used for identification and charge purposes. The computer first types ENTER USERID -, which should be answered with the one- to three-character code that has been assigned to you. The computer will then ask for the PASSWORD (a one- to eight-character code also assigned to you) that is consistent with the USERID. If the computer is satisfied with your replies, it will respond with your USERID LOGON IN PROGRESS, TIME, and DATE. Several general broadcast messages may be displayed prior to completion of LOGON. LOGON completion is indicated by the display of READY on the terminal. The terminal transmissions are now managed on the computer by the TSO program. Timesharing means that several programs (e.g., ORLOOK) may execute concurrently in the same computer memory region. Each program shares the region for a brief time interval.

4. To invoke the ORLOOK system, enter ORLOOK as a TSO command. Under ORLOOK control, only ORLOOK commands and the ORLOOK terminal interface commands are acceptable. (These commands are discussed in Sect. 2.4.) The computer will type the date, time, and perhaps a message about any recent revisions which have been made in the program. It will then ask two questions. DO YOU INTEND TO USE HARD COPY OR PRINT COMMANDS?; that is, do you intend to ask for a printed copy to be made by the computer on the line printers? (See Sect. 2.4.1 for definitions of LIST and PRINT commands.) It is anticipated that most users will not require printed output. There are three reasons for not requesting this feature during a session unless it is absolutely required: (1) the

printer data set requires system storage during the session, or until the RELEASE command is given; (2) the ORLOOK response time is slightly degraded because each terminal input or message output must be output to the printer data set; and (3) the printer data set ties up storage space until it is printed, perhaps hours later.

The second question asked by the computer concerns the makeup of the data base being sought. It will ask whether the data base being searched is PUBLIC, PRIVATE, OR OTHER, or is this ORLOOK session to be terminated by typing STOP? Because the SEPSYS data base is a public file, the answer to the second question should be PUBLIC. The terminal will then list the data bases with their file numbers until stopped or until all (over 40) have been listed. The listing of the files can be stopped by depressing the interrupt key (BREAK, ATTN, etc.). Caution must be observed when using this key because several interrupts issued consecutively will probably return control to the TSO MONITOR level (indicated by the READY message). If this occurs, ORLOOK control can be regained by entering a null line (i.e., only a return). Any other input will result in a complete loss of ORLOOK control and loss of all acquired subsets. If complete loss occurs, the user should reenter LOGON as before.

The computer will ask SELECT FILE NO. To access the SEPSYS file, the user should type in the appropriate file number. (The file number may change occasionally because of additions or deletions to the public data base files.) This answer will be acknowledged, and the terminal will also print the symbol that the computer uses to indicate that it is ready for input (for many terminals this is the period, .). A useful command to type now is LABELS, which will result in the terminal typing a list of field descriptors (see list of LABELS in Appendix A) used with this particular data set. Experienced users can start searching the data base immediately, but they should be cognizant that the field abbreviations are computer selected and may change. Therefore, an investigation of the labels table may be worthwhile.

2.2 Searching the Data Base

The file is now ready to be searched, and the terminal is waiting for a request. The ORLOOK program is constructed so that a file can be searched for only one or several key words in the stored information, or for a certain author, or journal, or even for individual words in the titles or abstracts. Two things are required to perform a search: specify what operation is to occur (e.g., LOOK), and specify a modifier (when needed) to describe what area in the record (e.g., <MATRIX>) and/or subject (e.g., ='bromide') is to be used with the command.

A command is recognized by the computer as typed, but a notation is needed for the modifiers, which are the field descriptors (or labels) and key words used for the search. A label must be entered with a less-than sign (<) before it and a greater-than sign (>) after it. (These symbols are used only for the LOOK command.) For example, in searching for authors, type <AUTHOR> or the ORLOOK generated abbreviation, in this case <AU>. (These abbreviations are assigned by the computer and are unique for each field. However, when a new field is added, the computer may need to change the abbreviations of some of the original fields to maintain their uniqueness. Therefore, the LABELS table should be consulted whenever ORLOOK is used. The complete name of the label can always be used.)

The second notation that is used is single quotation marks (' ') placed around the word or words being sought. Thus, if one were seeking the author A. B. Jones, the command would be written: LOOK <AU> = 'Jones, A.B.'. (Note that the field descriptor abbreviation has been used.)

The terminal will then display a period (ORLOOK's notice that it is waiting for a command), and the user should type END. The word END is entered at the end of the request to denote that the input information has been completed and that the search should begin. The file will be interrogated for the information *exactly* as typed between the single quotation marks, and the terminal will list the number of records meeting the specifications. Typing the command LIST AUTHOR [or LIST AU (the current abbreviation)] will produce a display of the authors of all the references found. Typing the word LIST would produce a lengthy display of the contents listing all records found (it would include all categories given under LABELS). If the number of records found is too many to list, the user can have all of them printed on the computer line printer, or the field of search can be narrowed by specifying additional modifiers (key words) to be applied to the records found. Substitution of the word PRINT for LIST causes the same material to be printed on the computer line printers if provision has been made for printing in initiating the program. A hard copy may be obtained by using the ADDRESS command (see Sect. 2.4.1 and Appendix A) even if no provision was made for this feature in initiating the program.

It should be noted that an ORLOOK search is made sequentially in the stated order of data base records. That is, if the first key-word choice produced 40 records, then these 40 records have been selected from the main file and made accessible as a group called SUBSET NO 1. The main or complete file is always called SUBSET NO 0. A subsequent search (e.g., with another key word) will interrogate only SUBSET NO 1 containing the 40 records unless a different SUBSET was specified. The new records found will be recorded in SUBSET NO 2 (if 0 records are found, then SUBSET NO 2 will be empty). To return to the main file, type SUBSET 0; the terminal will respond with a period, indicating it has returned to SUBSET 0 and is ready for the next command. The next search (of SUBSET NO 0, 1, or 2) will place the results in SUBSET NO 3, and these numbers will continue in sequence. Thus during any single session, several subsets will be generated which are distinct and separate. At any time during the session, it is possible to return to any subset for additional searches by just typing SUBSET followed by the appropriate number. A summary of the subsets created during a session may be displayed by typing REQUEST (see Sect. 2.4.1).

2.3 Terminating ORLOOK Session

To end the ORLOOK session the user types the STOP command. The terminal will type the amount of time used during the search, the time of day, and then place itself under TSO monitor control, indicated by the display of the word READY. ORLOOK can be reentered again as described in Sect. 2.1, Step 4, or other TSO systems can be used, or the session can be ended by typing LOGOFF. It is advisable, although not necessary, to wait until TSO verifies LOGOFF; it usually takes only a few seconds for a reply. The power to the terminal and to the acoustic coupler can then be turned off and the handset returned to the phone cradle. The session should *not* be terminated by "breaking" the connection (returning the handset to the cradle), because this may result in the user's session not logging off properly; however, no real harm will occur. If the connection is broken by something outside of the user's control, all of the subsets will be lost, but TSO can usually be reentered immediately by redialing the appropriate telephone number. The computer will assume this is the first LOGON attempt and will interrogate the user in the usual manner.

2.4 ORLOOK and Terminal Interface Command Descriptions

This section gives a brief description of the functions and options of the ORLOOK and terminal interface commands. The report by V. A. Singletary[1] should be read for a more detailed discussion of the capabilities of these commands.

2.4.1 *ORLOOK commands*

These commands are used to interact with the ORLOOK program and are the ones that are of importance in searching the data base. Appendix A gives examples of how these commands are to be used.

ADDRESS permits the user to have a subset printed on the ORNL computer even though a NO answer was given to the print or hard copy question (see Sect. 2.4, Step 4, and example in Appendix A). This command may also be used to change a previously specified address or remote station name.

BASES command results in a listing of the public files which may be searched by the ORLOOK program.

CANCEL permits the deletion of the last LOOK command given or all LOOK commands if CANCEL ALL is typed. It applies only to the current group of LOOK commands since the last END was given. Successive CANCELs delete LOOKs in reverse order, last to first, one LOOK per CANCEL.

COMBINE followed by two numbers results in the merging of the two subsets with these two numbers into one new subset. The original two subsets are left unchanged. If the word AND is placed between the two numbers, the new subset will include only entries that appear in both of the original subsets. The word OR placed between the two numbers causes the new subset to be a combination of both subsets except that duplicates are listed only once. The word NOT betweeen the two numbers has the effect of forming the new subset by first listing all the entries of the first numbered subset (before the NOT) and then deleting from this list any entries that also appear in the second numbered subset (after the NOT).

COPY subset number (e.g., COPY 3 for subset 3) causes the indicated ORLOOK subset to be copied to on-line storage while maintaining the ADSEP format. (Permission to use online storage can be obtained at the same time as the LOGON procedure password, see Sect. 2.) ORLOOK responds by demanding an eight-character or less name for the subset. The name must begin with a letter of the alphabet. The subset name is appended to the right of a prefix name in the format "USERID.ORLOOK.SUBSET." The complete name assigned to the data set is confirmed to the terminal. This command permits the user to save a subset for searching at another time. It can also be used to protect a subset from being lost because of a malfunction in equipment, user error, etc.

END is the command to tell the ORLOOK program that all LOOK commands for a specific search have been given and the search should be initiated. A search can be terminated by depressing the interrupt key several times; however, this action will result in a loss of all previous subsets and return of control to the TSO monitor.

LABELS command results in a listing of all labels (with their abbreviations) used with the file. These are the same LABEL terms mentioned earlier. Either the complete name or the

abbreviation can be used to specify a field, but the user must remember that the abbreviations may change. LABELS may be requested at any point in the ORLOOK session when the computer has prompted for a command (displayed a period).

LIST and *PRINT* commands are identical except in the routing of the output. LIST causes the desired information to be displayed at the terminal, whereas PRINT sends it to the ORNL computer printer. These commands are properly used only after the final data file has been reduced to a few records. Typing just the command LIST will result in a complete display of all information for each record in the selected subset. Typing LIST AU will give a list of all of the authors in the selected set; typing LIST T will give a listing of the titles. For both titles and authors one can type LIST T, AU. A listing at the terminal can be terminated by depressing the interrupt key (see Sect. 2.1, Step 4); however, a PRINT listing cannot be interrupted.

LOOK signifies that the items which follow the command are to be searched for in the stored information file. As many as ten LOOK commands can be given at one time by typing them on successive lines. A single subset will be produced. If the label is not specified for text string values (a series of up to 23 alphanumeric characters; see *Words and strings*, Sect. 2.5), data associated with all labels in each record will be searched, which can be very time consuming.

NEWBASE allows access to other public data base files by initiating a new ORLOOK session. ORLOOK responds by questioning the user as at the beginning of the initial ORLOOK session. This command can be issued at any time a command is requested. All previous subsets are lost when NEWBASE is entered.

RELEASE command tells the computer to begin printing any subsets that have been so designated and, when this operation has been accomplished, to release the disk storage space set aside for this purpose and make it available to other users.

REQUEST is a command that produces a summary table of subset creation during a session. The table includes the number of the subset, the number of records in the subset, and the key words used to generate each subset. This command can be used as many times as desired and covers the period from the initiation of the ORLOOK session.

RESET causes the ORLOOK program to ask for a new default field label for LOOK commands. Initially, the default is to ALL field labels, so that an unclassed search results from any LOOK command that does not specify a label. This default may be reset to any *one* field label or back to ALL at any time. The default permits omission of labels from the LOOK commands when (1) (set to ALL) search of all fields is desired (otherwise a separate LOOK command would be needed for each field label); and (2) (set to one label) principally one field is to be searched for several consecutive LOOK commands. Only one field at a time can be used for this command; for all other fields the labels must be specified.

STOP is the command that terminates an ORLOOK session. Termination causes all subsets not copied to on-line storage to be deleted. To copy a subset or part of a subset for a permanent record, the PRINT, ADDRESS, or COPY command (see ADDRESS, COPY, or LIST commands above) must be used before the STOP command is given. Upon completion of file cleanup, the computer returns control to the TSO MONITOR program, which is confirmed by the READY message. Once the confirmation is given, TSO commands can be entered. The LOGOFF command will end terminal communication. After LOGOFF is confirmed, the telephone can be disconnected.

SUBSET with a set number directs the search to either the entire data base file (SUBSET 0) or to a set of references already generated. ORLOOK automatically searches the last set of records created by the execution of the most recent LOOK command unless a command is given to search a different set. The sets are created and stored sequentially but may be accessed directly in any order by typing SUBSET and the set number. Only one subset can be searched at a time; however, more than one subset may be searched by merging them with the COMBINE command. Two additional modifiers, REL and ACC, may be used with the SUBSET command to create a new set. By typing SUBSET REL(A:B) the user will prepare a new subset containing the records of the main subset (SUBSET NO 0), which are located in the relative positions of A through B, where A is less than B. Typing SUBSET ACC(A:B) produces a new subset containing the records of SUBSET NO 0, which have internal record numbers A through B. These commands would permit the user to select just a few records from the data base, perhaps just the last few records in the file.

TIME results in a display of the elapsed time and main computer time used from the beginning of the ORLOOK session. The present time of day is also given in the same format of HH:MM:SS, meaning hours, minutes, and seconds.

2.4.2 *Terminal interface commands*

Several commands are available that communicate directly with the terminal ORLOOK interface program. These commands are intercepted and processed by the interface program rather than by ORLOOK. They can be entered any time ORLOOK is waiting for input. Furthermore, the manual interrupt key of the terminal can be depressed during any operation, including during a search, to enter these commands. If the interrupt key is activated during nonterminal input-output operations, a special input prompt (???) is sent to the terminal, and ORLOOK is deactivated temporarily. The interrupted ORLOOK process will not continue automatically after processing of an interface command; an end-of-line return (↓) *must* be entered for continuation. These commands are not used in searching the data base, and their definitions will not be listed here (see ref. 1 for additional information). Reports describing the TSO system may be obtained from ref. 2.

2.5 Comments

Combination of search terms. The ORLOOK program is capable of performing searches under the LOOK command based on several key words (or authors, titles, etc.) at the same time. Specifically, there are three ways of combining two or more terms for a search, which can be represented by the words OR, AND, and NOT. The use of the OR designation results in a selection of all references that contain any one or more of the terms. This method of search is indicated by two or more separate LOOK commands, and two or more separate LOOK commands always imply an OR search. Thus if the search is for key words 'a' OR 'b', the ORLOOK program will select all references that have either the key word 'a' OR the key word 'b' OR both 'a' OR 'b' assigned to them and would be written:

```
.look <label>='a'↓
.look <label>='b'↓
.end↓
```

To select all records that contain both key words 'a' AND 'b' (or all three if three terms are desired), the searcher would type the command as follows:

.look <label>='a' <label>='b'↓
.end↓

LOOK statements in sequence on the same line carry an implied AND between statements. LOOK statements in sequence on separate lines carry an implied OR between statements. The NOT restriction can be imposed once specifications are completed for the AND/OR relations. In performing a search of the set of references chosen (SUBSET 0, SUBSET 1, etc.), the computer first checks all the references for fit to the conditions specified by the AND/OR combinations which appear to the left of the NOTs. Each reference that meets these specifications is then checked against the AND/OR combinations that appear to the right of NOT. If any of the NOT items or combinations appear in a particular reference, that reference is deleted from the new subset that is being formed. An example of the use of the NOT command is:

.look <label>='a'↓
.look <label>='b'↓
.look not<label>='c'↓
.end↓

In this example a group of records will be assembled which contains 'a' OR 'b' as key words. This group will be searched for all records that contain the key word 'c', and these records will be rejected. The final subset will consist of those records that contain key words 'a' OR 'b' but NOT 'c'. Note that a NOT command is implied in every subsequent LOOK statement on the same line.

Rejected message. Occasionally the computer will reject a perfectly good message, possibly due to noise on the telephone line. If the computer replies with an error message, the user should check his input for correctness and then retype the command.

Typing errors. There are three methods for deleting a line if an error is made in typing. The entire line can be discarded by: (1) depressing the interrupt key, (2) typing an at (@) symbol before the RETURN key (↓) is depressed, and (3) typing a CONTROL-X (holding the CTRL key down while depressing the X key) on Teletype model terminals. When using the LOOK command, the previous line can be deleted by using the CANCEL command (see Sect. 2.4.1).

Words and strings. The ORLOOK program is actually written to search for a particular string of characters, that is, whatever is between the single quotation marks. A string is any combination of letters, special symbols, numbers, and spaces. This string can represent complete words, parts of words, or several words, but it is limited to a total of 23 characters and spaces. Each LOOK command may contain 23 characters and spaces between the single quotation marks. The at (@) symbol is not permitted because it is used for command line deletion.

2.6 Fields and Key Words

The SEPSYS data base contains information under specific headings called fields. The labels of these fields are easily accessible for listing by typing the LABELS command when using the

ORLOOK program. To simplify the scope of questions formulated for searching, and thus to increase the usefulness of the data base, the key words used to input information into six of the fields, SEP SYS, SEPAGENT, SEP SUB, MATRIX, LIT TYPE, and INFOTYPE, have been carefully selected and limited. These key words are listed in Sect. 4. Definitions have been included in Sect. 3.2.13 for the INFOTYPE terms to assist in reconciling the searcher's own definitions with those of the abstractors. The key word limitation is a limitation only on *input* to the data collection (see Sect. 3.). The user can expect the best results if all questions are put in the accepted terms, because these were the ones used by the abstractors. However, a search can be made for any string of characters not exceeding 23 in length, whether it is included in the accepted lists or not. The <ABSTRACT> field is an especially useful area in which to search for an unspecified term. However, multiple trials may be needed in searching this field because many of the commonly used words have been abbreviated to conserve computer space.

2.7 References for Section 2

1. V. A. Singletary, *An On-Line Conversational Retrieval System for Orchis Text-Oriented Data Bases User's Manual*, ORNL-4951, Rev. 1 (May 1975).

2. Computer Librarian, Computer Sciences Division, Oak Ridge National Laboratory, Oak Ridge, TN 37830.

3. INSERTION OF INFORMATION INTO THE SEPARATIONS SYSTEMS DATA BASE

Responsibility for adding to and maintaining the SEPSYS data base rests primarily with the Separations Systems Research Group of the Chemical Development Section, Chemical Technology Division, ORNL; however, others are invited to contribute. Comments or questions concerning the data base should be directed to one of the members of the Separations Systems Research Group.[1]

The following section describes the standard method of abstracting and key wording that allows searches to answer questions such as "How would one separate a substance from another out of a certain matrix?" as well as searches that retrieve information by the usual author, journal, sponsor, and abstract number identifications. A copy of an input form has been included (see Sect. 4), as well as a description of each of the main fields and the information to be placed in each.

The last six fields, beginning with <SEP SYS>, contain carefully chosen lists of terms. It is intended that adherence to these specific terms in indexing will allow the searcher to formulate the most efficient and effective questions (i.e., LOOK commands). *Remember: do not substitute synonyms. The computer cannot recognize synonyms.* At the same time, no list is either perfect or final. Hence the following additional procedure is intended to be used for adding new terms to the data base. When one or more terms appear to be strong candidates for subsequent use, they may be added to the field listing enclosed in square brackets. Bracketed terms will be collected and tabulated by the editor - information specialist in charge of input to the data base, and such terms will be considered for addition to the acceptable term list at appropriate intervals.

3.1 Fields

Each main heading under which information is to be stored is called a "field." For this data base, the names (LABELS) for the fields are: AUTHOR, TITLE, SOURCE, DATE, ORGANIZ, ABSTRACT, ABST ID, SEP SYS, SEPAGENT, SEP SUB, MATRIX, LIT TYPE, and INFOTYPE. These names have been assigned by members of the Separations Systems Research Group and will not be changed by the computer. Each field may contain as much information as necessary; however, the amount of information stored should be kept to the minimum to save time and to avoid excessive storage charges.

3.2 Contents of Fields

A description of the material to be included in each field follows. The abstractor should use as many terms as are needed to describe the field. If several terms are used, the abstractor should separate each one by a semicolon followed by a space. Capitalization of the terms has no significance because all records and all key words are capitalized by the ORLOOK program before interrogation. In several of the fields, abbreviations will be useful and necessary. When there is doubt as to the preferred abbreviation for a journal, country, etc., the abstractor should refer to the Chemical Abstracts Service Source Index (CASSI)[2] and references therein for guidance. The states in the United States are to be indexed using their standard post office abbreviations.

3.2.1 *<AUTHOR>*

Personal author. Enter the author of the paper with last name first, followed by a comma, a space, and the initials with periods, but no space between initials. Separate multiple authors by semicolons. Do not use the word "and" before the name of the last of two or more authors. List all authors; do not use *et al.* This method will enable the searcher to locate a specific author whether he is the first, second, third, or any other in the author list order. If the item is a book chapter with identified authors, enter these as authors and also enter the book editor (see below). Diacritical marks are unavailable and must not be included as input information. Diagraphic letters should be transliterated into characters that are available on a typical computer terminal (see Appendix B). Treatment of compound names varies with nationality of the author and should be written as given in the original publication.

Collaborator. Many cosponsored research projects result in manuscripts with confused authorships. If it is evident that a person has made a major contribution to the research, even though he is not called an author, include his name in the author field followed by (Collab.).

Committee report. In dealing with a committee report, name the organization and then the committee. Do not duplicate information given in the ORGANIZ field.

No author given. If a paper lists no author, place the word "unknown" in this field.

Editor. To designate the editor of a book or of proceedings, put (Ed.) after the editor's name. If citing a part of a larger work, give the author for the part (if there is one).

Translator. Give the name of the translator followed by the word (Translator) in parentheses. When both the original author and the translator are known give the translator last.

Examples:

Personal author

Brown, J.M.,Jr.

Jones, B.A.; Russell, C.M.; Schnook, H.J.,III

Collaborator

Sollins, P.; Edwards, N.T.(Collab.)

Committee report

Committee on Environmental Protection (National Research Council would appear in the <ORGANIZ> field).

Editor

Berg, G.D.(Ed.); Brown, S.T.(Ed.)

Translator

Jones, O.R.; Smith, L.A.(Translator)

Jermain, R.V.(Translator)

3.2.2 *<TITLE>*

For topical reports and journal articles the title is obvious. If a single chapter of a book is being referenced, the abstractor should give the chapter title followed by a chapter number in arabic numerals, and the title of the book should be given under <SOURCE>; however, the title of the book should be given under <TITLE> if it is referenced in its entirety. The special instructions given for insertion of chemical and mathematical expressions in the ABSTRACTS field (Sect. 3.2.6) also applies for titles.

3.2.3 *<SOURCE>*

This field should contain the source or point of origin of the original reference. If the material was published in a journal, the name of the journal, volume number together with (when appropriate) the issue number in parentheses, and inclusive page numbers should be given. The volume and page numbers should be preceded by V and pp, respectively, and separated by a comma. A report number should be listed for work printed in a report, a conference number if proceedings of a conference, the name of a book if a book, and if a patent the country where patented and the patent number. References from a book should include the publisher and place of publication. Abbreviations should follow the guidelines as set forth in CASSI.[2]

Examples:

Journal

J. Inorg. Nucl. Chem. V27(5), pp1111-1116

Conference

Proceedings of the 14th ERDA Air Cleaning Conference, CONF-760822

Book

The Solvent Extraction of Metal Chelates (Book), Pergamon Press, distributed by the Macmillan Company, New York

Patent

US Patent No 4,012,209

Report

ORNL TM-2737

3.2.4 *<DATE>*

The abstractor should list the month (when appropriate) and the year of publication in this field. The first three letters of each month will be used, followed by a space, and then the year (Dec 1976; May 1979). No punctuation marks are to be used.

3.2.5 *<ORGANIZ>*

This identifies where the work was done and, if pertinent, the sponsoring organization. For example, Oak Ridge National Laboratory would not require "DOE," but the University of Tennessee would require it if the work was sponsored by DOE.

Examples:

Oak Ridge National Laboratory, Oak Ridge, TN
Research Lab., Metallurgie Hoboken-Overpelt, Olen, Belgium

3.2.6 *<ABSTRACT>*

Content. The abstract should be a concise statement, in a single paragraph, of the essence of the document. It should summarize the major results and conclusions. When data sets are described, the methods, instruments, and/or techniques must be included to allow the user to correctly interpret the data.

Abstracts are of two general types: indicative and informative. The indicative abstract only describes the kind of information contained in the document; the informative abstract actually presents relevant information from the document. Informative abstracts should be written whenever possible.

The abstract should not contain reference numbers or illustration references. A necessary reference to other work should be given as a citation within the abstract.

Insertion of chemical and mathematical expressions. Many abstracts will contain chemical formulas, equations, Greek symbols, and other expressions which can be written in several ways. To be as consistent as possible in the insertion of such terms, we have set some guidelines that should be followed in placing these expressions into the data base.

1. Subscripts are to be written without special notation if their meanings are clear; for example, H2SO4, CaCl2, H3PO4. For more complicated expressions the abstractor should use parentheses as described below.

2. Parentheses are to be used in the normal manner to indicate that an expression is to be taken as a single entity; for example, Ca(OH)2, Fe3(PO4)2.

3. Superscripts are designated by placing the symbol ** before the item or expression that is to be the superscript; for example, (b**2 - 4ac)**0.5, e**(-Ea/kT).

4. The valence or charge of cations and anions is to be indicated by placing the appropriate number and a plus (+) or (-) sign in parentheses following the symbol. The ** is used to indicate a superscript; for example, Fe**(3+), NiCl4**(2-), PO4**(3-). Oxidation states may be indicated by Roman numerals; for example, Pu(IV), U(VI), and V(V).

5. The symbol E is used to represent times ten to the power; for example, 100 = 1E2, 0.001 = 1E-3, and 0.00100 = 1.00E-3.

6. Natural logarithms are to be represented by ln and common logarithms by log; for example, ln 10 = 2.303, log 10 = 1.000.

7. The letter e is used to represent the number 2.718...

8. Characters that have no counterpart on the keyboard will be spelled out; for example, μ = mu, γ = gamma, α = alpha.

9. Brackets are to be used to indicate concentrations in equilibrium expressions and to prevent confusion when several series of parentheses would be required.

10. Temperatures are presumed to be in degrees Celcius unless otherwise noted.

Examples:

M**(2+)(aq) + 2Cl**(-)(aq) + 2R4NCl(org) = (R4N)2.MCl(4)(org)

k(for above eq) = [[(R4N)2.MCl4](org)]/[[R4NCl](org)]**2
[[[Cl**(-)]gamma(-)](aq)]**2[[[M**(2+)]gamma(+)](aq)]

Debye-Huckel expression; log(gamma +-) = |z+z-|AI**0.5/(1 + BaI**0.5)

3.2.7 *<ABST ID>*

If an abstract is available in a standard abstract service, for example, Energy Research Abstracts or Chemical Abstracts, place that abstract number with the identifying prefix such as "ERA" or "CA" in this field. If the record is indexed in more than one abstract service, use both prefixes and numbers, separating the two service designations by a semicolon and a space. In addition, the abstractor should place his initials (preferably 3 with no punctuation marks) following the abstract number or numbers, again separated by a semicolon and a space. If the record was abstracted from the original paper, the abstractor should place his initials first in this field followed by the abstract references.

Examples:

<ABST ID> CA86:12345a; ACB
<ABST ID> CA86:195899c; ERA2:6663; ACB
<ABST ID> ACB; ERA4:52638

3.2.8 *<SEP SYS>*

This field should contain at least one term, chosen from the accepted list as given in Sect. 4, to describe the separation system used.

Examples:

<SEP SYS> Distillation
<SEP SYS> Gas-Liquid; Chromatography

3.2.9 *<SEPAGENT>*

Terms should be chosen from the input form (see Sect. 4) to indicate the separation agent used. Care should be taken to list the agent that actually transfers the substance from one phase to the other and not an agent that simply adjusts conditions in one phase or the other so that transfer can occur. Many separation agents can be described with several terms and should be so listed, each term to be separated with a semicolon and a space.

Example:

<SEPAGENT> TBP; Ester; Phosphate-org

3.2.10 *<SEP SUB>*

Each separated substance should be listed in this field. Names are used for the elements, radicals, ions, and molecules. Substances collected in the separation system (i.e., extracted or held on column or filter) are entered as is. Substances rejected (i.e., not extracted, not held on column or filter) are followed by a space and a minus sign (-). Substances that can optionally be either collected or rejected, are followed by a space, a comma, and a minus sign (,-). Substances that typically split and cannot be effectively separated are followed by a space, a plus, and a minus sign (+-). Materials for which the information is considered doubtful (by author or abstractor) should be preceded by a question mark (?). The valence of an element may be indicated by adding, immediately after the element's name, the valence in Roman numerals enclosed in parentheses (see example below). Multiple entries in this field should be separated by placing semicolons after each one and preceding the next one with a space. Accepted terms for this field are listed in Sect. 4.

Example:

<SEP SUB> Thorium; Uranium; Iron(III)+-; Chloride

3.2.11 *<MATRIX>*

The matrix system from which the substance is separated is to be listed in this field. For example, in air filtration the matrix would be "Gas; Air"; in metal ion extraction or ion exchange from a sulfuric acid leach, "Aqueous; Acid; Salt; Sulfate"; or from an ammonium carbonate leach, "Aqueous; Ammoniacal; Salt; Carbonate." In flotation from an ore, the matrix would be, "Ore," (and also "Silicate," "Oxide," or "Sulfide," etc., if appropriate). Accepted terms are listed in Sect. 4.

3.2.12 *<LIT TYPE>*

Terms included in this field should specify the type of reference in which the article was published. This field has been limited to the terms given on the input form (see Sect. 4).

3.2.13 *<INFOTYPE>*

The principal types of information to be found in the original publication, as indicated by the available abstract or paper, are included in this field. Table 3.1 lists the accepted terms and their definitions (also see Sect. 4).

Table 3.1. Definitions of information terms (INFOTYPE)

Term	Definition
Acidity effect	Variation in separation or rate of separation of a substance with respect to a change in acid concentration, at generally greater than 0.01 *M* (see pH effect).
Agent compn. effect	A comparison of the separation effectiveness of two or more separation agents (compositions). An example is a comparison of TBP with TOPO.
Agent concn. effect	Variation of the separation effectiveness with respect to the separation agent concentration.
Analytical method	A separation technique used as part of an analytical procedure.
Antagonism	A combination of two substances produces a separation less than the sum of their individual effects (see Synergism).
At. no. effect	Variation in separation or rate of separation for several substances with respect to their atomic numbers.
Bibliography	A list, often with descriptive or critical notes or writings relating to methods of separation.
Capacity	Denotes the maximum concentration of a separated substance obtainable in the separating agent.
Coefficient	The extraction or distribution coefficient is given or discussed.

Table 3.1. (continued)

Term	Definition
Constant	Used where equilibrium, stability, instability, formation, or rate constants are presented.
Decontamination factor	A ratio of two substances (e.g., ratio of contaminant to desired substance) in the product stream of a separation system vs their ratio in the entrance stream.
Device	A unique or distinctive apparatus is used in the separation.
Diluent compn. effect	Variation of the separation effectiveness of an agent when the diluent type (composition, structure) is changed. An example is the comparison of *n*-hexane with benzene.
Flowsheet	A description of the steps in a practical process is given by words and/or diagram.
Interfacial phenomena	Contains information about interaction at or transport through the boundary between two phases that is significantly affected by the nature of the boundary (including the thin in-phase regions adjacent to and influenced by the boundary).
Intensive properties	Physical characteristics of one or both of the individual phases of the system are given. Examples include density, viscosity, dielectric constant, and spectra.
Isotherm	Used where a line, curve, equation, or tabulation expresses a relationship between the concentration of a substance present in one phase as a function of its concentration in the other phase at equilibrium.
Kinetics	The velocity or rate of separation is discussed. The rate constant may or may not be given.
Mathematical modeling	The results are represented by algorithms, mathematical equations, etc.
Matrix compn. effect	Variation in separation or rate of separation of a substance with respect to a change in matrix components.
Matrix concn. effect	Variation in separation or rate of separation of a substance with respect to a change in matrix concentration.
Mechanism	Used where an attempt has been made to ascertain the actual stages through which the reactants have passed to produce the final products.
pH effect	Variation of the separation or rate of separation of a substance with respect to a change in acid concentration, generally at less than 1 *M*(see Acidity effect).

Table 3.1. (continued)

Term	Definition
Pressure effect	Variation of the separation or rate of separation of a substance with respect to changes in pressures.
Process	A method has been developed for accomplishing a chemical manufacturing operation, separation, purification, etc.
Review	Contains little or no new experimental data. May present new insight into interpreting earlier data and/or may give a historical discussion of previous work. This category should be interrogated separately when searching for separated substances.
Sepn. degree	The relative qualitative and/or quantitative distributions of two or more substances are given.
Sep. sub. concn. effect	Variation in separation or rate of separation of a substance with respect to a change in its concentration.
Solubility	The maximum concentration at saturation of a substance in a mixture of substances which are chemically or physically homogeneous throughout. In liquid-liquid extraction systems the term (1) means avoidance of third phase formation, (2) means solubility of extractant in diluent, (3) means solubility of each phase in the other, and (4) does not mean capacity of the organic phase for the extracted species.
Stoichiometry	Equilibria, chemical equation, and chemical species are discussed.
Synergism	A combination of two substances produces a separation greater than the sum of their individual effects (see Antagonism).
Temp. effect	Variation of the separation or rate of separation of a substance with respect to changes in temperature.
Thermodynamics	The concepts of chemical potential, activity, and activity coefficient are used to obtain or explain equilibrium constants. Heats of reaction or formation or free energies or entropies of the reactants or products are calculated. Heat transfer studies are also included.
Theory	Used where a hypothesis presenting a concise systematic view of a separation system is given.
Transferred sub. interaction	Variation in separation or rate of separation of one substance with respect to the modification of the separation agent by the presence of another separated substance.
Valence effect	Variation of the separation or rate of separation of a substance with respect to changes in its valence.

3.3 References for Section 3

1. Members of the group are: C. F. Coleman, W. J. McDowell, B. A. Moyer, J. W. Roddy, and R. R. Shoun. They may be reached by calling (615) 524-6714 or FTS 624-6714; or by mail at:

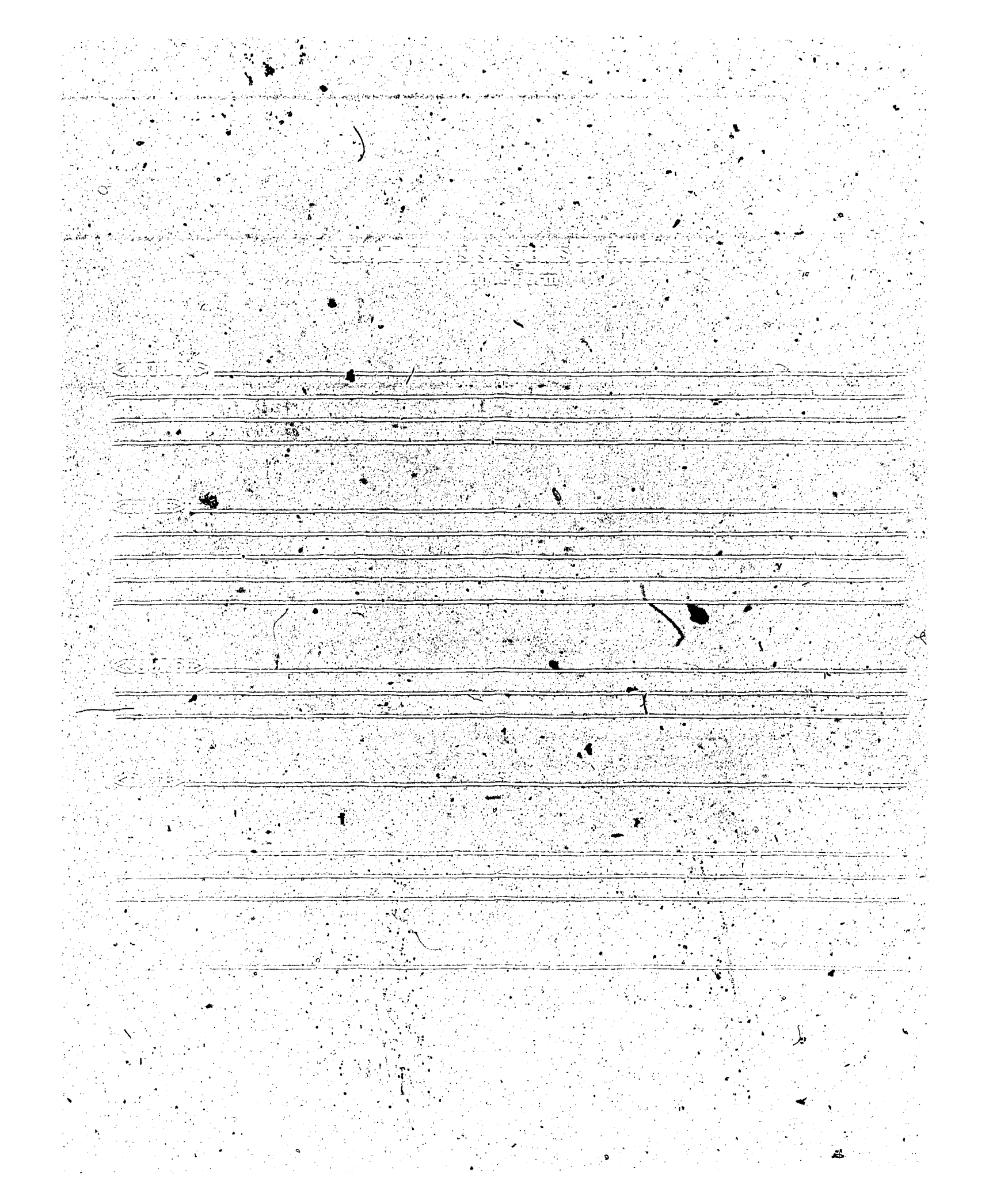
   Oak Ridge National Laboratory
   P.O. Box X
   Oak Ridge, TN 37830

2. Chemical Abstracts Service Source Index, Chemical Abstracts Service, P.O. Box 3012, Columbus, OH 43210.

4. INPUT FORM

The input form is a folder containing 4 pages divided into 13 field descriptors with space following each for the required information. Acceptable terms for the last six fields are listed in alphabetical order and may be circled or highlighted. Great care should be taken in choosing the correct terms to use. A space is provided in which an abstract may be written or in which a copy of the original abstract, with appropriate editing, may be attached. An example of an input form follows.

Blank.



[NOTE TO COMPUTER PERSONNEL]
(If more than one term per field has been selected by the abstractor, separate the terms with a semicolon followed by a space.)

CAREFULLY CIRCLE OR HIGHLIGHT THE APPROPRIATE TERM OR TERMS FROM EACH TABLE

<SHIP SYS>

5. APPENDIX A. Sample ORLOOK Session

The following section lists an example of a typical search of the SEPSYS Data Base. An attempt has been made to include most of the ORLOOK commands. Declarations made by the computer are capitalized, and those typed by the user can be in either upper or lower case. For this example the user's input has been given in lower case. Explanatory comments are given in brackets ([ ]) following most of the statements to help clarify their meaning. Capital and lower case have been used in the explanations in a similar manner. Depression of the return key by the user is indicated by the symbol ↓.

A↓
[user initiates the speed sensing device of the computer system (see Sect. 2.1, Step 3), and prods computer for additional information.]

SELECT A SYSTEM, THEN PROCEED EXACTLY AS IN PAST TO COMPLETE LOGON.
R=RECON, T=TSO, OR TYPE H FOR HELP
[COMPUTER IS ASKING WHICH SYSTEM USER DESIRES TO ACCESS.]

t=tso↓
[user selects the tso system.]

ENTER LOGON OR RECON
[COMPUTER IS ASKING AGAIN WHICH SYSTEM IS DESIRED. (IN ANOTHER WAY.)]

logon↓
[user has selected the tso system.]

IKJ56700A ENTER USERID -
[COMPUTER ASKS FOR IDENTIFICATION CODE.]

abc↓
[user gives identification code (this example is fictitious.)]

ENTER PASSWORD FOR ABC -
[COMPUTER ASKS FOR PASSWORD THAT CORRESPONDS TO IDENTIFICATION CODE.]

defghj↓
[user gives password. (this example is fictitious.)]

ABC LOGON IN PROGRESS AT 14:11:21 ON FEBRUARY 29, 1980
ABC: ASSIGNED TO REGION(04,270K,USERS=5) LINE(051) VOLUME (TSOLB2)
[MESSAGES AND ADDITIONAL INFORMATION FROM THE COMPUTER. BECAUSE THERE ARE FIVE USERS IN THE SAME REGION, INTERACTION TIME MAY BE SLOW. THE LINE NUMBER 051 AND VOLUME NUMBER MAY BE USEFUL IF THE USER IS DISCONNECTED FROM THE COMPUTER.]

READY
[LOGON HAS BEEN COMPLETED AND THE COMPUTER IS READY FOR A COMMAND.]
[the user is now interacting with the tso system.]

ORLOOK↓
[user selects the ORLOOK system.]

DATE = 02-29-80 TIME NOW = 14:12:58
////////// NEW VERSION ORLOOK 10-19-78 //////////////////////////

DO YOU INTEND TO USE HARD COPY OR PRINT COMMAND? YES/NO: no↓
[COMPUTER INTERROGATES USER CONCERNING TYPE OF OUTPUT DESIRED, and user responds that he does not wish a permanent copy. (see use of ADDRESS command.)]

DEFAULT AND SPECIFIED HASP CONTROLS:
SYSOUT FORM(1001)
[THESE STATEMENTS WOULD BE USED BY THE COMPUTER IF YES WERE GIVEN TO THE ABOVE QUESTION. THE COMPUTER WOULD ASK FOR A MAILING ADDRESS WHICH WOULD BE PRINTED FOLLOWING THE LAST LINE.]

DATABASE PUBLIC/PRIVATE/OTHER/STOP ? public↓
[COMPUTER ASKS WHAT TYPE OF DATA BASE WILL BE SEARCHED, and user responds that the data base is public.]

FILE NO	DATABASE
1	NUCLEAR WASTE ISOLATION
2	DSRS NON-WELD MISCELLANEOUS DATABASE
3	RMIC REVIEWS, COMPILATIONS, AND BIBLIOGRAPHIES
4	FIREBASE
5	COAL TECHNOLOGY
6	RMIC REFRACTIVE INDEX BIBLIOGRAPHY
7	NUMERIC GEOGRAPHIC AND SPATIAL DATA FILES
8	GYPSY MOTH CITATIONS
10	STRIPED BASS
11	TRANSPORATION TECHNOLOGY LEGISLATION
12	CARBON CYCLES AND CLIMATE
14	US FOREST SERVICE WILDLANDPLANNING–PLANBASE (BIBLIOGRAPHY)
20	ENVIRONMENTAL ASPECTS OF THE TRANSURANICS
21	THERMAL EFFECTS
22	URANIUM RESERVES AND RESOURCES
23	RADIOLOGICAL MODELING
24	FOREST SERVICE WILDPLANNING-PLANBASE (ABSTRACTS)
25	CAD PUBLICATIONS INVENTORY
27	SMALL COMPUTER INVENTORY
28	ORCHIS DATABASE INVENTORY
29	SEPARATIONS SYSTEMS
30	HEALTH PHYSICS INFORMATION SYSTEM
31	CRYSTAL GROWTH BIBLIOGRAPHY

<REAGENT>

Acetylacetone
Adsorbent
Alcohol
Aliphatic solvent
Alumina
Amide
Amine
Amine oxide
Aniline
Antipyrine
Aromatic solvent
Arsenic compound
Azo compound
Bidentate extractant
Carbamate
Carbazone
Carbitol
Carbon
Carboxylic acid
Chloroform
Complexant
Diantipyrylmethane
  use DAPM
Di(2-ethylhexyl)phosphoric acid
  use HDEHP
Diketone
Dye
Electrode
Ester
Ether
Halonydrocarbon
Heterocyclic compound
Hexone
  use MIBK
Hydrocarbon
Hydroxamic acid
Hydroxyoxime
Inorganic acid
Inorganic base
Inorganic compound
Inorganic ion exchanger
Isopropyltropolone
  use IPT
Ketone
Macrocyclic compound
Membrane
Mercaptan
Mesityl oxide
Metal oxide
Methyl isobutyl ketone
  use MIBK
Mica
Molecular sieve
Neutral extractant
Nitrile
Nitro compound
Oil
Organic acid
Organic base
Oxidant
Oxime
Oxine
Phenol
Phosphate-org
Phosphinate
Phosphine oxide
Phosphinic acid
Phosphite-org
Phosphonate
Phosphonic acid
Phosphoric acid-org
Phosphorus ester
Precipitant
Primary amine
Pyrazoline
Pyridine
Pyrophosphate-org
Pyrophosphoric acid-org
Pyrrolidine compound
Quat. ammonium compound
Reductant
Resin
Secondary amine
Silicate
Sulfide-org
Sulfonate
Sulfone
Sulfonic acid
Sulfoxide
Sulfur compound-org
Tertiary amine
Thenoyltrifluoroacetone
  use TTA
Thiophosphate-org
Thiophosphoric acid-org
Tin compound-org
Trialkylphosphate
Trialkylphosphine oxide
Tributylphosphate
  use TBP
Trioctylphosphine oxide
  use TOPO
Trioctylphosphine sulfide
  use TOPS
Urea compound
Water
Xanthate
Zeolite

<INFOTYPE>

Acidity effect
Agent compn. effect
Agent concn. effect
Analytical method
Antagonism
At. no. effect
Bibliography
Capacity
Coefficient
Constant
Decontamination factor
Device
Diluent compn. effect
Flowsheet
Intensive properties
Interfacial phenomena
Isotherm
Kinetics
Mathematical modeling
Matrix compn. effect
Matrix concn. effect
Mechanism
pH effect
Pres. effect
Process
Review
Sepn. degree
Sep. sub. concn. effect
Solubility
Stoichiometry
Synergism
Temp. effect
Thermodynamics
Theory
Transferred sub.
  Interaction
  use TSI
Valence effect

<LITTYPE>

Bibliography Book Conference Journal Other Patent Thesis

CAREFULLY CIRCLE OR HIGHLIGHT THE APPROPRIATE TERM OR TERMS FROM EACH TABLE

<SEP SUB>
(IN ADDITION TO BINARY -IDES)

Acetate	Chromium	Lanthanides	Phosphate	Tellurium
Actinides	Cobalt	Lanthanum	Phosphorus	Terbium
Actinium	Copper	Lawrencium	Platinum	Thallium
Aerosol	Curium	Lead	Plutonium	Thiocyanate
Alcohol	Cyanide	Lithium	Polonium	Thorium
Alkali	Dysprosium	Lutetium	Polycyclic aromatic	Thulium
Aluminum	Einsteinium	Magnesium	hydrocarbons	Tin
Americium	Erbium	Manganese	use PAHs	Titanium
Ammonia	Europium	Mendelevium	Potassium	Transplutonium,
Ammonium	Fermium	Mercury	Praseodymium	use TPUs
Anion	Fission products	Metal	Promethium	Tungstate
Antimony	use FPs	Molybdate	Protactinium	Tungsten
Argon	Fluorine	Molybdenum	Radium	Uranium
Arsenic	Francium	Neodymium	Radon	Vanadium
Astatine	Gadolinium	Neon	Reagent	Water
Barium	Gallium	Neptunium	Rhenium	Xenon
Berkelium	Germanium	Nickel	Rhodium	Ytterbium
Beryllium	Gold	Niobium	Rubidium	Yttrium
Bismuth	Hafnium	Nitrate	Ruthenium	Zinc
Boron	Helium	Nitrite	Samarium	Zirconium
Bromine	Holmium	Nitrogen	Scandium	
Cadmium	Hydrocarbon	Nitrogen oxides	Selenium	______
Calcium	Hydrogen	Nobelium	Silicon	
Californium	Indium	Organic acid	Silver	______
Carbon	Inorganic acid	Organic base	Sodium	
Carboxylate	Inorganic base	Organics	Strontium	______
Cation	Iodate	Osmium	Sulfate	
Cerium	Iodine	Oxygen	Sulfur	______
Cesium	Iridium	Palladium	Sulfur oxides	
Chlorine	Iron	Perchlorate	Tantalum	______
Chromate	Krypton	Phenol	Technetium	

<MATRIX>

Acetate	Bromide	Gas	Neutral	Perchlorate	Solvent refined coal
Acid	Carbonate	Glass	Nitrate	Phosphate	use SRC
Air	Chloride	Glycolate	Nitrite	Plastic	Sulfate
Alcohol	Citrate	Halide	Ore	Reductant	Sulfide
Ammoniacal	Coal	Iodate	Organic	Residuals	Sulfite
Aqueous	Complexant	Iodide	Organic anion	Resin	Tartrate
Base	Cyanide	Lactate	Oxalate	Salt	Thiocyanate
Borate	Fluoride	Metal	Oxidant	Silicate	
[illegible]	Formate	Molten salt	Oxide		

[COMPUTER IS LISTING THE PUBLIC DATA BASES AVAILABLE. REMEMBER THAT THE FILE NUMBERS ARE SUBJECT TO CHANGE FROM TIME TO TIME.]

!

[user terminates listing of data bases by depressing the interrupt key. the listing can be stopped while or after the first file is given.]

SELECT FILE NO: 29↓
[COMPUTER ASKS USER TO SELECT A FILE, and user selects the separations systems file.]

29 SEPARATIONS SYSTEMS
FILE NAME: SEPARATIONS SYST ** LAST UPDATE ON: 09-05-78
[COMPUTER LISTS FILE NAME SELECTED BY USER AND LAST TIME FILE WAS UPDATED.]

COMMENTS:
SEPARATIONS SYSTEMS
[THIS AREA WILL BE USED TO INFORM USERS OF THE DATA BASE OF CHANGES AND IMPROVEMENTS IN THE SYSTEM.]
[THE DATA BASE IS READY FOR SEARCHING.]

.labels↓
[NOTE PERIOD PLACED BY THE COMPUTER, INDICATING THAT IT IS WAITING FOR A COMMAND. user asks for a listing of the field descriptors.]

LABELS(ABBREV)	MODE	TYPE
AUTHOR(AU)	TEXT	LIST
TITLE(T)	TEXT	LIST
SOURCE(P)	TEXT	LIST
DATE(D)	TEXT	LIST
ORGANIZ(O)	TEXT	LIST
ABSTRACT(AB)	TEXT	LIST
ABST ID(A)	TEXT	LIST
SEP SYS(SE)	TEXT	LIST
SEPAGENT(SEP)	TEXT	LIST
SEP SUB(S)	TEXT	LIST
MATRIX(M)	TEXT	LIST
LIT TYPE(L)	TEXT	LIST
INFOTYPE(I)	TEXT	LIST

[COMPUTER LISTS FIELD DESCRIPTORS AND THEIR CURRENT ABBREVIATIONS. MODE INDICATES THE STYLE OF MATERIAL IN THE DATA BASE, WHETHER NUMERIC, INTEGER REAL TEXTUAL OR NUMERIC FORMAT, AND TEXTUAL FORMAT. THE TYPE CAN BE EITHER STRUCTURED OR LIST.]

.look <sep sub>='plutonium' 'thorium'↓
[in this look command the user asks for a search of plutonium and thorium as a separated substance, which requires that each reference must contain both plutonium and thorium.]

.look <s>='uranium'↓
[the user also wants to include in the same subset all references that have uranium as a separated substance, regardless of whether they contain plutonium and thorium. note that the abbreviation was used for the field name in this command.]

.look <s>='fps'↓
.cancel↓
[the user cancels the third look command because he failed to use the desired not restriction.]

.look not<s>='fps'↓
[by using the not restriction in the last look command, the user will eliminate all records that have fission products as a separated substance. this command will eliminate only those records that have been inputted with the term 'FPs'. records listed under the specific element symbols will not be deleted.]

.end↓
[the user completes the series with an end.]

SEARCHING SUBSET NO 0
[COMPUTER IS SEARCHING THE ENTIRE FILE.]

1284 DOCUMENTS IN FILE
[THERE ARE 1284 DOCUMENTS IN THE SEPARATIONS SYSTEMS DATA BASE FILE.]

ANSWERS IN SUBSET NO 1
324 DOCUMENTS IN RESULT
[THE COMPUTER HAS FOUND 324 DOCUMENTS CONTAINING BOTH PLUTONIUM AND THORIUM, OR URANIUM, AND NOT CONTAINING FISSION PRODUCTS AS SEPARATED SUBSTANCES.]

.look <sep>='tbp'↓
.end↓
[user ask how many of the records in subset 1 have tbp as the separation agent.]

SEARCHING SUBSET NO 1
ANSWERS IN SUBSET NO 2
56 DOCUMENTS IN RESULT
[COMPUTER HAS SEARCHED SUBSET NO 1 FOR TBP AND HAS FOUND 56 DOCUMENTS THAT CONTAIN TBP AS THE SEPARATION AGENT AND HAS PLACED THEM IN SUBSET NO 2.]

.subset 1↓
[user wants to search subset 1 again.]

.look <sep>=topo↓
INVALID OR MISSING DELIMITERS
THIS LOOK COMMAND IGNORED
[user neglected to place single quotation marks around the modifying word topo that was being sought. COMPUTER REJECTED THE COMMAND.]

.look <sep>='topo'↓
.end↓
[user tries the search again.]

SEARCHING SUBSET NO 1
ANSWERS IN SUBSET NO 3
8 DOCUMENTS IN RESULT
[COMPUTER HAS SEARCHED SUBSET NO 1 FOR THE SEPARATION AGENT TOPO, FOUND 8 DOCUMENTS THAT MEET THE SPECIFICATIONS, AND HAS PLACED THEM IN SUBSET NO 3.]

.combone @↓
[user misspells the word and deletes the command by typing the symbol for at.]

RETRY: combine 2 or 3↓
ANSWERS IN SUBSET NO 4
63 DOCUMENTS IN COMBINED RESULT
[COMPUTER RESPONDS WITH A RETRY STATEMENT. user wants to place all records in a single file that contains both plutonium and thorium, or uranium but delete all records in which the fission products were separated. This file is further restricted by containing only those records where either tbp or topo was used as a separation agent.]

.look <m>='nitric acid' <i>='coefficient'↓
.end↓
[user wants to search subset 4 for all references in which nitric acid was the matrix and the distribution coefficient was discussed or given.]

SEARCHING SUBSET NO 4
ANSWERS IN SUBSET NO 5
15 DOCUMENTS IN RESULT
[COMPUTER HAS SEARCHED FOR AND FOUND 15 RECORDS THAT ANSWER THE LOOK INTERROGATION. THESE RECORDS HAVE BEEN PLACED IN SUBSET NO 5.]

.look <l>='journal'↓
.end↓
[user now asks for only those records in subset 5 that have been published in a journal.]

SEARCHING SUBSET NO 5
ANSWERS IN SUBSET NO 6
11 DOCUMENTS IN RESULT
[COMPUTER HAS FOUND 11 DOCUMENTS AND PLACED THEM IN SUBSET NO 6.]

.look <s>='americium'↓
.end↓
[user wants to search subset 6 and place into a separate subset only those records that have americium as a separated substance.]

SEARCHING SUBSET NO 6
ANSWERS IN SUBSET NO 7
4 DOCUMENTS IN RESULT
[COMPUTER HAS FOUND 4 RECORDS AND PLACED THEN IN SUBSET NO 7.]

.list au,t↓
[user asks the computer to display the author and title of the four documents that are in subset 7.]

**** SUBSET NO 7 ****

*** 463 ****
<AUTHOR>OCHSENFELD, W.; SCHOEN, J.; SMITS, D.; TULLIS, E.
<TITLE>EXTRACTION DATA FOR URANIUM, PLUTONIUM, AMERICIUM, ZIRCONIUM, AND RUTHENIUM IN THE SYSTEM NITRIC ACID-LEVEXTREL-TBP

*** 733 ****
<AUTHOR>IRVING, H.; EDGINGTON, D.N.
<TITLE>SYNERGIC EFFECTS IN SOLVENT EXTRACTION

*** 873 ****
<AUTHOR>WATANABE, K.; ONO, R.
<TITLE>THE EXTRACTION OF CURIUM AND AMERICIUM BY TRI-N-OCTYLPHOSPHINE OXIDE

*** 1059 ****
<AUTHOR>ISHIMORI, T.; RHEE, C.T.; FUJINO, T.
<TITLE>THE EXTRACTION OF AMERICIUM AND EUROPIUM NITRATES BY TRI-N-OCTYL PHOSPHINE OXIDE IN TOLUENE

*** END LIST
[COMPUTER HAS LISTED THE INFORMATION. THE NUMBERS ENCLOSED BY ASTERISKS ARE INTERNAL RECORD IDENTIFIER NUMBERS, ALSO CALLED ACCESSION NUMBERS.]

.request!
[user asks for a summary table of the results of the session.]

RESULT IN NO	SEARCH FROM NO	NO. HITS	DEFAULT LABELS	SEARCH ITEMS(S) OR REQUESTS(S)
1	0	324	ALL	LOOK <SEP SUB>='PLUTONIUM' 'THORIUM' LOOK <S>='URANIUM' LOOK NOT<S>='FPS'
2	1	56	ALL	LOOK <SEP>='TBP'
3	1	8	ALL	LOOK <SEP>='TOPO'
4		63	ALL	COMBINE 2 OR 3
5	4	15	ALL	LOOK <M>='NITRIC ACID' <D>='COEFFICIENT'
6	5	11	ALL	LOOK <L>='JOURNAL'
7	6	4	ALL	LOOK <S>='AMERICIUM'

[SUMMARY TABLE IS DISPLAYED BY THE COMPUTER.]

.address↓
[user requests a hard copy of part of the search and consequently must specify a delivery address. user desires the copy to be printed on the computer's system printer.]

DELIVERY ADDRESS: a. b. joy bin j↓
[user gives his name and indicates that the results are to be placed in bin j in room 275 of 4500N.]

ROUTE LOCAL/REMOTE ? local↓
[COMPUTER ASKS IF THE PRINTER IS LOCAL OR REMOTE.]
[user responds that it is local.]

DEFAULT AND SPECIFIED HASP CONTROLS:
SYSOUT FORM(1001) FIELD('A.B. JOY BIN J')
[COMPUTER GIVES THE ADDRESS WHERE THE MATERIAL WILL BE SENT AND INDICATES BY (1001) THAT IT WILL USE THE STANDARD BLANK PAPER.]

.subset 7↓
[COMPUTER RESPONDS WITH A PERIOD and user types the subset number he wants printed.]

.print↓
[user has completed the input and tells the computer to print the designated subset.]

PRINTED
[COMPUTER ACKNOWLEDGES THE REQUEST AND INDICATES A SUCCESSFUL COPY HAS BEEN MADE ON THE SYSTEM PRINT DISK SPACE.]

.release↓
[user should release the disk storage space that the computer allocated when the PRINT command was given. this allows someone else the use of this space.]

PRINTER DATASET RELEASED
[COMPUTER VERIFIES THAT IT HAS RELEASED THE SPACE.]

.time↓
[user asks for a listing of the elapsed time and the amount of main computer time that has been used.]

CPU(SEC) USED = 50.43 LAPSED (HR.MIN.SEC) = 00.28.01
TIME NOW = 14.40.59
[COMPUTER GIVES THE REQUESTED INFORMATION.]

.bases↓
[user asks for a listing of the public data bases.]

FILE NO	DATABASE
1	NUCLEAR WASTE ISOLATION
2	DSRS NON-WELD MISCELLANEOUS DATABASE
3	RMIC REVIEWS, COMPILATIONS, AND BIBLIOGRAPHIES
4	FIREBASE

5 COAL TECHNOLOGY
6 RMIC REFRACTIVE INDEX BIBLIOGRAPHY
7 NUMERIC GEOGRAPHIC AND SPATIAL DATA FILES
8 GYPSY MOTH CITATIONS
10 STRIPED BASS

!
[COMPUTER LISTS THE DATA BASES UNTIL user depresses the interrupt key.]

.newbase↓
[user wants to start a search of a different data base.]

DATABASE PUBLIC/PRIVATE/OTHER/STOP ? public↓
[COMPUTER RESPONDS AS BEFORE.]

FILE NO DATABASE

!

???
[user depresses the interrupt key before the first file is listed. THE COMPUTER RESPONDS WITH ???, INDICATING THE ORLOOK PROGRAM HAS BEEN DEACTIVATED. to continue with the ORLOOK program a return (↓) must be entered by the user.]

↓
[user depresses the return key.]

FILE NO DATABASE

1 NUCLEAR WASTE ISOLATION

!
[user performs the interrupt correctly.]

SELECT FILE NO: 1↓
[COMPUTER ASKS FOR A FILE NUMBER, and user selects file number 1.]

1 NUCLEAR WASTE ISOLATION
FILE NAME: TEMPORARY ** LAST UPDATE ON: 12-27-79
COMMENTS:
TECHNICAL ASPECTS OF NWI
[COMPUTER LISTS FILE SELECTED BY USER, TELLS WHEN IT WAS LAST UPDATED, AND GIVES ANY COMMENTS CONCERNING THE FILE.]

ORLOOK READY
[FILE IS READY TO BE SEARCHED.]

.labels↓
[user asks for a list of the labels of the file.]

LABELS(ABBREV)	MODE	TYPE
HEADER(H)	TEXT	LIST
INPUTEAM(I)	TEXT	LIST
LIT TYPE(LI)	TEXT	LIST
PUB DATE(P)	TEXT	LIST
TITLE(T)	TEXT	LIST
AUTHOR(AU)	TEXT	LIST
CORPAUTH(CO)	TEXT	LIST
PUB DESC(PU)	TEXT	LIST
MEAS RAD(ME)	TEXT	LIST
MEAS PAR(M)	TEXT	LIST
COMMENT(C)	TEXT	LIST
SPONSOR(S)	TEXT	LIST
STATE(ST)	TEXT	LIST
GEOGDESC(G)	TEXT	LIST
DATADATE(D)	TEXT	LIST
MENTOR(MEN)	TEXT	LIST
COUNTRY(COU)	TEXT	LIST
LANGUAGE(L)	TEXT	LIST
ABSTRACT(A)	TEXT	LIST
SUBJ CAT(SU)	TEXT	LIST
KEYWORDS(K)	TEXT	LIST
FORTITLE(F)	TEXT	LIST
DI(DI)	TEXT	LIST

[COMPUTER HAS LISTED THE LABELS.]

.subset rel(1:5)¡
[user requests to make up a subset of the first five records in the new data base.]

*** MAPPING FILE
[COMPUTER IS LOCATING THE FIRST 5 RECORDS.]

425 DOCUMENTS IN FILE
RECORDS IN SUBSET 1
5 DOCUMENTS IN RESULT
[COMPUTER INFORMS THE SEARCHER THAT 425 RECORDS ARE IN THE DATA BASE AND HAS PLACED THE FIRST 5 RECORDS IN SUBSET NO 1.]

.subset acc(423:425)¡
[searcher requests the records with accession numbers 423 through 425 be placed in a separate file.]

RECORDS IN SUBSET NO 2
3 DOCUMENTS IN RESULT
[COMPUTER HAS PLACED THE 3 RECORDS IN SUBSET NO 2.]

.list$14.47.20 JOB 306 ON INTRDR – ABC12345
JOB ABC12345 SUBMITTED TO HASP FOR PRINT

ERROR–CANNOT IDENTIFY COMMAND
[SEVERAL THINGS HAVE OCCURRED HERE. while user was attempting to list some items from subset 2, THE COMPUTER DECIDED THAT THE JOB REQUESTED EARLIER HAS BEEN SUBMITTED TO THE IBM 3033 COMPUTER FOR PRINTING. of course, ORLOOK doesn't understand the command and gives the user an error message.]

.list t!
[user asks for a list of the titles, in this case, from subset 2.]

**** SUBSET NO 2 ****

*** 423 ****
<TITLE>A PRELIMINARY ENGINEERING AND ECONOMIC ANALYSIS OF THE FIXATION OF HIGH-LEVEL RADIOACTIVE WASTES IN CONCRETE

*** 424 ****
<TITLE>FRACTURE DETECTION IN CRYSTALLINE ROCK USING ULTRASONIC SHEER WAVES

*** 425 ****
<TITLE>CEMENT TECHNOLOGY FOR PLUGGING BOREHOLES IN RADIOACTIVE WASTE REPOSITORY SITES: PROGRESS REPORT FOR THE PERIOD OCTOBER 1, 1977 TO SEPTEMBER 30, 1978

*** END LIST
[COMPUTER HAS LISTED TITLES ON THE TERMINAL.]

.stop!
[user decides to end ORLOOK sesion.]

END ORLOOK SESSION
[COMPUTER ACKNOWLEDGES TERMINATION OF SESSION.]

CPU(SEC) USED = 55.53 LAPSED (HR.MIN.SEC) = 00.36.00
TIME NOW = 14.48.58

READY
[COMPUTER IS NOW IN TSO MONITOR MODE AND ORLOOK CAN BE REENTERED.]

logoff!
[user terminates computer connection.]

ABC LOGGED OFF TSO AT 14:49:47 ON FEB 29, 1980.
[COMPUTER RESPONDS TO TERMINATION WITH LOGOFF INFORMATION.]

SELECT A SYSTEM, THEN PROCEED EXACTLY AS IN PASS TO COMPLETE LOGON.
R=RECON, T=TSO, OR TYPE H FOR HELP
[COMPUTER IS READY FOR A NEW SEARCH.]
[user may now remove his telephone from the acoustic coupler.]

6. APPENDIX B. Recognizable ASCII characters

The TSO system is designed to be compatible with the majority of terminals in use. The computer system at the Oak Ridge National Laboratory can process information from the following terminals: IBM-2741, IBM-3270, and any teletype-compatible systems. The minimum number of characters that must be available on a terminal to access the data base is the 96-character ASCII set, which is listed in Table 6.1.

Table 6.1 Standard ASCII character set

A	B	C	D	E	F	G	H	I	J	K	L
M	N	O	P	Q	R	S	T	U	V	W	X
Y	Z	a	b	c	d	e	f	g	h	i	j
k	l	m	n	o	p	q	r	s	t	u	v
w	x	y	z	1	2	3	4	5	6	7	8
9	0	!	"	#	$	%	&	'	(	)	-
@	\	=	~	|	^	[	_	Del[1]	{	]	}
+	;	:	,	.	?		<	>	*	sp[1]	

[1]Del = delete; sp = space.